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The Diversification of Deterrence: New Data and Novel Realities

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Summary and Keywords

Deterrence theory is slowly beginning to emerge from a long sleep after the Cold War, and from its theoretical origins over half a century ago. New realities have led to a diversification of deterrence in practice, as well as to new avenues for its study and empirical analysis. Three major categories of changes in the international system—new actors, new means of warfare, and new contexts—have led to corresponding changes in the way that deterrence is theorized and studied. First, the field of deterrence has broadened to include nonstate and nonnuclear actors, which has challenged scholars with new types of theories and tests. Second, cyberthreats, terrorism, and diverse nuclear force structures have led scholars to consider means in new ways. Third, the likelihood of an international crisis has shifted as a result of physical, economic, and normative changes in the costs of crisis, which had led scholars to more closely address the crisis context itself. The assumptions of classical deterrence are breaking down, in research as well as in reality. However, more work needs to be done in understanding these international changes and building successful deterrence policy. A better understanding of new modes of deterrence will aid policymakers in managing today's threats and in preventing future deterrence failures, even as it prompts the so-called virtuous cycle of new theory and additional empirical testing.

Keywords: deterrence, cyberweapons, terrorism, international crises, interdependence, war, empirical international relations theory

Introduction: New World, New Uses for Deterrence

The world has changed considerably since the Cold War. Rather than conducting duck-and-cover drills to prepare for a nuclear attack, schools now implement lockdown procedures, reflecting concerns about shootings or bomb threats. The same populations that once faced incineration in a general nuclear exchange now fret over terrorist incidents perpetrated by radicalized youths or cyberattacks initiated by murky figures located in Russia, China, or North Korea. The relative transparency of the major international threats during the Cold War era contrasts with the complexity and ambiguity of hazards of the contemporary international arena. How many of the basic insights

about deterrence inspired by Cold War events remain relevant today? How has deterrence changed in the interim? The study of deterrence has been, and can continue to be, updated to address evolving international realities.

The circumstances characterizing deterrence in the modern world are less elemental than total nuclear annihilation, but they are also more varied and complex. The supposed success of classical deterrence theory and the stability that it (may have) produced, set the scene for today's multifaceted deterrence environment. U.S. hegemony after the Cold War forced its near-competitors to pursue new modes of conflict that skirt the constraints imposed by the classical model. The United States, the North Atlantic Treaty Organization (NATO), Japan, South Korea, and other stable states now face adversaries whose actions are more difficult to detect and control.

An increasing number of countries also possess nuclear capabilities, latent or overt,[1] even as Western governments are forced to confront a more diverse set of antagonists exercising a wider range of strategies involving terrorism, insurgency, and cyberattacks. Practitioners have taken up the language of deterrence to define their own and others' behavior in these new contexts. For example, President Barack Obama's Comprehensive National Cybersecurity Initiative requires the United States to define and develop deterrence strategies and programs (Executive Office of the President, 2010). Think tanks such as the Council on Foreign Relations publish reports on how to deter terrorism (e.g., Kroenig & Pavel, 2012). The demand for novel and insightful research on deterrence is high, and the supply of quality analysis—after a hiatus following the collapse of the Berlin Wall—began to grow again in the wake of the 9/11 terrorist attacks.

The core concept of deterrence is as old as the organized practice of war. It rests on a simple but profound paradoxical insight: the ability to harm can be used to prevent harm. Specifically, the anticipation of harm can be used to fashion strategies that prevent war, lower costs, maintain the status quo, or generate influence generally. Nation-states and other lesser political actors need not actually deny or punish another entity in order to protect themselves, secure their allies, or win arguments. Recognition of the fundamental psychological relationship between force and influence freed nuclear strategists from the conceptual constraints imposed by earlier theoreticians, allowing them to enunciate what competent practitioners had long understood. International politics is frequently conducted through the shadow of force. It is—to reverse Carl von Clausewitz's classic equivalence—the continuation of war by other means.

As early as Thomas Hobbes, classical philosophers introduced the mechanisms now known as *deterrence theory*. The social contract, discussed in Hobbes's *Leviathan*, may be considered an implicit deterrence relationship. If the punishment for a crime is greater than the benefit that comes from committing the crime, as Hobbes insists it must, then deterrence can exist. Quester (1986) points out similarities between the Cold-War–era study of deterrence and decisions concerning aerial bombardment in World War II. Nevertheless, scholars generally agree that explicit theoretical framing of deterrence in its current form stems directly from the nuclear era. According to Jervis (1979, p. 290), "it is hard to imagine that deterrence theory could have grown so rapidly if it had not been for the cold war." The mechanisms described in classical models of deterrence thus were built for and around that unique period. Morgan (2012, p. 86) notes the sudden increase in systematic thinking about deterrence after the invention of nuclear weapons, when "[d]eterrence became critical, not for preventing wars of any sort but for preventing those that could be unusually violent and destructive."

Deterrence theory subsequently drove much of strategic thinking throughout the second half of the 20th century. The RAND Corporation's pathbreaking research on deterrence was read widely in policy circles. Henry Kissinger, one especially prominent RAND consultant, argued so persuasively for deterrence as a key token of Cold War policy that President Richard Nixon hired him as national security advisor and, eventually, secretary of state. Other

contemporary scholars, such as Thomas Schelling, Paul Nitze, and George Kennan, were also influential in the U.S. policy community throughout the Cold War (Thompson, 2009). During the Cold War, deterrence scholars played a special role, helping policymakers navigate the dangerous and unknown terrain of nuclear detente with the Soviet Union.

Since the end of the Cold War, scholars have begun using basic concepts from deterrence theory to address emerging international problems in new ways. The RAND Corporation recently issued a report considering the lessons learned from a series of international crises and addressing how these lessons can be applied to understand contemporary problems (Delpech, 2012). The report highlights cases of previous use of deterrence strategies. President John F. Kennedy's actions, first during the Berlin crisis and later during the Cuban missile crisis, constitute classic scenarios of deterrence success (Allison, 1969). Despite Nikita Khrushchev's overt threats, the United States managed to contain nuclear aggression in part by developing and threatening the use of second-strike nuclear retaliatory capabilities. Fortunately, the Soviet leadership backed down in 1961 before the United States resorted to a plan, proposed by Thomas Schelling, of "firing a nuclear warning shot over some isolated location in the USSR" (Delpech, 2012, p. 66). The Russian decision to deescalate reflected in part a supposed missile gap favoring the United States. The number and type of nuclear weapons, along with strategy itself, may thus be important factors in deterrence success (Kroenig, 2013). Other commonly referenced examples of successful nuclear deterrence come from South Asia, where India and Pakistan have fought four conventional wars and have experienced a number of smaller disputes as well. The existence of nuclear weapons on both sides of the rivalry has been a factor influencing both stability and instability in the region (Narang, 2010).

Even as deterrence theory represented an important evolution in thinking about international affairs, other aspects of deterrence have remained opaque or underexplored. The classical model seldom has much to say about how deterrence is actually practiced and produced. Consequently, many of the most important debates that have emerged in the study of nuclear deterrence in particular, such as the consequences of nuclear proliferation under psychological biases and organizational weaknesses, can be considered empirical in nature. Even basic assumptions and definitions of deterrence can vary by state and therefore are based on an empirical understanding of the outcomes that states (in the past, the Cold War superpowers) seek. As deterrence theory has evolved from its Cold War roots, it has increasingly sought to envelop empirical realities into its theoretic underpinnings. This has benefitted scholars and policymakers alike. Despite recent gains, there remains a considerable amount of room for empirical realities to further inform our understanding, study, and practice of deterrence.

Empirical research on deterrence offers at least three new sets of insights. Each insight emerged initially as a critique of the basic assumptions of the original theory. First, tension between theory and practice has led scholars to explore the importance of means and question the assumed exceptionalism of nuclear weapons. Recent scholarship suggests that considering unexplored variation within weapons systems (e.g., Kroenig, 2013; Gartzke, Kaplow, & Mehta, 2014; Fuhrmann & Sechser, 2014) and across asymmetric dyads (e.g., Rauchhaus, 2009; Beardsley & Asal, 2009) can lead to new predictions and clarifications of classical deterrence. Only by empirically considering these sources of variation can scholars really learn the mechanisms leading to deterrence success or failure. Further, empirical research on variation within and between weapons systems gives us a better idea of the scope conditions of deterrence theory. Is successful deterrence limited to those bleak scenarios of mutually assured destruction (MAD) and the nuclear holocaust for which explicit theories were created? Or is successful deterrence possible in the absence of MAD, such as in the cyber realm? The answers to these questions must involve an empirical component and will help scholars and policymakers alike. The effectiveness of the means that states use to deter depends on the mechanisms of the theory and is key to deterrence and policy success.

Second, empirical research has led scholars to consider new types of actors, including variations across states themselves. The origins of deterrence research in the early Cold War era led formative thinkers on the subject to a narrow focus on bilateral unitary actors. However, more recent deterrence research has created new models of three-party deterrence (Quackenbush, 2006B) and more general models allowing goals to vary from the original "chicken" formulation (Kilgour & Zagare, 1991; Zagare & Kilgour, 1993, 2000). These modifications to deterrence theory were partly driven by scholars' observations of a new empirical reality that does not match the framework used in early versions of deterrence. Similarly, criticism of policy pronouncements made by deterrence hardliners, such as Waltz (1981) and Bueno de Mesquita and Riker (1982), arguing for some benefits of increased nuclear proliferation, were informed by empirical realities. For example, Sagan (1994) noted accidents at and break-ins into nuclear facilities, suggesting that the unitary actor assumption may blind us to empirical realities. Debates like these require further empirical study to refine and resolve.

Third, empirical research in deterrence theory has allowed scholars to reconsider and broaden the international context, such as the crisis environment. Crises don't emerge from a vacuum, and the international context that may have led to a crisis is important for understanding how crises evolve and resolve themselves. Insights by Morgan (1977) and George and Smoke (1974) eventually led to newer theoretical models like the selection model of Fearon (2002), which formally addresses the fact that crises only occur in the first place when general deterrence has failed to some extent. Without empirical debates on case selection (e.g., Lebow & Stein, 1989; Huth & Russett, 1990; Lieberman, 1994; Fearon, 1994; Bar-Joseph, 1998), scholars would not have updated definitions of what does and does not constitute deterrence success. These definitions remain incomplete; it will be empirical investigation that allows us to continue filling the voids in our knowledge and eventually leads to a fuller understanding of this subject.

Updating the study of deterrence to better reflect new means, actors, and contexts of the contemporary world is an ongoing process. It is not until recently, however, that deterrence theory has begun keeping up with new empirical understandings of the international environment. Scholars still lack a full theoretical and empirical understanding of the mechanisms leading to deterrence success and failure in non-MAD, nonbilateral situations. Such an understanding must consider previous empirical findings on variations within and between means, actors, and crisis environments. This will help scholars create and test new theories and allow policymakers to better use scholarly insights to create informed policy. No doubt, theory and evidence will continue to interact in new ways in the future study of deterrence.

Deterrence Theory and Empirical International Realities

It is not difficult to understand why classical deterrence theory struggles to explain and predict phenomena in today's complex world. The Cold War environment offered little incentive for deterrence scholars to consider situations outside a bipolar nuclear context. It was practical for early strategists to make strict assumptions in order to discipline their thinking and confront the terrifying realities of the nuclear age. Serious academic study of deterrence as a modern concept stems more or less directly from the detonation of early nuclear devices in peace (Trinity, Bikini) and war (Hiroshima, Nagasaki). First-wave theoreticians called for a new logic of security (Brodie, 1946) and foreign policy in the atomic age (Kissinger, 1957). The primary dilemma was how to practice security and politics with a weapon whose use was nearly unthinkable. The early U.S. monopoly on nuclear arms meant that nuclear deterrence was not an issue. However, the now-familiar concept of MAD began to evolve

throughout the 1950s, as the Soviet Union initially tested and then fielded a growing nuclear deterrent (Russell, 1959).

The prevailing theme of the earliest deterrence scholarship was one of uncertainty. The international system was in a state of flux in the immediate aftermath of World War II. Global thinkers had big questions about the future, many of which had nothing to do with nuclear weapons. Would the United Nations go the way of the League of Nations before it, or would it yield at least a modicum of international cooperation? How could Europe work to prevent World War III? Would ideologies of fascism, communism, and democracy continue to spread? As if these questions weren't complicated enough, "[t]he atomic bomb upset the timetable" for addressing them (Chamberlain, 1946, p. 443). Physicists and policymakers predicted the proliferation of these weapons and felt the need to answer lingering questions about global order before it was too late. In the mid-1940s, scholars were forced to consider the future of nuclear weapons without knowing the global structure or institutions that would emerge after World War II.

As the focus of deterrence scholarship gravitated toward nuclear weapons, empirical scholarship became increasingly difficult to carry out. Nuclear weapons were even rarer then than they are now. The quantitative tests that many of today's most enterprising scholars are able to employ were all but impossible in the 1940s. With the focus on such a rare event, the thought experiment became the prevailing empirical strategy. This would change little until later.

Modern forms of deterrence research, on the other hand, are beginning to make and test predictions about new types of weapons, processes, and relationships. This is at least partly due to changes in empirical realities making powerful weapons more common. Yields on nuclear weapons can be reduced to the level of extremely large conventional explosives. At the same time, advances in deployment, targeting, precision, and command and control make it possible for certain conventional weaponry to have strategic effects. Russia has already made it clear that a nonnuclear attack on its nuclear deterrent capabilities would be treated as nuclear aggression. Differences between conventional and nuclear weapons remain, but these are often characterized as normative, rather than military (Tannenwald, 2007). However, the increasingly diverse list of situations being applied to deterrence suggest that scholars are also becoming creative in the data that they are collecting and cases that they are considering. Even as practitioners grapple with applying traditional deterrence concepts to new actors, means, and contexts, scholars has been slow to reorient to the new demands and opportunities for research extending the deterrence envelope.

The sections that follow outline the three ways in which the empirical study of deterrence has allowed the field to evolve over the past half-century. The article also suggests avenues in which current or future empirical work could drive the field further forward. New contexts, new actors, and new means of warfare are reshaping our world, but deterrence theory has been slow to keep pace. This failure to evolve is detrimental to both scholarship and practice. A more contemporary understanding of deterrence would benefit the academic community by creating new opportunities for empirical research. Such research in turn would help the policy community respond to today's threats and prevent future deterrence failure. How actors fashion and respond to deterrence threats depends on the nature of those threats and on the information that particular kinds of deterrent threats or actions convey or conceal. What follows is a discussion of these and other issues about updating deterrence.

The Means of Deterrence: Nuclear Exceptionalism and Emerging Domains

What is it that makes nuclear weapons so special as implements of deterrence? Theorists like Jervis (1979) have argued that nuclear weapons deter because they can impose tremendous harm. It is much less critical that the probability of nuclear attack is very low if the cost of such an attack is extremely high. If this is the aspect of nuclear weapons that sets them apart from other types of weapons, then similar outcomes should be seen for very powerful conventional weapons. In essence, much of classical deterrence theory assumes that the most powerful weapons produce the best deterrence due to their larger imposition of harm. An ideal empirical investigation of this theory would test, in several ways, the importance of costly action in crisis bargaining. Potentially, all types of costs could be considered similarly, and the state willing to pay the highest costs would win out in a crisis. This assumption is seldom held up to empirical testing.

However, cost is not the only element separating nuclear from conventional weapons. Nuclear weapons are powerful—not only materially, but also as a clear signal of capacity. Because they are highly visible and can easily be revealed to an adversary without much affecting the potential effectiveness of their attack, nuclear weapons make a state's true power easier to estimate. In this sense, it may be the visibility, not the cost, of nuclear weapons that allows them to function well as a deterrent. Deterrence, of course, requires visibility; one cannot deter with weapons or capabilities that remain unknown to an adversary, no matter how lethal these obscure capabilities might be. However, some weapons or capabilities must remain secret to be effective. Before its 1941 attack on Pearl Harbor, Japan could not reveal its critical military innovations—near-surface aerial torpedoes and a highly innovative plan of attack—to its adversary in an effort to compel the United States to return to a neutral policy stance in the Pacific. Doing so would have allowed American forces to better defend against Japan's planned attack and undermined Japanese initiative. Therefore, weapons or other capabilities that can be disclosed to an adversary are better at reducing uncertainty and achieving the deterrence objective of avoiding war.

This implies a new hypothesis: extremely visible weapons are better at deterring aggression than less visible weapons. Once again, this is empirically falsifiable by examining the visibility of states' crisis strategies to determine whether the most visible strategies make the best deterrents. A general theory of deterrence would allow scholars to determine whether nuclear weapons are especially useful for deterrence because of the costs that they promise to impose, whether because of their visibility or for some other reason. Empirical research can play a role in testing such a theory. This more general theory might also account for why and how concerns about credibility can be overcome, at least in part. By training existing theories on nuclear weapons, deterrence theorists appear to have addressed the role and special attributes of nuclear capabilities by assumption. A more general theory, and tests of that theory, relax assumptions about means and can instead consider how means matter for deterrence, or compellence, success.

Conventional weapons, and even nonmilitary solutions, have increasingly become a part of deterrence practice but have yet to be carefully considered as broadening existing deterrence concepts. This is in part because of the success of nuclear deterrence that other modes of interaction have become more salient and numerous, as both states and nonstate actors seek ways to pursue their interests (or stymie those of opponents) in a world where total war is no longer tenable. Scholars have clearly been concerned in the past with the role of conventional weapons in generating deterrence. Mearsheimer (1983) makes the case that certain types of weapons—such as precision-

guided munitions—can change the way that conventional deterrence works by blunting or accentuating offensive advantage. More such broad theoretical and empirical work is needed.

Note that this need for additional insight follows directly from an evolution of practice in the Cold War. Early after World War II, the United States assumed that nuclear dominance would be more than sufficient to meet its security needs. The shortcomings of nuclear deterrence became clear, however, as U.S. officials were unable either to deter aggression in places like Eastern Europe or to convince themselves or adversaries that the use of nuclear weapons was imminent. These concerns came to a head during the Korean War, which forced the United States to remobilize.

The border between nuclear and conventional deterrence has yet to be delineated, and boundaries between other capabilities and military domains may be understood even less. How can emerging technologies and areas of operation, such as space and cyberweapons, be used to deter attack elsewhere, or alternatively to fight a successful war? Which attributes of weapons or capabilities make them more or less valuable for deterring certain types of aggression? Given the increasing complexity of modern warfare, deterrence theory faces a new set of questions and challenges that current research has barely begun to address.

Scholars of deterrence throughout the past half-century have considered, either explicitly or implicitly, the means that states use. However, little empirical research has been used to distinguish the applicability of the assumptions set by these theories. Thomas Schelling, the second-wave scholar most commonly credited with the development of deterrence theory, took important steps in defining the importance of nuclear weapons. In doing so, he created a whole new set of potential hypotheses to test. Schelling (1966) proposed that nuclear technology had changed the face of warfare in at least two areas:

- **Timing:** Nuclear weapons make destruction happen faster, making it harder to recover from a bad decision.
- **Civilians:** Nuclear weapons change civilians' relationship to war by potentially putting them closer to direct action.[2]

He was skeptical that nuclear weapons created as much of a revolution in warfare as previous theorists claimed, arguing, "Against defenseless people there is not much nuclear weapons can do that cannot be done with an ice pick" (Schelling, 1966, p. 19). In Schelling's view, the exceptional nature of nuclear weapons only had to do with (a) how quickly the weapons can be used and (b) the fact that, unlike an ice pick, nuclear weapons cannot be separated from civilians by a line of trenches. In questioning the supposed dichotomy between nuclear and conventional weapons, Schelling examined the root differences between two means of defense. In so doing, he laid the groundwork for scholars to theorize how deterrence strategies may be applicable to different means of warfare.

Schelling's insight was that the unique features of nuclear weapons resulted from the defenselessness that they engender in the population. This insight, like the ones given previously, can be stated in the form of a hypothesis and empirically verified. Because of both the timing and the direct access to civilians that are characteristic of nuclear weapons, they are especially difficult to defend against. Presumably, then, other weapons that limit defense, although perhaps not to the same extent, can be powerful for deterrence. Schelling also implies that the strength of nuclear weapons lies in being very visibly difficult to defend against. For example, cyberweapons may be equally difficult to defend against, but the vulnerability that they create is less visible than that of nuclear weapons. This difference highlights the importance of deterring nuclear weapons and explains why these types of weapons are such powerful tools for deterrence. Not only are nuclear weapons necessary to deter due to the defenselessness they create, they are also remarkably deterrable due to the visibility of this defenselessness.

Some of Schelling's contemporaries showed a similar skepticism about the universal distinctiveness of nuclear weapons. Wohlstetter (1958) considered variations in the usefulness of nuclear arsenals for deterring attacks. He argued that many deterrence theorists "have talked too much of a strategic threat as a substitute for many things it cannot replace" (Wohlstetter, 1958, p. 230). Wohlstetter claimed that some types of nuclear weapons can substitute for conventional capabilities and argued for deeper consideration of the differences between nuclear and conventional technologies. While the second wave of deterrence theorists considered nuclear technology as an important new development in the practice of war, many rejected the previous consensus of a strict qualitative difference between nuclear and conventional weapons.

This painstaking second-wave analysis of the exceptionality of nuclear technology was never empirically tested. Instead, it was turned into assumption by later scholars. Much of the third wave of deterrence theory simply asserted that nuclear weapons were special, without theorizing why or testing that assertion. Rather than revisit the assumptions of deterrence, they identified the outcomes that would logically follow if these assumptions were true. In doing so, scholars like Waltz (1981) and others championed a resurgence of deterrence theory back into the policy realm, without simultaneously grappling with the mechanisms of the theory. Waltz, for example, implicitly assumes that all nuclear weapons are perfectly substitutable for each other, but not for any conventional weapon. This extremely strong assumption ignores the fact that some nuclear weapons are more visible or costly than others, and that not all nuclear or conventional weapons are equally efficient signals. It also ignores complementarities among weapon types. If signaling resolve is indeed the most important aspect of deterrence, then future empirical work should consider the signaling properties of weapons, not simply on their nominal nuclear status. Conversely, if signaling is unimportant, then it is not clear why, for example, nuclear deterrence could be used as a partial substitute for declining U.S. defensive capabilities in Europe and elsewhere.

Although he arguably focuses on the wrong variables, Waltz's assumptions unwittingly highlight the importance of means in deterrence theory. His theory of deterrence is inherently intertwined with nuclear symmetry. According to Waltz and other proponents of the nuclear peace hypothesis, the nuclear domain is unique, and crossing from conventional to nuclear weapons is largely impossible. One cannot use conventional threats to deter nuclear attack. Taking nuclear deterrence theory to its logical extreme, Waltz argues that the proliferation of nuclear weapons can actually benefit international stability. Because states will do anything to avoid MAD, an increase in nuclear weapons will make all states less likely to use these weapons.

Bueno de Mesquita and Riker (1982) further elucidate this same basic insight in a formal model. The authors even advocate a global policy of "selective nuclear proliferation" in which nuclear asymmetries—and therefore incentives to use nuclear weapons—are eliminated. Scholars also use models of nuclear deterrence to argue against policies of defensive nuclear technology (Brams & Kilgour, 1988), work that has since been countered both theoretically and empirically using new models of deterrence (Quackenbush, 2006A; Quackenbush & Drury, 2011). A key assumption in all this work is that there is an important qualitative difference between nuclear and conventional means of deterrence.

This literature has its critics. However, most of these critics do not focus on the implicit assumptions about the importance of means, much less test the assumptions empirically. Instead, they fall into two main categories, each posing attacks on the unitary actor assumption employed by Waltz and others. First, organizational theorists highlight inherent inefficiencies and organizational pathologies that the authors argue are destined to generate accidents. According to Sagan (1994) and others, domestic actors often differ in their incentives from the state as a whole. Sagan argues that if rogue actors were to gain access to nuclear weapons—a danger that becomes

increasingly likely as more weapons come into existence—they would be likely to use them rather than simply threatening to do so. Deterrence is likely to fail in the face of rogue actors, thus risking rather than inhibiting nuclear war.

This criticism was taken up more vigorously after the terrorist attacks of September 11, 2001, and the revelation that Pakistani nuclear physicist A. Q. Khan had been selling nuclear secrets to the highest bidder. By creating a theory that ignores the possibility of accidental war, Waltz and others advocate policy actions that could lead to deterrence failure and nuclear catastrophe.[3] Poor domestic safeguards of nuclear weapons may leave something to chance, but in the absence of signaling power, they do not benefit a state's deterrence capabilities. In this case, the "threat that leaves something to chance" may fail depending upon the visibility of the means that are used.[4]

A second group of critics of Waltzian nuclear optimism question the rationality of state actors themselves. Jervis (1988A) highlights the role of misperception in guiding responses to nuclear threats. He introduces the idea of arms race spirals resulting from mutual fear and misunderstanding, which can result in accidental nuclear war if actors choose to act preemptively to prevent a first strike from an adversary.[5] Posen (1991) goes on to highlight the dangers of inadvertent escalation leading states from conventional to nuclear policies. Other scholars simply present the possibility of myopia, in which short-sighted sovereigns may not be willing or able to consider the long-term consequences of their actions. However, few researchers have questioned the corollary of Waltz's assertion: it is really true that threats outside the nuclear domain are useless for deterring nuclear attacks? Theories of deterrence that cross typical domains of warfare are scarce, and empirical tests even scarcer.

A few critics of Waltz have begun to address this problem by questioning the exceptionality of the nuclear domain. Mueller (1988) claims that nuclear weapons make little difference to world affairs.[6] Once more, the confusion in the third-wave literature about (a) the role of nuclear weapons in preventing war and (b) whether nuclear weapons make any difference at all highlights the need for more direct theorizing of the role of means in deterrence. As one of many potential means of carrying out deterrence policy, nuclear weapons may indeed have different outcomes from other types of weapons. However, how and when they differ, as well as which other types of weapons have such implications, remain unknown.

Waltz was not the only scholar to use Schelling's work as an assumption rather than a hypothesis. Other third-wave literature implicitly questions the ability of deterrence to cross domains in the other direction. Powell (1990) formally questions the credibility of threatening nuclear retaliation to a conventional attack. His work is one of the first formal descriptions of the stability-instability paradox. A term coined by Glenn Snyder, the *stability-instability paradox* highlights the futility of using nuclear weapons to deter conventional war. According to this paradox, the more stable nuclear deterrence is between two states, the more likely that these states will resort to conventional warfare because they do not fear nuclear escalation.

The very fact that deterrence works in the nuclear domain creates an unstable conventional relationship. While this has been well theorized and even empirically tested (e.g., Rauchhaus, 2009) in the nuclear domain, little research has considered the crossover to other types of weapons. If nuclear retaliation is not a credible response to conventional attack, is the threat of a cyberattack or space response more credible? Because the credibility of a response likely varies with type as well as intensity (are small nuclear attacks more acceptable than large conventional ones?), it is important to consider all combinations of attacks and counterattacks in deciding policy options. This requires a more generalized theory of deterrence that is better capable of spanning different types of means and operational domains than what is available today.

Only recently has fourth-wave deterrence scholarship begun considering heterogeneity within and between weapon types. However, there is still much work to do in establishing and testing the mechanisms behind the different means of carrying out deterrence. Interestingly, although this literature considers new ways in which novel means or strategies may be used to challenge the status quo, researchers have largely failed to consider the possible heterogeneous effects of the various means that status quo actors use to deter or otherwise address these threats.

If it is indeed the case that threats and means are intertwined—as nuclear deterrence theorists largely seem to assume—then the means that states use to deter cyberthreats, terrorism, or both may have changed in unpredictable ways. In addressing new threats, ignoring means becomes especially problematic. Is it important that the means that states use to deter be symmetric to the threat itself, as the stability-instability paradox would imply? Or do threats need to be visible, regardless of what states are deterring, as bargaining theory would argue? Fourth-wave deterrence scholars have yet to address heterogeneity in the means of deterrence, even as they apply deterrence concepts to an increasingly heterogeneous group of behaviors.

Fourth-wave deterrence theorists tend to focus on how to deter new types of threats, especially terrorism, in an asymmetric environment (Freedman, 2004; Trager & Zagorcheva, 2005). A recent return to the study of deterrence by denial (Jenkins & Davis, 2002) has created room for scholars to evaluate different deterrence strategies for various scenarios. Some fourth-wave theorists have begun calling for more theory of the specific motivations and acts of deterrence. For example, Knopf (2010, pp. 26–27) argues that "there is a need to differentiate and be clearer about the intended goals of a deterrence strategy . . . The fourth wave could contribute more to policy debates if it gave more careful consideration to the question of what actions should be the primary focus of a deterrence strategy." He further indicates a need for more theory on which specific policies need to be deterred and how to deter them. This lays the groundwork for future research differentiating between means of deterrence.

Empirical research in the fourth wave is increasingly quantitative and methodologically rigorous and has begun differentiating nuclear and other types of weapons. Beardsley and Asal (2009) find that nuclear states tend to win in crises and have shorter crises to begin with, although unlike Rauchhaus, they do not look at the other aspect of deterrence: prevention of war. Kroenig (2013) assesses the importance of nuclear supremacy in immediate deterrence situations, finding that the size of a nuclear arsenal may be an important factor in deterrence success (defined by "victory" in a nuclear crisis). Gartzke et al. (2014) find that nuclear force structure varies based on the unique attributes of a state, and Fuhrmann and Sechser (2014) find that nuclear deployment plays a role in the credibility of signals. In short, heterogeneity in the number, type, and use of nuclear technologies affects crisis behavior. Contrary to what Waltz and his contemporaries assumed, all nuclear forces are not perfect substitutes for one another.

Nuclear deterrence may even be possible in the absence of nuclear weapons. A new set of fourth-wave scholars have begun considering yet another area of particular concern for policymakers: nuclear latency. This work suggests pathways by which countries have the power to deter without having tested a single nuclear bomb. Simply being able to display the potential to create nuclear weapons may be enough to give states a unique international status.

Fuhrmann and Tkach (2015) show that states with the potential to create nuclear weapons are less likely to be targeted militarily. This adds another dimension to the nuclear-nonnuclear dichotomy that has driven so much deterrence research. It also provides more opportunities for scholars to begin testing theories of the means of deterrence. This empirical agenda once again highlights the need for theories that differentiate between and within

means. If the number and type of nuclear weapons in a state's arsenal are factors influencing deterrence success, then the number and type of conventional, space, and cyber weapons should be important as well. An increasing interest in the crossover between nuclear and conventional forces highlights the field's need for a theory of means in bargaining and deterrence.

The Actors of Deterrence: Heterogeneity in Means and Ends

Deterrence implies trade-offs, and recent empirical work has begun considering heterogeneous actors and their decisions in these trade-offs. Deterrence really involves at least three objectives: (a) decreasing the probability of war, (b) maintaining the status quo, and (c) minimizing the cost of providing security. It is understandable why early deterrence theorists failed to distinguish or consider these three objectives separately, much as earlier strategists treated deterrence under the rubric of defense. Nuclear weapons were new at the time, and their nonuse —along with peaceful detente—was the status quo. Deterrence theory in its early years was tailored toward the prevention of nuclear war. An intimidating nuclear capability also meant that the United States in particular could exert influence internationally without maintaining large standing armies abroad, thus dramatically lowering the cost of security. But while these goals may have gone hand in hand in the early Cold War, their complementarity is not inevitable.

It is possible for states to seek to preserve the status quo by exhibiting a willingness to endure war, or to avoid war by compromising on the status quo (Sechser, 2015). Costly signals can demonstrate a state's resolve while at the same time decreasing its prospects for success in the event of a battle (Slantchev, 2011). Conversely, failing to signal can increase an actor's share of an eventual bargain while simultaneously increasing the risk of war. The classical model is not clear about how such actions should be treated in deterrence terms, or how nations should treat the tradeoffs that they imply. If a nation's primary goal is to maintain its international standing, then a compromise might be deemed a failure. However, discretion that averts a major contest, even nuclear war, might also be considered a success.[7]

The Cuban missile crisis is often presented as an iconic example of deterrence in action. The United States gave very little ground and, at a low cost, managed to maintain a peaceful status quo. However, even in this example, neither party was able to achieve all its goals. Both nations chose to make at least some concessions. Indeed, most cases of so-called deterrence success seem to involve at least some compromise. The questions then become: At what point are the concessions too much? When has a deterring state given up so much that it has failed at deterrence? Huth (1999, p. 28) argues that when states make far-reaching concessions, they have at least partially failed at deterrence, claiming:

> If armed conflict is avoided at the price of diplomatic concessions to the maximum demands of the potential attacker under the threat of war, then we cannot claim that deterrence has succeeded.

Huth's definition of success requires both a status quo bargain and the prevention of war. This is in direct contention with contemporaneous literature on bargaining and war. According to Powell (1999), for example, when the distribution of goods between states does not equal the distribution of power, either costly conflict or a new bargain is necessary. Based on Powell's model, then, Huth's definition of deterrence would often be impossible for states to achieve. The fact that the most prominent empirical analysis and definition of deterrence consider bargaining to be a failure is further evidence that bargaining and deterrence exist in parallel theoretical

universes, even as the two must clearly coexist in the policy sphere. The intertwining of these two aspects—war avoidance and reversion to the status quo—was common in definitions of deterrence throughout the third-wave literature.

Actors' incentives to maintain a status quo distribution of goods may be inimical to their desire to decrease the probability of war. Overrepresenting one's resolve or capabilities in order to gain a better bargain also increases the probability that an adversary will balk or correctly identify bluffing or misinformation. Given that states often face a trade-off in their goals for deterrence, it becomes reasonable to examine how states should and do act given their specific goals. Such inquiries require us to develop new hypotheses that can be empirically tested with existing data about heterogeneous state capabilities.

Recent deterrence literature has provided some new empirical work in considering the diverse goals and strategies of state and nonstate actors. Based partly on empirical work from the third wave, Kilgour and Zagare (1991) and Zagare and Kilgour (1993, 2000) present models of "perfect" deterrence in which a bipolar world with nuclear weapons is only a special case. In doing so, they suggest that deterrence does not require the international structure or technology that inspired deterrence theory in the first place. They find that the "chicken"-like preferences that deterrence theorists have been assuming since Schelling do not always describe states' interests in a crisis. Rather, behavior and outcome of a deterrence strategy depend upon the structure of the game. According to Zagare and Kilgour (2000, p. 19), "by uncritically embracing the Chicken analogy, this group of classical deterrence theorists takes as given many of the major propositions of structural deterrence theory!" Their work has since been tested and expanded (Quackenbush, 2006A, 2010, 2011A, 2011B).

The major difference between the assumptions in perfect and classical deterrence theories is the heterogeneity of the actors' preferences. Perfect deterrence theory allows states to vary in their preferences over backing down and fighting—a better reflection of states' actual interests and a closer fit to previous historical studies of deterrence (Trachtenberg, 1991). Heterogeneity of preferences, however, should and does go hand in hand with heterogeneity of means. Perfect deterrence theory does not engage the heterogeneity of means. Instead, it follows the lead of classical deterrence theorists, avoiding the question of how states carry out deterrence. By ignoring heterogeneous means, perfect deterrence theory continues to ignore a major source of heterogeneity between states. Depending on which means a state has at its disposal, it may choose to signal resolve in different ways. Future theories of deterrence must address this fact.

Empirical scholars have also begun considering new types of actors in deterrence. Freedman (2004) and Trager and Zagorcheva (2005) ask whether terrorism can be deterred using current strategies. A recent return to the study of deterrence by denial (Jenkins & Davis, 2002) has allowed scholars to consider new ways of deterring these types of complex threats. Responding to theoretical work highlighting the asymmetry of deterrence, recent empirical work has also begun studying deterrence in asymmetric dyads. Rauchhaus (2009) finds symmetry in nuclear power to be an important factor in outcomes of violence (just one of the two components of deterrence). This indicates a need for more careful theorizing of how symmetry between states matters in other domains.

Although deterrence is designed to promote the status quo by definition, different status quo objectives (ends) can be promoted through different deterrence means. Quackenbush (2006B) examines three-party deterrence, noting the changing polarity in the international system. All these scholars are responding to changes in the relevant actors in the international system. More empirical work should focus on how these actors may respond differently to the strategies of classical deterrence.

The Context of Deterrence: Selection into the Crisis Environment

The original theory of deterrence begins with two states in a crisis situation. The question of how these states got themselves into the crisis to begin with is left unanswered. This created problems for empirical researchers attempting to select a set of cases to determine the causes of deterrence success. Both quantitative and qualitative researchers were driven into intense methodological debates about the types of selection bias faced by each methodology. Later theories of deterrence would begin to address the crisis environment more carefully. However, much work remains to be done in exploring the mechanisms of deterrence for new types of dyads. The international context, including the networks of states and the interdependence of actors, has surely shifted expectations about when and where crises should emerge. Physical and normative constraints have shifted the credibility of nuclear, or even conventional, retaliation. These changes, in turn, must be considered when examining the situations and strategies that make for successful deterrence.

Empirical scholars selected cases of attempted deterrence in different ways. Much of the third-wave empirical literature relied upon comparative case studies—an approach to research that poses various challenges as well as opportunities.[8] While the small sample of nuclear states lends itself to qualitative approaches, structural and contextual factors, including selection for nuclear status, strategic interaction among nuclear powers, and other factors, make inferences of any form in this setting difficult.

Even as these methodological issues were being debated, quantitative studies of deterrence were already cropping up. The emergence of a quantitative literature created new debates of its own. Huth and Russett (1984) create a formal model of deterrence success and later test several hypotheses on a data set of international crisis events (Huth & Russett, 1988). In further empirical work, Huth (1988) tests the impact of military capabilities and nuclear weapons on the success of immediate deterrence in crises. He finds that nuclear weapons don't empirically make much difference, but immediate-term military capabilities and past deterrence strategies do, probably through reputation. Fearon (1994) later criticizes Huth's theory and methods. In this and later work (see Fearon, 2002), Fearon points to the importance of the threat environment in the initial creation of a conflict. In cases where conflict does not occur, deterrence may have already worked. A few scholars have extended this research more recently,[9] but little work has explicitly outlined the role of nuclear status in shaping bargains rather than the probability of war.[10]

Much third-wave scholarship considers the endogeneity of the crisis environment. The question of what happens before a crisis exists has led scholars toward further refinements of deterrence theory. For example, Morgan (1977) notes the debates regarding case selection and selection bias[11] and develops a distinction between general and immediate deterrence. In general deterrence, states use threats of retribution to deter any form or threat of aggression from potential adversaries. Once general deterrence has failed, states enter a situation of immediate deterrence, in which they make threats in a crisis. George and Smoke (1974) draw from a similar insight in creating separate theories of deterrence "initiation," "commitment," and "warning and response." States will challenge deterrence, allowing themselves to face a security crisis, only if they do not believe or regard a general deterrent threat.

The endogeneity of the crisis environment is an important consideration in formal deterrence theory and empirical testing. Both quantitative and qualitative research designs suffer from selection bias in choosing immediate deterrence crises, a fact that Fearon (2002) confronts formally. However, integrating bargaining theory into

deterrence models would address selection bias in a new way. Allowing states to bargain their way into an immediate crisis would highlight the role of incomplete information and costly signaling in creating a crisis that may result in war. Just as the visibility of signals can play a role in immediate deterrence, signaling is also important before a conflict even begins. Different force structures can differentially create crises, just as different force postures can differentially turn a crisis into war. The means of deterrence are important at both the general and the immediate level.

Conclusion: Relaxing the Assumptions of Classical Deterrence

The empirical literature on deterrence has made great strides in informing deterrence theory and practice, but much remains to be done. Recent changes in the international system have challenged scholars to relax the original assumptions of deterrence theory and to begin studying new contexts, actors, and means. In considering the international contexts in which states find themselves immersed in crises, scholarship has moved toward a more general understanding of interactions and deterrence before a crisis even occurs. However, more empirical work on the universe of potential conflictual dyads would offer an even greater list of deterrence success stories, which in turn would help to build theory. Ironically, scholars know more about deterrence failure than success. It is up to empirical scholars to find novel ways to locate and describe cases of deterrence success, especially before a crisis takes place.

Researchers have also begun considering ways that a more diverse set of actors may carry out deterrence. Nuclear proliferation has made this an important question in the nuclear realm. Theories questioning the assumptions of bilateral nuclear superpowers no longer seem relevant, and empirical tests show that to be true. Just as important, deterrence literature is beginning to consider heterogeneity in the goals of deterrence. Some states strongly prefer a status quo distribution of wealth, while others just want to prevent war. The diversity of preferences was not well understood in previous waves of deterrence. Finally, the most recent deterrence literature is beginning to consider nonstate actors, both as the ones deterring and the ones being deterred.

The diverse means that states use to undertake deterrence is the least-studied international change to date. An important next step for deterrence theory is to consider the origins and consequences of the means that states use. The necessity of this additional relaxation of the assumptions of classical deterrence becomes clear when you consider the novel theory and policy implications that it would generate.

Many of the policy implications that scholars derive from deterrence theory apply to the nuclear domain. Because deterrence scholars have historically modeled costly conflict as synonymous with nuclear war, there is little room for considering costly nonnuclear and less costly nuclear forms of conflict. However, it is not clear that cost is the most important aspect separating nuclear from conventional domains. Given that the explicit introduction of incomplete information into models of deterrence (Powell, 1987; Nalebuff, 1991; Wagner, 1991; Bueno de Mesquita, Morrow, & Zorick, 1997) and war (Fearon, 1995; Powell, 1999) creates wholly new theoretical expectations, it is not a stretch to believe that the informational impact of means is an important factor in shaping the qualities of deterrence. Means differ in the information that they provide adversaries, and thus in their effectiveness as mechanisms for generating war avoidance, cost minimization, or maintenance of the status quo.

As important as the study of means is for the academic literature, it is even more important to policymakers. As has long been clear in the policy world, the means of warfare—be they strategic, operational, or tactical—play a

critical role in winning, losing, and even preventing war. Policymakers and major military officials strategize and agonize over how to deter, not just whether to seek to do so. The deterrence literature often fails to adequately address policymaker interest in this topic, instead focusing on large-scale strategic questions about whether and when to declare nuclear or conventional war. Few policymakers are involved in such large-scale questions, and of those who are, many have better things to do than read through academic treatises. Most policymakers therefore find little value in political science research that limits itself to modeling only these grand decisions.[12] The questions that most policymakers face on a daily basis are often ignored by the political science community: how to spend limited resources given specific strategic goals—or what Biddle (2010) calls force employment.

For example, members of Congress may face the question of whether to increase the budget of the Navy. Given an increase in the budget, naval and defense strategists must then decide whether to spend these increased resources on aircraft carriers or submarines. All these decision makers would benefit from a theory that considers the strategic implications of employing resources on one type of military capability versus another. But such a theory is hard to come by in political science. It is possible for political scientists to model variations in different means of warfare. The fact that scholars often fail to do so reduces their reputation among policymakers and the quality of our research. A more specific modeling of means of both warfare and deterrence would improve both.

In making policy prescriptions, scholars are better off generalizing beyond the dichotomy of nuclear versus conventional weapons. First, the literature needs a theory of when and why certain domains may or may not cross over. Credibility is an important part of the reason that nuclear threats cannot deter conventional attacks. But why assume that conventional weapons cannot deter nuclear attacks? And how do these theories carry over to other domains, such as space and cyber? Second, the literature needs a way to test these theories in order to understand the validity of our current understanding of nuclear-conventional and other domains. Examining domains beyond nuclear and conventional will provide more variation and a larger number of relevant cases from which to infer. Expanding deterrence theory to other domains thus will improve both the theory itself and our ability to test the theory. While the literature has made strides toward differentiating means and strategies of deterrence, it still lacks a generalized theory.

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Notes:

(1.) For a discussion of the deterrent effects of latent nuclear capabilities, see Pilat (2015) and Fuhrmann and Tkach (2015).

(2.) This is a theme followed by Jervis (1984), among others. However, earlier theoreticians had already anticipated the targeting of civilians due to modern military technology in the 19th century, and of course, two world wars saw this targeting in action.

(3.) Interestingly, rational deterrence theory virtually requires a risk of accident in nuclear operations in order for there to be a potential threat that leaves something to chance.

(4.) A corollary to Sagan presents an interesting unanswered question in this literature. Yes, organizational inefficiencies may cause mistakes that increase the probability of war. But might they also cause mistakes that decrease the probability of war? One can imagine a scenario in which organizational inefficiencies allow someone to "fall asleep at the trigger," reducing the probability of accidental (or purposeful) nuclear war. The question of when these inefficiencies will cause war and when they may prevent war instead is an interesting one that deserves more attention from deterrence and organizational scholars alike. Nevertheless, current thinking tends to assume one type of error over the other.

(5.) Kydd (1997) later formalizes this concept in a game theoretic model, showing that mutual fear can result even in the absence of psychological biases and when both players have only defensive, rather than aggressive, intentions.

(6.) His thesis has been developed more recently by Gavin (2006, 2010, 2012), although Jervis (1988b) would counter that the importance of nuclear weapons is in their perceived, rather than their actual, exceptionality.

(7.) Huth (1999) would consider such an outcome to be a partial success. A more satisfying answer might derive from a closer examination of the goals of the state or states in question.

(8.) A 1989 *World Politics* issue introduced this debate, with Lebow and Stein (1989) arguing that deterrence failed in all or most of the cases they examined, and Achen and Snidal (1989) countering that the comparative case study method is neither rigorous nor systematic enough to tell us much about real-world deterrence success. Downs (1989) and George and Smoke (1989) attempt to reconcile the two methodologies and call for a more unified way of studying the phenomenon. Others later joined the argument by criticizing Stein and Lebow's particular case selection and methods (Huth & Russett, 1990; Lieberman, 1994; Fearon, 1994; Bar-Joseph, 1998).

(9.) This includes Bell and Miller (2013) and Rauchhaus (2009), about its effects on conflict, and Sechser and Fuhrmann (2013), about its effects on bargaining.

(10.) For an exception, see Gartzke and Jo (2009).

(11.) This debate is later exemplified by Lebow and Stein (1989), Huth and Russett (1990), Lieberman (1994), Fearon (1994), and Bar-Joseph (1998), among others.

(12.) In contrast, the early days of deterrence witnessed much policymaker interest. Scholars like Schelling, Kahn, and Brodie were integral to policy thinking in their time (George, 1993; Nye, 2008).

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