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The Fourth Wave in Deterrence Research

JEFFREY W. KNOPF

A new line of work on deterrence began emerging after the end of the Cold War and gained momentum after the September 11 terrorist attacks. Building on a previous characterization by Robert Jervis that identified three waves of deterrence research,¹ this work is here designated the fourth wave. *The fourth wave* reflects a change from a focus on relatively symmetrical situations of mutual deterrence to a greater concern with what have come to be called asymmetric threats. The most important result has been to reveal the value of adopting a broader concept of deterrence that is not exclusively military in nature.

The initial wave of deterrence theorizing came after World War II and was driven by the need to respond to a real-world problem – the invention of the atom bomb. The second wave emerged in the 1950s and 1960s. It applied tools like game theory to develop much of what became conventional wisdom about nuclear strategy (at least in the West). Starting in the 1960s but really taking off in the 1970s, the third wave used statistical and case-study methods to empirically test deterrence theory, mainly against cases of conventional deterrence. The case-study literature also challenged the rational actor assumption employed in second-wave theory.

For at least a decade after Jervis published his seminal review, most research involved ‘normal science’ contributions within the second and third waves, along with lively debates across the existing theoretical and methodological divides.² Even after the end of the Cold War and the rise of concerns about rogue states and terrorism, scholars have continued to produce research that adds to and in some cases challenges previous work in the first three waves.³ Nearly all of this research, however, retains a focus on traditional interstate conflict. Given that it has a different substantive focus than work that addresses asymmetric threats, recent scholarship that deals with deterrence in the context of great power relations or regional rivalries will not be considered part of the fourth wave.

Alongside ongoing work that grows out of the second and third waves, a distinct new strand of deterrence research has emerged. Like the first wave, this fourth wave is primarily a response to real-world developments – most notably, 9/11. For this reason, again similar to the first wave, the latest wave has been more concerned with developing deterrence strategy than deterrence theory. Attempts to test fourth-wave ideas empirically have also been limited. Instead, the work has mainly been conceptual and policy-oriented.

The roots of the fourth wave can be traced to the collapse of the Soviet Union. By the second half of the 1990s, studies began appearing that focused on post-Cold War deterrence,⁴ including some important pre-9/11 attempts to think about how to deter terrorism involving weapons of mass destruction (WMD).⁵ The terrorist attacks of

September 11, 2001 created a much greater impetus for efforts to reexamine deterrence, so this review essay focuses on studies completed after 9/11. The attacks not only raised obvious questions about whether it would be possible to deter non-state actors willing to commit suicide for their cause. They also accentuated concerns about WMD-seeking rogue states. In response, the George W. Bush administration announced a new doctrine of preemption, leading many observers to conclude that US strategy had abandoned deterrence.⁶

These challenges prompted many people to reexamine deterrence. Some focused mainly on seeking ways to apply deterrence against terrorism. Others were motivated by concerns about the preemption doctrine and preparations to put it into practice through an invasion of Iraq. Still others were already engaged in reflecting on the role of deterrence after the Cold War and sought to incorporate the implications of 9/11 and the Bush Doctrine into their thinking. Collectively, these efforts have produced a fourth wave in deterrence research (considerations of cyber-deterrence could also be considered part of the fourth wave, but there is not yet enough published research for a meaningful review). The following review aims to clarify what is and is not new in the fourth wave, to identify where there is consensus and where there is still significant disagreement, and to point out the most important remaining problems and gaps. These latter will indicate where policymakers should still exercise caution and where academic researchers could contribute through more rigorous development of the underlying logic and empirical testing of suggestions made in the fourth wave.

The area of greatest and most important consensus is that deterrence remains viable and relevant, even in dealing with terrorism. Scholars also agree that the strategy is unlikely to be foolproof, but significant disagreements remain over how reliable it is likely to be with respect to different types of actors. There is also near but not complete consensus that deterrence both will and should play a lesser role today than in the Cold War. Whether it is wise to accompany the reduced role of deterrence with a greater emphasis on the preventive use of force remains a subject of intense disagreement however. There is also debate about whether it is appropriate and would be effective to target the families and communities that suicide terrorists come from.

Although there are some creative new ideas in the fourth wave, there are also areas of continuity with previous discussions of deterrence. Some of the debates, especially about deterring rogue states, echo prominent Cold War debates. The fourth wave also draws on ideas from the second and third waves, such as the role of assurances in making deterrence effective and the importance of integrating deterrence into a larger framework that includes other policy tools. What most distinguishes the work summarized here is its empirical focus; the fourth wave is driven by attempts to think through how deterrence might operate in situations that appear different from the traditional interstate rivalries that drove earlier theorizing. The most noteworthy new development in this literature is a trend toward no longer viewing deterrence exclusively in terms of nuclear or even conventional military means. The fourth wave is giving rise to a broader concept of deterrence that still includes but is not limited to threats of military retaliation.⁷ One especially innovative

suggestion that merits follow-up research involves using information or discourse as a source of influence.

Several issues still require further research and analysis. One important question is the extent to which deterrence strategy needs to take into account unique features of a target state's political regime and strategic culture. This issue reflects a larger problem in the literature, which is a tendency to assume that signs of non-rationality in an adversary automatically make deterrence a bad bet. This is not necessarily the case, and the fourth wave needs to develop a more complete picture of the factors relevant for estimating the odds of deterrence success or failure. There is also still considerable uncertainty about what kind of threatened response is most appropriate for trying to deter the ultimate nightmare of nuclear terrorism. More broadly, the question of *what* to try to deter in the first place has not been sufficiently addressed. As the conclusion emphasizes, identifying the appropriate red-lines for a deterrence strategy remains a critical task.

The remainder of this article reviews the state of fourth-wave research through six major sections. First, it describes how the changed security environment has affected the objectives of deterrence research. It next identifies major areas of consensus and debate about the appropriate role of deterrence overall. This is followed by sections that summarize research on the specific problems of deterring rogue states and terrorists, respectively. An important strand of research on terrorism focuses solely on nuclear or WMD terrorism, so this research is discussed in a separate section. The concluding section identifies outstanding priorities for further fourth-wave research and analysis.

The Changed Context for Deterrence Research

The fourth wave reflects the time and context in which it has emerged. The most significant difference from the Cold War environment of the first three waves is a change in focus from roughly symmetrical relations to asymmetric threats. Even in the Cold War, questions about deterrence could arise in relations between very unequal actors, as in US concerns about guerrilla movements or the emergence of China's nuclear weapons programme. The primary concern, however, was the superpower relationship, in which the focus was nuclear, the two sides were similar in their level of military capability, and deterrence eventually became mutual. Today, in the scenarios that most concern many analysts and policymakers, the United States and many of its friends and allies have clear military superiority over the actors they perceive as posing the greatest threats. The resort to tactics like terrorism or insurgency and efforts to acquire and perhaps use WMD are often described as asymmetric responses to the overwhelming military advantage enjoyed by the United States and its partners.

The current situation is also asymmetric in a second sense. While the United States had no choice but to accept the mutuality of deterrence in the Cold War, today the clear US preference is for unidirectional deterrence. The United States hopes to deter rogue states and terrorist organizations, but it does not want those actors to be able to deter the United States. The US desire to avoid the development of mutual deterrence in some ways makes the exercise of deterrence more

challenging. It requires trying to deter other actors not just from launching attacks but also from acquiring capabilities like nuclear weapons that could be used for deterrence against the United States even if those weapons are not actually used in an attack. As will be discussed further in the conclusion, these policy goals make the question of what to try to deter more salient.

Asymmetry has mixed implications however. While the current situation creates new complications for deterrence, it also permits a less demanding yardstick for measuring the value of deterrence. In the mutual deterrence environment of the Cold War, stability became the overwhelming preoccupation. Deterrence could not be allowed to fail even once, because failure might have meant mutual nuclear annihilation. Today's security environment makes possible a different metric. Although any deterrence failure would have terrible consequences for some people, for the United States and most other countries national survival is not at stake. However undesirable, one or even a handful of deterrence failures would not vitiate the value of deterrence. Because a single deterrence failure does not risk complete destruction of the country, the standard for evaluating deterrence has changed from the Cold War.⁸ Today, the key question is whether deterrence can make a positive contribution at the margins. Against contemporary threats from terrorism and rogue states, a partially effective deterrent is less than ideal but is also meaningfully better than no deterrence. Although the overarching goal remains preventing all attacks if possible, preventing even some attacks is still better than preventing none. For policy purposes, this makes the key question how to add increments to the effectiveness of deterrence. Especially regarding terrorism, the focus has changed from seeking a guarantee of success to finding ideas that could contribute at the margins to reducing the number of attacks.⁹

The Overall Role of Deterrence

The bulk of the fourth wave is concerned with the challenges of deterring rogue states and terrorists. Some of the work, however, steps back from these specific concerns to consider the overall utility of deterrence in the post-Cold War world. This work includes reflections by some senior scholars who were influential in previous waves, including Alexander George, Colin Gray, Patrick Morgan, Lawrence Freedman, and Robert Jervis. Not only these veteran deterrence theorists, but all of the literature in the fourth wave is in complete agreement on one key point: deterrence remains relevant and potentially useful against contemporary threats. Even Colin Gray, who built much of his career on critiques of mainstream deterrence theory, argued in response to the unveiling of the preemption doctrine that 'deterrence, though diminished in significance, remains absolutely essential as an element in U.S. grand strategy'.¹⁰

The agreement that deterrence remains usable does not imply a wish to return to near-exclusive reliance on this strategy. There is also a near consensus that deterrence both will not and should not play as central a role as it did during the Cold War. Lawrence Freedman observes that the disappearance of the Soviet threat 'pointed back to the original concept of [deterrence as] an occasional stratagem rather than a constant, all-purpose stance'.¹¹ Patrick Morgan concurs that this is appropriate

because deterrence 'is inherently imperfect' and cannot be made into 'a completely reliable tool of statecraft. That means it must be approached with care and used as part of a larger tool kit'.¹²

In viewing deterrence as 'inherently imperfect', the fourth wave accepts critiques of deterrence made by the third wave. Nevertheless, the fourth wave differs from the third. The third wave focused almost entirely on the limitations of deterrence strategy. In a policy environment that took for granted the necessity for deterrence, third-wave research argued that the strategy was not always appropriate and sought to highlight the circumstances in which deterrence might prove irrelevant or counterproductive.¹³ The fourth wave emerged in a different environment in which many now expressed doubt that deterrence would be feasible even in dealing with threats against which it would otherwise be appropriate. The latest wave hence stresses the reach rather than the limits of deterrence. Although it does not see deterrence as a silver bullet, it argues that deterrence can potentially be effective against a wider range of threats than assumed by the conventional wisdom that emerged after 9/11.

Although most fourth-wave studies assert that deterrence should play a less prominent role than it did in the Cold War, there are some apparent dissenters from this position. The full extent of disagreement is hard to judge, because the dissenters do not focus on the exact same issue as the studies discussed above. Rather, the dissenters emphasize that deterrence still provides a useful organizing framework for thinking about strategy. In a book defending the continuing utility of deterrence, James Lebovic argues that 'deterrence theory is not a Cold War relic', and he stresses 'the value of addressing ... [threats from rogue states and terrorists] within a deterrence framework'.¹⁴ In a similar but somewhat stronger endorsement, Elbridge Colby describes deterrence as a 'logic to guide American policymaking', leading to a recommendation that 'the policy of deterrence remains today the best strategic posture for the United States'.¹⁵

Yet even these authors seem to accept that deterrence will not always be the right policy. Both Lebovic and Colby mention the possibility that deterrence will fail,¹⁶ which would seem to indicate other policies might be necessary in those cases. Thus, it is possible that they do not disagree with the conclusion that deterrence will not be as central as it was during the Cold War. Rather, they seem to be saying that insights about strategic interaction developed from theorizing during the Cold War are still relevant for thinking about contemporary threats.¹⁷ This makes it clear that the fourth wave is not a rejection of the previous waves. Rather, part of its concern is to identify insights from the earlier waves that can be adapted to new contexts. Overall, even if there are differences in how central a role various authors want to assign to deterrence, this should not obscure the more fundamental agreement that deterrence remains viable and has the potential to be applied with some success against asymmetric threats.

Detering Rogue States

The remaining areas of consensus and debate in the fourth wave mainly involve discussions about rogue states or terrorists specifically. In general, there is agreement

that deterrence has a better chance of success with respect to state actors, even those designated as rogues, than it does against violent non-state actors. Ironically, this has led to greater disagreements in the analyses that deal with rogue states. Because no one seems to believe that deterrence can be made 100 per cent effective against terrorism, research on deterring terrorism focuses on how to gain at least some leverage from this strategy. With state actors, it is possible to hope for a higher likelihood of deterrence success. This, however, has led to sharp debate about whether the chances for success are good enough or more actively preventive measures are needed. As several observers have noted, much of this debate directly echoes similar Cold War-era debates.¹⁸

The basic fault line involves whether or not to reduce reliance on deterrence in favour of a strategy that gives a greater role to active defences and offensive operations. Some analysts agreed with the George W. Bush administration that deterrence is not sufficiently reliable against rogue regimes. This strand of the literature tended to support Bush administration policies of building missile defences, being willing to use force preventively, and (though with some dissenters) pushing for regime change. These studies argued the preemption doctrine and other elements of Bush strategy would also tend to bolster deterrence. Other studies disagreed on every point.

While no fourth-wave study completely dismisses deterrence, the analysts who were sympathetic to Bush administration strategy tended to be more dubious than the rest of the fourth wave about the prospects against rogue states. Their analysis grew out of Cold War-era scepticism about the mainstream view of nuclear deterrence. A long line of work by Colin Gray and Keith Payne has argued that some actors have very different value systems from the Western democracies and hence might not be deterred by the threat of nuclear destruction of their societies.¹⁹ In his most recent book, Payne calls the US approach to deterrence since the Cold War 'the great American gamble'.²⁰

Although analysts in this tradition have long viewed deterrence as unreliable, they argue that the problems are worse now. Most fundamentally, they claim, the United States does not understand some current adversaries, such as North Korea and Iran, as well as it understood the Soviet Union.²¹ This makes it harder to know what to 'hold at risk' in order to deter those adversaries. Terrorism compounds the problem by creating a possibility that rogue regimes might deliberately hand off WMD to terrorist groups in the hope that they could escape detection as the source of an attack.²² The example of suicide terrorism has also led to heightened fears that some state leaders might be willing to 'volunteer' their state to play the same role.²³ Iran has become the primary focus of such concerns. In an extreme formulation of this concern, which ignores the manifold internal divisions in Iran, Adam Garfinkle asks, 'How does one deter people who . . . are willing and even eager – from the sound of it – to turn their entire country and their entire religious sect into a suicide bomb?'²⁴

Given their doubts about the prospects for deterring rogue states, analysts in this school of thought believe preventive attack will occasionally be necessary. However, they do not actually view deterrence as impossible. Instead, they generally described the Bush preemption doctrine as a measure that would also strengthen deterrence.

A.R. Knott, for example, asserts that 'Forceful pre-emptive action has a deterrent effect of its own, not only on those that are near to committing an act, but also on those who are planning attacks in the longer term'.²⁵

The preponderant position in the fourth wave, however, disputes the above conclusions. Several studies have offered a comparative assessment of the relative merits of deterrence and preventive attack and found the latter option more problematic.²⁶ On the one hand, these studies point out that preventive action does not always succeed in stopping WMD programmes and that it can have undesirable second-order effects. In particular, another US military attack on a Muslim state like Iran would be likely to stimulate further anti-US terrorism. On the other hand, these studies observe that there have been many past cases in which doubts were expressed about the deterrability of other actors, sometimes leading to calls for preventive action. Before 9/11, arguments about the fragility of deterrence had been made with respect to the Soviet Union, as well as China under Mao, Egypt under Nasser, North Korea under both Kim Il Sung and Kim Jong Il, and Iraq during Saddam Hussein's reign. While Egypt, Iraq, and perhaps the Soviet Union did use chemical weapons, none of these states ever used WMD against any state capable of nuclear retaliation. This historical record suggests that it is possible to deter WMD use by rogue regimes and that, while it is not possible to guarantee success, deterrence is not as unreliable as the sceptics imply. The other possibility noted above, that deterrence might fail because a rogue state, rather than launch its own attack, thinks it can get away with transferring WMD to terrorists, will be discussed below in connection with the research on deterring WMD terrorism.

If deterrence and preventive attack were mutually reinforcing, as supporters of a preemption doctrine suggest, or even simply alternative options, there would be no reason not to keep the option of preemption rather ostentatiously on the table. The problem is that the two might instead work at cross purposes. This observation led many fourth-wave studies to argue that the Bush administration emphasis on preemption, especially when combined with rhetoric calling for regime change, tended not to reinforce but to undercut deterrence. This analysis drew on Thomas Schelling's famous second-wave observation that deterrent threats must be paired with assurances that the threat will not be implemented if the other actor refrains from challenging one's deterrent commitment.²⁷ With respect to Bush administration policies toward Iraq before the war, which gave the impression the United States would seek Saddam's removal even if he cooperated with weapons inspectors, Robert Jervis concluded, 'The administration seems to have trouble with Schelling's basic point that if the other is to be influenced, threats to act if the other refuses to comply with demands must be paired with promises not to take action if the other does cooperate'.²⁸ As several studies point out, if rogue regimes believe that a preemptive attack or effort to impose regime change is likely even if they refrain from using WMD, this only increases their incentives to acquire nuclear weapons as a deterrent and to use WMD first if they believe a US attack is imminent or their regime is about to be overthrown.²⁹ Indeed, even some analysts who have expressed support for policies of preemption or regime change have acknowledged these strategies can make proliferation or deterrence failure more likely.³⁰

Ultimately, policy choices regarding rogue states involve trade-offs. Although the preponderance of fourth-wave research suggests the probability of deterrence failure leading to a WMD attack is quite low, the residual risk of deterrence failure still leads some people to favour offensive operations to eliminate WMD programmes. Derek Smith contends that 'even a low level of incidence [of potentially undeterrable actors] is a major cause for concern given the potential effects of WMD'. To Smith, this puts the burden of proof on deterrence advocates to prove the strategy will not fail.³¹ Gerard Alexander is even more explicit in judging the trade-off: 'While false positives in these matters (unnecessary wars) are costly, type 2 errors (false negatives) have become much more costly with the development of unconventional weapons.'³²

Knopf challenges this assessment.³³ Noting that the 1995 Tokyo subway attack killed 12 people and the 2001 anthrax mailings killed five, Knopf observes that use of WMD is not automatically catastrophic. Without an effort to make a realistic estimate of the consequences of a potential deterrence failure, it is not possible to conclude that a deterrence failure would necessarily be more costly than a preventive military action meant to forestall such a possibility. This means the burden of proof should not be placed on either side; instead, the costs and risks of both strategies should be assessed without a starting presumption in favour of either. Lebovic goes further and argues that the trade-offs actually favour deterrence. He claims that 'reckless US preemptive policies are a greater threat to the US than the mere possession of nonconventional weapons by rogue states'. Given the likelihood that deterrence will work, 'the worst-case scenario for the US and its allies is not that a rogue state will come into possession of a nuclear weapon. Instead, the worst case is that, *because of* preemptive efforts, a war erupts ... in which the offending weapons are actually used.'³⁴ Arguments on both sides have generally been put forward without benefit of thorough research to estimate the actual probabilities or consequences of failure for deterrence versus those of other options. Further research and analysis, including efforts to present the possible risks and trade-offs to policymakers and the public in a way that would facilitate informed debate, remains one of the greatest needs in the literature.

Tailoring Deterrence

Although fourth-wave research on deterring rogue states involves sharp disagreement over the relationship between and relative merits of deterrence and preventive attack, there is one area of near consensus. A wide range of authors agree that it does not make sense to rely on a single, 'one size fits all' deterrent posture.³⁵ Most believe that maximizing the chances of deterrence success will require gaining as much knowledge as possible about the perceptions and value systems of potential adversaries. This is not a new idea, but rather a point that has gained greater emphasis in the fourth wave. Even during the Cold War, there were efforts to ascertain whether or not the Soviet Union thought about nuclear weapons in a manner similar to the United States, but many thought the consequences of nuclear war were so obviously horrific as to make deterrence existential even if there were differences in the two sides' military doctrines. In the fourth wave, however, it is

increasingly taken as a truism that deterrence must be tailored to each individual case based on a detailed understanding of the other side.³⁶ In fact, Bush administration policy moved in a direction consistent with this line of thinking and embraced a strategy officially labelled 'tailored deterrence'.³⁷

A White Paper by the Institute for Foreign Policy Analysis (IFPA) recommends the Obama administration continue this approach. It contends that deterrence must be shaped to 'the unique circumstances of each situation' and 'may need to be personalized down to the level of a handful of key adversarial decision-makers'.³⁸ Jeffrey Lantis points out that it might also be important to take into account actors below the leadership level; for example, it may be useful to send tailored messages to militaries that have a strong organization culture.³⁹ Consistent with the trend toward a broader notion of deterrence identified in this review, the IFPA study and other recent work on tailored deterrence also claim that tailoring will require incorporating a range of non-military tools, such as financial sanctions.⁴⁰

Although there is general consensus that a return to the stereotypical Cold War model of deterrence will not be appropriate for all contingencies, there are some dissenting notes on the move towards tailoring deterrence to individual actors. It makes sense to learn as much as possible about potential adversaries, but it does not follow from this that deterrence should be tailored to the maximum extent possible to each individual actor one seeks to deter. Knopf expresses concern that changing the message for each individual actor could lead the deterrent signal to get lost in the noise of individual tailoring.⁴¹ Morgan suggests, moreover, that it is probably impossible to completely figure out the other side's culture and its leader's personality. Morgan argues that the value of deterrence can be to cut through such complexities and present a simple message loudly and clearly enough that many different actors can understand it.⁴² Rather than individually tailored postures, Knopf proposes a middle-range, 'situation-specific' posture. Such an approach would lay out the range of possible responses that would follow a particular proscribed behaviour, such as providing WMD to terrorists, regardless of the particular actor who acts in this way. This is a debate that is just beginning to be joined, and there is a clear need for future research on how to overcome the challenges to implementing tailored deterrence and, even more importantly, on the question of how far it makes sense to go in the direction of individual tailoring as opposed to more generic deterrent postures.⁴³

Deterring Terrorism

Recent research on deterring rogue states has its roots in earlier Cold War debates, which is not surprising given that past research focused on deterring states. In contrast, the issue of deterring terrorism received only sporadic attention during the Cold War. After September 11, many observers dismissed the applicability of deterrence to non-state actors. They pointed to the difficulties of finding effective threats both against individual terrorists, who may care more about heavenly than earthly rewards and are willing to commit suicide for their cause, and against terrorist organizations that 'lack a return address' against which to retaliate. These same

challenges spurred others to look for ways around the obstacles to utilizing deterrence. Ironically, the very fact that the prospects for deterring terrorism appear so daunting has produced a greater degree of consensus in this area. Most research has been concerned simply with identifying ways to gain some leverage from this strategy. Although there are still areas of debate, a fair amount of consensus has emerged on the basic approaches that make sense.

Three possible approaches to deterring terrorism have received the most attention. First, many of proposed approaches to deterrence are indirect in nature, intended to pressure third parties who facilitate terrorism rather than terrorist operatives themselves. Second, this research shows renewed appreciation for Glenn Snyder's concept of 'deterrence by denial'.⁴⁴ In contrast to deterrence by punishment, which threatens to inflict costs through retaliation after an attack, denial strategies aim to dissuade a potential attacker by convincing them that the effort will not succeed and they will be denied the benefits they hope to obtain. The third and most novel approach involves challenging terrorists' justifications for violence, an approach that has been labelled both deterrence by counter-narrative and by delegitimization. Consistent with the broader trend identified here, all three approaches rely at least partly on sources of deterrence that are not only non-nuclear but non-military in nature. One other point of consensus is also worth reiterating. Despite widespread public doubts that terrorism can be deterred, studies on deterring terrorism argue unanimously that it is possible, though not necessarily easy. There is also one significant area of disagreement, involving whether it makes sense to threaten retaliation against the communities that terrorists claim to represent.

Indirect Deterrence

Most of the major ideas for how to apply deterrence to terrorism appeared fairly soon after 9/11. A short book published in 2002 by Paul Davis and Brian Jenkins of RAND has been especially influential. Their key insight involved the value of disaggregating a terrorist network into its component elements. Although the suicide terrorist who has hijacked an airplane is almost certainly beyond the reach of deterrence, other actors involved in the terrorist enterprise might not be. As Davis and Jenkins put it:

It is a mistake to think of influencing al Qaeda as though it were a single entity; rather, the targets of US influence are the many elements of the al Qaeda *system*, which comprises leaders, lieutenants, financiers, logisticians and other facilitators, foot soldiers, recruiters, supporting population segments, and religious or otherwise ideological figures. A particular leader may not be easily deterrable, but other elements of the system (e.g., state supporters or wealthy financiers living the good life while supporting al Qaeda in the shadows) may be.⁴⁵

Thinking of al Qaeda as a system opens the door to deterrence by punishment. The various supporters and enablers of terrorism who are not themselves eager to sacrifice their own lives for the cause can be threatened with retaliation for their role in facilitating terrorist operations. The threatened response need not be lethal, but could, depending on the actor, involve financial sanctions or imprisonment.

This approach is good example of what Alexander George has described as 'indirect deterrence'.⁴⁶ Traditionally, deterrent threats have been aimed directly at a potential attacker. Indirect deterrence, in contrast, is not aimed at attackers themselves, but at third parties whose actions could affect the likelihood that a potential attacker can or will carry out an attack. The likely need to pursue an indirect approach was a major theme in a study conducted for the National Academy of Sciences soon after 9/11 and has been echoed in much of the subsequent research.⁴⁷ In sum, there is broad agreement that threats to punish state sponsors of terrorism and private enablers, such as financiers, might help prevent terrorism not by directly deterring the terrorists themselves but by deterring these other parties from providing support terrorists need to carry out their operations.

The indirect approach has an important implication. Just because a terrorist organization is a non-state actor does not mean that states are irrelevant. If a terrorist group relies upon or benefits from state assistance, then the state can be threatened with consequences if it does not cease providing support. Wyn Bowen has pointed out that threats to take action against state sponsors may be more a matter of compellence than deterrence.⁴⁸ If a state is already supporting a terrorist group, the purpose of the threat is to get it to stop an activity already underway rather than to prevent initiation of that activity (and the same point applies to private supporters as well). Since the conventional wisdom holds that compellence is harder than deterrence, Bowen cautions that it may be difficult to successfully coerce state sponsors to abandon their support – though this does not lead him to recommend against trying.

Even failed compellence, however, as in the effort after 9/11 to coerce the Taliban to turn over Osama bin Laden, can have deterrent benefits if there is appropriate follow-up. In such cases, most of the literature points out, effective action to remove an offending regime from power can exercise a deterrent effect on other states.⁴⁹ For efforts to deter other non-state actors in the future, rather than state sponsors, the fate of al Qaeda is more relevant. Colby thus concludes, 'deterrence requires that the United States take every step to destroy al Qaeda in order for our deterrent against terrorists to be credible'.⁵⁰

The goal of destroying al Qaeda creates complications because, as Davis and Jenkins put it, 'deterrence and eradication do not fit together easily'.⁵¹ The US intention to go after al Qaeda whether or not it launches further attacks means there can be no US promise to let the organization survive if it refrains from future terrorism. Without such an assurance, using deterrence by punishment against al Qaeda as whole is nearly impossible.⁵² As noted above, though, threats of punishment might still work with elements of the network that enables Qaeda terrorism. It is important to recognize that this will make assurances necessary. To threaten private financiers or state sponsors with punishment if they support terrorism also requires promising to leave them be if they desist from aiding al Qaeda.

This insight is the basis for a proposal that in effect applies indirect deterrence to terrorist organizations as well. Trager and Zagorcheva focus on deterring terrorist groups that are not affiliated with al Qaeda from allying with bin Laden's group.⁵³ Some groups that have similar ideologies can still be more concerned with local political struggles than with al Qaeda's global jihad. If so, Trager and Zagorcheva

argue, their local goals can be held at risk. If the United States is willing to indicate that it will not act against local groups as long as they do not assist al Qaeda, it could deter them from doing so by threatening to intervene to block them from achieving their local political goals if they do assist al Qaeda. Trager and Zagorcheva's proposal is a logical extension of the indirect deterrence approach. Instead of focusing on deterring elements of the existing network, however, it seeks to prevent al Qaeda from expanding its network. Trager and Zagorcheva thus do not deal with how to deter al Qaeda itself, but their analysis does have an important policy implication. It suggests President Bush made a mistake to declare a global war on terror. By suggesting the United States would go on the offensive against all terrorist groups, it gave them an incentive to join together as allies facing a common threat. Trager and Zagorcheva also support their analysis with a case study of contrasting approaches utilized against two different insurgencies in the Philippines. This makes their article almost unique among fourth-wave studies in actually testing its ideas against empirical evidence.

Deterrence by Denial

The fact that many analysts do not see a viable way to use deterrence by punishment directly against the Qaeda organization as a whole has led much of the literature to focus instead on deterrence by denial. Davis and Jenkins identified two approaches, subsequently developed more fully by others, that fit this mode of deterrence. The first involves increasing the probability that individual attacks will fail. Davis and Jenkins observed that 'even hardened terrorists dislike operational risk and may be deterred by uncertainty and risk'. This means that homeland security measures and other steps to reduce the chances that terrorists can carry out a spectacular attack also have deterrent effects. Terrorists 'may be willing to risk or give their lives, but not in futile attacks. Thus, better defensive measures can help to deter or deflect, even if they are decidedly imperfect.'⁵⁴ Indeed, even before the Davis and Jenkins study appeared, a study conducted by Lawrence Livermore National Laboratory also proposed that increasing the chances of operational failure could deter some terrorist attacks,⁵⁵ and many subsequent studies have echoed this conclusion.

Robert Anthony has provided empirical backing to the notion that anything that reduces the estimated probability of operational success could deter. Anthony notes that the 9/11 hijackers took multiple test trips on the same flights they later hijacked because they wanted to convince themselves they would not be stopped before boarding on the day of the attacks. This suggests that successfully identifying and arresting one or more of the hijackers before 9/11 might have deterred the entire plot.⁵⁶

As a second observation consistent with denial, Davis and Jenkins stressed the importance of showing that even successful terrorist attacks will not produce larger-scale effects on the United States. Measures to manage and mitigate the consequences of an attack and to speed recovery afterward could contribute to this type of denial by making it harder for terrorists to achieve the spectacular results they seek. Bolstering societal resilience is especially important.⁵⁷ When a society can demonstrate the ability to withstand terrorism, it sends a message that using this tactic will not enable terrorist organizations to achieve their goals.

Deterrence depends significantly on convincing organizations such as al Qaeda and those who support it that any notion of defeating the United States – much less ‘bringing the United States down’ – is ridiculous. . . . The United States needs to demonstrate that it will not be brought down and will not close itself down . . .⁵⁸

Although Davis and Jenkins did not use the punishment and denial terminology, other studies have invoked the distinction and argued that both approaches will be necessary to deter terrorism.⁵⁹ Several analyses especially emphasize the second type of denial strategy discussed by Davis and Jenkins. They add some important amendments, however, regarding how to make this type of denial effort effective. It is not enough to show the United States will not be crippled or closed down by an attack. It is also necessary, several studies point out, to show that successful attacks will not advance terrorists’ larger political goals. A remarkable report by a Student Task Force at the National War College (NWC) stressed that one way to deter terror groups is to ensure that there is ‘doubt placed in the terrorist’s mind that even if acts of terrorism are successfully carried out, the overall aims may not be achieved’. Although it ‘will take time’ to achieve this, the ‘bottom line is that terrorists must believe that ultimately their efforts would be futile’.⁶⁰ Some influential senior scholars have endorsed this idea as well, using it as a central argument for why they reject the premise that terrorism is undeterrable. Colin Gray points out that, despite the grandiosity of its objectives, al Qaeda ‘functions strategically’ in trying to use its suicide attacks to advance those objectives. As a result, ‘It can be deterred by the fact and expectation of strategic failure’.⁶¹

A helpful framework for identifying different ways to use deterrence by denial against terrorism has been produced by James Smith and Brent Talbot.⁶² They observe that denial strategies can be implemented at the tactical, operational, and strategic levels. Efforts to improve homeland defences and increase operational risk produce tactical deterrence. Smith and Talbot refer to this as ‘denial of opportunity’. At the operational level, the goal is ‘denial of capability’ that terrorists require for an ongoing campaign of attacks. Here, denial and punishment can work in synergy. The indirect approach that threatens retaliation against third-party enablers can contribute to a direct version of denial by preventing terrorist organizations from getting the resources they need, such as money, weapons materials, and safe havens. Finally, at the strategic level, deterrence by denial involves the approach emphasized by the NWC Student Task Force, Gray, and others. Strategic deterrence by denial entails the ‘denial of objectives’, that is, showing that terrorism will fail to achieve terrorist groups’ end goals.

An analysis by Dutter and Seliktar suggests the strategic level is the most important one. As long as terrorists believe there is a chance of success in achieving their fundamental goals eventually, the risk of tactical or operational failure might not be sufficient to deter them from trying to launch further attacks.⁶³ In an important cautionary note for denial efforts at the tactical level, Alex Wilner points out that al Qaeda has still tried to target airliners and embassies despite significantly improved defences against attacks on both. A success despite the increased obstacles would

produce a sensational result for the group, while even failures generate new publicity.⁶⁴

Analysts who see promise in deterrence by denial at the strategic level argue it is especially important to avoid public and governmental overreaction to terrorism, since manipulation of fear among the public or government officials is what enables terrorists to achieve their objectives.⁶⁵ The potential sticking point in this approach is that avoiding overreaction can be difficult, because elected officials feel public pressure to take dramatic, visible measures to minimize the terrorist threat in the short term.⁶⁶ Both further public education about how terrorism exploits public fear and strong political leadership will be necessary to realize the potential of denial at the strategic level.

Another approach, which overlaps with denial strategies, has been proposed by Doron Almog.⁶⁷ He suggests adapting the Israeli notion of ‘cumulative deterrence’. Israeli strategists believe their country achieved deterrence against the Arab front-line states by repeatedly defeating them in a series of military confrontations. Although each war represented a deterrence failure in the short term, successive Israeli victories eventually convinced Arab states they could not defeat Israel militarily, creating deterrence as the cumulative result. Almog argues that a combination of successfully interdicting some terrorists, retaliating for those attacks that do occur, and demonstrating long-term patience could work similarly to establish cumulative deterrence against terrorism. Almog’s suggestion is similar to the idea of strategic deterrence by denial, in that it involves convincing terrorists over time that they will not prevail. It differs, however, because his emphasis on effective retaliation means that Almog puts more weight on punishment than denial. Whether or not cumulative deterrence offers a useful framework for preventing terrorism hence depends on whether punishing forms of retaliation would add a significant increment of deterrence to the indirect and denial approaches outlined so far.

Deterrence by Punishment

The question of whether threats of retaliation could be effective as a direct deterrent against terrorism is an obvious one. This is the issue on which there is the greatest disagreement in the literature. Some analysts believe that threats analogous to the Cold War threat of massive retaliation are necessary to establish deterrence, while others strongly criticize the idea of seeking to deter terrorism in this way. This question arises in discussions of both conventional and WMD terrorism, with the important difference that only in the latter case is there ever consideration of a nuclear response. Punishment scenarios for WMD terrorism are discussed separately below, while this section considers proposals for direct deterrence by punishment as a response to terrorism in general. Here, debate centres on whether or not it is a good idea to threaten retaliation against the families or larger communities from which terrorists originate.

Among those who advocate this approach are several Israeli analysts who have drawn conclusions from their country’s long experience as a target of terrorism. Gerald Steinberg wrote one of the first articles published after 9/11 that made the case that terrorism can be deterred. In it, he deliberately invoked the notion of

massive retaliation. He argued, 'it is important to identify high-value targets, including family and supporters, that will cause even the most radical leaders to weigh the costs and benefits of their actions . . .' Steinberg added that responses might have to appear 'excessive' or 'disproportionate' in order to make the costs great enough to deter further terrorism.⁶⁸ Ariel Merari, Shmuel Bar, and Amos Malka have made similar arguments, stressing that the defender needs to cultivate an image of being 'willing to go "all the way"' or 'go crazy'.⁶⁹ According to Bar, even more important than the severity of the response is its certainty. Bar believes that deterrence erodes quickly, leading him to conclude that repeated counter-strikes are necessary to establish temporary periods of deterrence against terrorism.⁷⁰

In a similar vein, Uri Fisher suggests that only harsh reprisals, including threats to kill family members, can deter terrorism, but he worries that US liberal values will prevent the United States from ever implementing the type of policy that could provide effective deterrence.⁷¹ This concern about domestic constraints is overstated. There has been no US public backlash against civilian casualties that have resulted from US air strikes in Afghanistan or Pakistan. More importantly, a lot of the literature reviewed here suggests there are other, possibly more effective ways to deter terrorism, so any constraints on the use of harsh retaliatory measures might not make deterrence impossible.

Others question whether deterrence should be sought by threatening collective punishment. Overall, the majority of fourth-wave studies reject this. The objections are partly moral, as retaliation would be directed at people who do not necessarily support terrorism and at least some of whom are innocent bystanders. Most studies also criticize threats to punish families and communities for practical reasons however. Davis and Jenkins contend that indiscriminate retaliation would diminish the moral legitimacy of the US effort, which could reduce international support for and cooperation with the US campaign against terror.⁷² Returning to the Israeli example, Jonathan Schachter contends that collective punishment has been ineffective because community members direct their anger at Israel after reprisals rather than hold terror groups accountable for provoking those reprisals.⁷³

The biggest problem, according to most analysts, is that targeting families or broader populations is more likely to increase support for al Qaeda or other terrorist groups than to decrease it.⁷⁴ Indeed, groups often use terrorism with the intent of provoking an excessive government reaction in order to prove their claims that the government in question is brutal or oppressive. Hence, it is important not to fall into the terrorists' trap by reacting in a heavy-handed manner if that is what they are trying to elicit.⁷⁵ Some analysts warn in particular against targeting holy sites.⁷⁶ The basic equation is simple: to be worthwhile, a retaliatory threat or action has to convince more people to abandon the terrorist cause than it incites to join it. Just as al Qaeda's attacks on symbolic targets like the World Trade Center and the Pentagon aroused American ire, so too would targeting religious symbols be more likely to provoke than to deter.

There are hence good reasons to be wary of retaliating against family members or societal targets. Practicing deterrence by denial (rather than punishment) with respect to these targets is still important however. For example, the NWC Student Task Force

points to the need to make sure families do not gain financially if a family member conducts a suicide terror mission.⁷⁷ This will help deter those who are recruited by the promise of financial rewards for their families.

It is also important to recognize that large-scale military retaliation is not the only possible way to implement a direct punishment strategy. Some propose that targeted killings of mid-level terrorist operatives could have a deterrent effect by increasing the personal risks for those who plan and prepare terrorist attacks but do not themselves conduct them. In one of the handful of fourth-wave studies based on systematic empirical research, Wilner found that targeting killings in Afghanistan did not reduce the rate of terrorism, but did shift it toward lower value targets and less effective forms of attack.⁷⁸ It is not possible to tell from the data, however, whether this shift arose from terrorist operatives being deterred from certain attacks out of fear for their personal safety or instead from terrorist capabilities being degraded by the loss of key personnel.

Others speculate that lethal forms of punishment might not be the most effective. Brad Roberts suggests that for terrorist foot soldiers who want to die for the cause, the threat to arrest and imprison them may be a greater deterrent than the threat to kill them.⁷⁹ The NWC Student Task Force also envisions the threat of life in prison as a possible deterrent. The group's report argues, 'if captured, the terrorist's fate must be worse than a martyr's death. . . . A terrorist may be willing to die for his cause but be unwilling to spend the rest of his life in the unglamorous, isolated, largely forgotten role of a prisoner.'⁸⁰ This again highlights the value of broadening the concept of deterrence. Although the United States views itself as engaged in a war on terrorism, this does not preclude also using the criminal justice system as an additional source of deterrence.

Finally, most fourth-wave studies recognize that any form of deterrence, including against terrorism, results from an actor's comparison of the expected utility of attacking versus that of not attacking. To bolster deterrence therefore requires improving the attractiveness of alternatives to terrorism. Bruno Frey observes, for example, that increasing opportunities for peaceful political participation and for membership in civil society organizations would reduce the incentives for the disaffected to press their cause through terrorism.⁸¹ As noted above, though, some studies exclusively emphasize the need for greater toughness. These studies tend to be wary of any efforts to create positive alternatives out of fear these will convey an image of weakness. This issue needs to be addressed by more systematic empirical research. Based on existing deterrence theory, however, there are strong logical grounds for expecting that deterrence will be more effective when it is paired with efforts to improve the available alternatives to the path of terrorism.

Detering WMD Terrorism

A number of studies focus not on how to deter terrorism in general but instead on the specific problem of how to deter terrorism involving weapons of mass destruction. Because the detonation of a nuclear bomb would be much more destructive than the most likely chemical or biological terrorism scenarios, most of these studies

focus exclusively on deterring nuclear terrorism, though some frame their discussion in terms of deterring WMD terrorism without distinguishing nuclear from chemical or biological threats. The majority of analysts assume that if a group like al Qaeda manages to acquire a nuclear device, they will use it. Hence, most studies focus on how to deter third parties from assisting terrorist groups in obtaining WMD. There are, however, some analysts who think it might be possible to directly deter terrorist groups from using WMD.

Proposals to Threaten Societal Targets

Similar to the analysts discussed above who favour applying direct deterrence by punishment against conventional forms of terrorism, some scholars propose threatening a counter-value response in the event of WMD terrorism. Daniel Whiteneck, Elbridge Colby, and Paul Kapur all argue for the need to threaten retaliation against societal targets in response to a WMD attack.⁸² Kapur makes it clear that the US retaliation need not be nuclear and indicates that he considers threats against society legitimate only in the case of nuclear terrorism, not conventional terrorism. Colby suggests that retaliation does not necessarily even have to be military and would likewise limit counter-society targeting only to 'catastrophic' WMD terrorism (but including biological and not just nuclear attacks). The three vary somewhat in the targets they propose holding at risk. Whiteneck lists family members, religious schools, and public infrastructure as possible targets, and Colby also includes food and housing. Kapur proposes more broadly that both the population and territory with which terrorist groups identify could be threatened.⁸³

Colby differs from others who advocate punishing community members, in that he frames this entirely as an effort at indirect rather than direct deterrence. He does not believe counter-value targeting will cause terrorist leaders to hesitate. Instead, he envisions that threats against those who support or passively allow terrorist activities will pressure those actors to take steps to prevent a terrorist group in their midst from carrying out a WMD attack.⁸⁴

Even those who advocate counter-society targeting do not generally call for responding to WMD terrorism with nuclear retaliation against non-state actors (state sponsors, discussed below, are a somewhat different story). The US Defense Department even commissioned a team at West Point's Combating Terrorism Center to study whether there is a role for nuclear weapons in deterring terrorist organizations. The study team firmly recommended against any use of nuclear threats. Not only might such threats increase general sympathy for al Qaeda, the study concluded, they could also sway Muslim opinion toward greater support for al Qaeda acquiring or even using nuclear weapons.⁸⁵

Proposals to seek deterrence through threats against society are not the main thrust of suggestions for how to deter WMD terrorism, however, because all the arguments against punishing community members for acts of terrorism in general also apply in the case of WMD attacks. But fourth-wave analysts have not all given up on direct forms of deterrence. Instead, several have identified a possible alternative to Cold War-style massive retaliation.

Deterrence by Public Backlash

An alternative route to direct deterrence comes from the observation that, for al Qaeda at least, sympathy and support among Muslims is an important centre of gravity. If Qaeda leaders came to expect that key audiences would react negatively to new attacks, this could serve as a source of restraint on terrorist behaviour.⁸⁶ Lew Dunn has explicitly connected this insight to a proposed path for deterring nuclear terrorism. He contends that 'nuclear use does have the potential of provoking revulsion among the very communities that bin Laden is seeking to rally'. This makes it important 'to shape perceptions among al Qaeda leaders of the possibility that nuclear or biological weapons use could backfire, alienating ... the wider Islamic community'.⁸⁷

To increase the chances of such a backlash, analysts call for putting forward or eliciting challenges that could discredit the ideological justifications terrorists invoke for WMD acquisition or use. According to Dunn, one way to do this is to encourage declarations by Islamic clerics and other respected Muslim leaders that indiscriminate killing, as would result from WMD use, is illegitimate.⁸⁸ Brad Roberts adds that groups affiliated with al Qaeda could also exert pressure against use if they expect local reactions in the areas where they operate would be negative.⁸⁹ In short, if al Qaeda's leaders come to anticipate that WMD use would hurt their cause, this might dissuade them from such a course.

The study by the Combating Terrorism Center endorses this approach, labelling it 'deterrence by counter-narrative'.⁹⁰ Alex Wilner uses the label 'deterrence by delegitimization', which he defines as 'targeting what terrorists believe'.⁹¹ The latter term is more parallel to punishment and denial, because it refers to the way a deterrent effect is achieved, while a counter-narrative, like military retaliation, is a means that can be used. In practice, delegitimization is not a truly different way of generating deterrence. Instead, it blends the other two, seeking to deny terrorists the benefit of a public rally while perhaps also imposing the punitive cost of a loss in previous public support. Because the means used are so distinctive, however, it is worth retaining a separate label for this approach.

As support for the potential of this approach, analysts point to several pieces of evidence that suggest Qaeda leaders are indeed sensitive to how the Muslim community perceives their actions. They cite, among other things, a letter from al Qaeda's number two leader, Ayman al-Zawahiri, to Abu Musab al-Zarqawi, leader of al Qaeda in Iraq before he was killed by an air strike in 2006. In the letter, Zawahiri instructed Zarqawi that his methods, including indiscriminate attacks on Muslim civilians and the release of videos showing hostage beheadings, were so excessive they had become counterproductive. According to Zawahiri, 'the strongest weapon which the mujahadeen enjoy ... is popular support from the Muslim masses ... [meaning] the mujahed movement must avoid any action that the masses do not understand or approve ...'.⁹²

As with some of the other proposals discussed above, effective implementation of deterrence by counter-narrative will be challenging. Adam Garfinkle observes that it is difficult for non-Muslims to influence relations among Muslims.⁹³ Indeed,

there is always a risk that efforts by a foreign government to influence a state's or a community's internal debates will provoke a backlash against outside interference. But this is not a reason to reject this approach out of hand. Rather, it points to the need for additional thinking and, if possible, empirical research about how to implement a delegitimization strategy successfully.

This proposed approach highlights another way in which thinking about deterrence is becoming broader. This effort at deterrence would not rely on military reprisal, nor for that matter on some of the other tools discussed so far, such as homeland defences or criminal justice measures. It instead represents an attempt to use discourse as a source of leverage. The fourth wave in general has involved consideration of the role that non-military tools of national power might play in deterrence. Delegitimization proposals show that information (or strategic communication) could be one of those tools. As the most innovative suggestion in the fourth wave, this approach merits serious follow-up research to ascertain its potential.

The Possibility of State Assistance

Although, as the preceding paragraphs indicate, there are some suggestions for deterring terrorist groups directly, most of the research on deterring WMD terrorism emphasizes indirect deterrence. Despite the ideas noted above, it is hard to have confidence that a group that has obtained WMD can reliably be convinced not to use it. Hence, the primary focus has been preventing terrorists from obtaining such weapons in the first place. With respect to nuclear weapons, though not necessarily chemical or biological agents, terrorist organizations will require outside assistance. They do not have the capacity to produce fissile materials, so they will have to acquire fissile materials or an actual nuclear device that were manufactured elsewhere. This creates an opening, and indeed an urgent necessity, to deter third parties from assisting terror organizations in acquiring nuclear materials.

There are several potential scenarios by which terrorists could acquire such materials. There could be deliberate transfer by a state or by sub-national actors acting without their government's knowledge. There could also be inadvertent leakage from poorly secured facilities, through either theft by outsiders or diversion to the black market by insiders. The fourth wave includes suggestions for establishing deterrence against each of these scenarios. These generally involve threatening punishment against any actor that enables terrorists to obtain WMD. As Kapur points out, such efforts could also contribute to deterrence by denial by making it more difficult or more expensive for terrorist organizations to acquire nuclear materials.⁹⁴

There is broad consensus over the basic approach to deterring WMD assistance to terrorists, but considerable debate about the details of implementing such deterrence and the overall likelihood it will be effective. Some of the disagreements emerged from debates about the necessity of the Iraq War. As part of its case for invading Iraq, the Bush administration emphasized the danger that rogue states might deliberately provide WMD to terrorists. The administration discounted the likelihood of deterring such transfers by asserting that rogue regimes might believe they could keep their role secret and hence avoid being held accountable.

A number of fourth-wave studies challenged these assertions. Sceptics of the deliberate transfer scenario put forward three main counter-arguments. First, because rogue regimes will find it hard to produce more than a handful of bombs initially, they are unlikely to give away such a scarce resource, which is also important for their own security.⁹⁵ Second, any transfer would mean that the regime would no longer control the weapon and would face a risk that a non-state actor might turn the weapon against the regime itself.⁹⁶ Finally, even if there is no way to guarantee that a rogue regime will be found out if it transfers WMD, there is also no way a state can be sure it will escape detection – and, as described below, there are US programmes to improve the chances of such attribution. The scale of the retaliation that might follow an act of WMD terrorism provides a powerful disincentive against taking the risk.⁹⁷ As Whiteneck puts the point, ‘Deterrence involves communicating what might happen, rather than what will happen . . . Any state would have a high degree of uncertainty as to its ability to escape responsibility and avoid the consequences of a US response.’⁹⁸ In sum, the majority position in the fourth wave holds that deterrence can operate effectively to keep states from intentionally giving WMD to terrorists.

There is not complete consensus on this issue. Gerard Alexander and Matthew Phillips, for example, both question whether uncertainty about avoiding detection would be sufficient to deter rogue states from supplying nuclear weapons or materials to terrorists.⁹⁹ If the state is highly risk acceptant, they claim, the thought that it might get away with a clandestine transfer might lead it to take the risk. They do not explain, however, what objectives a state would want to achieve by giving WMD to terrorists that would lead it to run this risk.

Disagreements about the probability of deterring intentional transfer lead to different recommendations about the advisability of preventive military action. They do not, however, lead any analyst to recommend against trying to strengthen deterrence. Instead, there is broad agreement on the importance of making deterrence of state assistance as effective as possible. In addition, most analysts recognize that inadvertent leakage of NBC weapons or materials is also possible and may be the more likely scenario. Another possibility, usually mentioned in connection with North Korea, is that a state that has no actual intent to attack the United States by using terrorists as a delivery system might nevertheless sell weapons or materials as a way to raise cash. There have thus been a number of suggestions for how to strengthen deterrence of both deliberate and unintentional supply scenarios. Figuring out how to improve such deterrence involves questions of both declaratory strategy and technical capabilities. Before describing debates about the appropriate declaratory posture, this article briefly reviews the technical side of the issue.

Nuclear Forensics

Efforts to deter states or sub-national actors from aiding or enabling terrorist efforts to acquire a nuclear device will depend on the ability to determine the origin of nuclear materials used in a terrorist attack. This is partly a function of intelligence and police work, but it also has a significant technical component, known as nuclear forensics. The production facilities that make fissile materials needed for a nuclear bomb, either

plutonium or highly enriched uranium (HEU), generally vary in the exact mix of isotopes in the materials produced at each facility. In theory, analysis of radioactive debris and fallout after a nuclear detonation (or of materials found in an intercepted device) could determine the general isotopic composition and age of the fissile materials used to make the bomb. If there are samples of the fissile materials produced at various facilities, it might be possible to match the bomb materials to a sample to determine where the fissile materials initially came from. Even if it is not possible to establish a definite match, nuclear forensics should make it possible to rule out certain countries as the source of the nuclear materials.¹⁰⁰

Many fourth-wave studies attach great importance to the deterrent potential of nuclear forensics. The post-9/11 publications that first highlighted the importance of nuclear forensics implied that simply establishing attribution capabilities would deter nuclear terrorism. Michael Levi, for example, noted that the Bush administration's reservations about deterrence rested on the premise that rogue states could secretly supply nuclear weapons or materials to terrorists. 'But were such now-secret links to be exposed, deterrence could largely be restored', he claimed.¹⁰¹

Subsequent studies have qualified the straightforward equation of forensics with deterrence. They point to several problems that will have to be managed. The most obvious is the need to have samples against which to match post-attack debris. Both the United States and the International Atomic Energy Agency (IAEA) have databases of information about nuclear materials, but both databases are incomplete. This has led to a range of proposals designed to increase state participation in efforts to create a comprehensive database.¹⁰² Even with improved access to fissile material samples, however, it probably still will not be possible to pinpoint with certainty the source of materials involved in an attack. Where definitive proof is lacking, Caitlin Talmadge points out, it may be hard for political leaders to decide whether retaliation is warranted and even harder to line up diplomatic support for military action.¹⁰³

Given the potential problems that might complicate a posture based on nuclear attribution, attention has focused on how to maximize the deterrent benefits of nuclear forensics despite its limitations. One simple measure, recommended by several authors, is to increase the publicity given to nuclear attribution programmes.¹⁰⁴ Calling greater attention to US efforts and capabilities, without revealing technical details that could enable others to design around US programmes, would increase the chances that others might fear being identified if their nuclear materials are used by terrorists.

Dilemmas of Declaratory Posture

Leveraging the deterrent potential of nuclear attribution programmes also involves declaratory strategy, but dilemmas that arise in this area have produced a range of opinion about the most appropriate posture. Initial proposals mostly suggested that the United States should make clear in advance that any state will be held accountable if its nuclear materials are used in a terrorist attack. Based on an assumption that other states would likely anticipate retaliation in a case of deliberate transfer, an important goal of such a posture is to reduce the chances of unintentional leakage by putting pressure on states to improve the security of their nuclear materials. This approach

thus blends compellence and deterrence. It seeks to deter states that would contemplate intentionally giving nuclear materials to terrorists, while compelling other states to take steps that would minimize the chances that terrorists could acquire poorly secured materials. These coercive pressures are in turn part of a larger strategy to deny terrorists the ability to obtain nuclear weapons or materials.

In one proposed approach of this type that draws on legal theories of liability, Anders Corr has called for establishing a 'negligence doctrine'.¹⁰⁵ Under such a doctrine, states that are sources of materials used by terrorists could be retaliated against if they had failed to take adequate steps to secure their materials. Robert Gallucci has put forward a similar proposal for what he labels 'expanded deterrence'.¹⁰⁶ The term is meant to convey that deterrence would be expanded to cover not just terrorists who carry out an attack but also states whose materials were used. Gallucci states explicitly that such a doctrine would apply both to states that deliberately transfer and to those that inadvertently leak nuclear weapons or materials. Elbridge Colby has subsequently also embraced the term 'expanded deterrence', stretching it further to cover not only states but also private individuals who are in any way complicit in making possible terrorism with WMD.¹⁰⁷ To maximize state cooperation in securing nuclear materials, Gallucci suggests that 'a threat [of retaliation] would remain even if the transfer were *not* authorized, but *only* if that government had failed to be fully cooperative in controlling its fissile material and weapons'.¹⁰⁸ Both Gallucci and Corr claim that, because the United States would be likely to retaliate in any event after an act of nuclear terrorism, it makes sense to gain the deterrent benefits of publicly declaring this ahead of time. Corr points out a second advantage of formulating a declaratory posture before any nuclear terrorism incident: 'a threat of limited retaliation could actually *restrain* the United States if voters' *ex post* preference were more vengeful than their *ex ante* preference'.¹⁰⁹

Although many analysts want to hold accountable any state that becomes a source of nuclear materials, deciding what type of retaliation to threaten if a state's materials are employed by terrorists has proven a thorny issue. There has been willingness to contemplate a nuclear response, but little support for mandating that retaliation must be nuclear even in cases of intentional transfer. Many analysts simply note that the US response could be either nuclear or non-nuclear without specifying any scenario in which it should automatically be nuclear.¹¹⁰

The main reason for hesitation is that there are good reasons not to threaten nuclear strikes against certain states whose fissile materials might not be completely secure, including Russia and Pakistan. Russia could launch extensive nuclear counter-strikes in response, while the United States has viewed Pakistan as an ally, if an ambivalent one, and would not want to lose its cooperation in fighting al Qaeda and the Taliban. Even against states that are hostile to the United States and unable to strike back in kind, nuclear retaliation could be seen as excessive by the international community and lead to a loss of support for the United States. This would especially be true if leakage were inadvertent rather than deliberate. For these reasons, Corr advocates threatening weaker states with a conventional invasion to impose regime change rather than nuclear retaliation.¹¹¹ In contrast, Whiteneck claims it makes sense to leave the nuclear option on the table because, after Iraq,

US conventional capabilities are stretched thin and the threat to invade and occupy another country might lack credibility.¹¹²

There are also situations in which even conventional military retaliation might be counterproductive. For example, actors in Pakistan's tribal regions unhappy with government efforts to crack down on them might try to provoke US military strikes on Pakistan that would help them topple the central government.¹¹³ Given the wide range of scenarios that could lead to terrorists obtaining nuclear materials and the political complications that would follow explicitly threatening countries like Russia or Pakistan, the majority of analysts recommend a declaratory posture of calculated ambiguity.¹¹⁴ Even Phillips, despite expressing doubt about whether intentional WMD transfers can be deterred, advocates a 'broadly scoped, operationally ambiguous declaratory policy'.¹¹⁵ By this, he means that all options, including nuclear retaliation, should be on the table, but the exact nature of the military response should not be specified in advance. This declaratory posture would also leave open the precise level of proof the United States would require. Because of the inherent uncertainties in attribution, Phillips and other analysts recommend that the United States declare it will not necessarily require definitive attribution before responding.¹¹⁶

Consideration of deterrence through attribution has now been underway long enough for some analysts to have second thoughts. Michael Levi, who was an early proponent of this approach, now recommends that the United States limit any threat to retaliate for the transfer or leakage of nuclear materials solely to North Korea and perhaps Iran, but in the latter case only if the United States can establish with reasonable confidence that a transfer was deliberate. In contrast, Levi argues, the United States should remove any hint of military retaliation from its dealings with states like Russia or Pakistan. With these states, any leakage is likely to be unauthorized. If such a state discovers a possible loss of materials, fear of suffering retaliation might dissuade state authorities from revealing the loss. Levi concludes that the most important goal should be to maximize cooperation from other states in giving notice of leakage and tracking missing materials, and this requires forgoing any deterrent threats.¹¹⁷ Although eliciting such cooperation is clearly important, there are risks to eschewing a deterrent posture altogether. An alternative way to encourage cooperation from a state that discovers or suspects a loss of nuclear materials would be to announce that prompt reporting of a loss and cooperation to trace any remaining missing materials will lead any retaliatory response to be reduced or withheld altogether, depending on the degree of state culpability beforehand and cooperation afterwards.

In an interesting complement to the foregoing proposals for deterring states from allowing terrorists to acquire nuclear materials, David Auerswald argues that efforts to dissuade WMD transfer should focus less on states and more on transnational criminal organizations. Where inadvertent leakage of WMD materials occurs, he believes, it is most likely to involve organized crime. The key to keeping WMD out of terrorist hands, therefore, is to deter criminal groups from selling them the weapons or materials. Because organized crime groups are motivated by profit, not ideology, they are susceptible to deterrence by punishment. Auerswald proposes threatening

their lives, their freedom, or their property and legitimate businesses if they are suspected of assisting in WMD smuggling.¹¹⁸ He suggests deterrence by denial might also be possible by improving interdiction of WMD shipments or finding other ways to prevent transnational crime organizations from being able to profit from WMD smuggling.¹¹⁹

Consistent with other strands of the fourth wave, this approach again involves recognition that the basis of deterrence need not be military. As Auerswald observes, efforts to deter criminal smuggling of WMD 'will require placing a larger emphasis on the nonmilitary instruments of national power', including intelligence, law enforcement, and financial tools.¹²⁰ A complementary suggestion comes from Anne-Marie Slaughter and Thomas Wright. To deter individual scientists or military officers from working with crime groups, they recommend making 'illegal transfer of nuclear materials a crime against humanity triable by international tribunals and by national courts in every country'.¹²¹ Although there are variations in individual proposals, the fourth wave overall attaches great importance to seeking indirect deterrence of WMD terrorism through measures to persuade states and other actors not to do anything that could assist terrorist groups in obtaining such weapons.

Conclusions

The end of the Cold War made it possible to believe that deterrence might no longer be needed, at least at the nuclear level. Soon after, prospects of WMD proliferation to rogue regimes and the emergence of mass-casualty terrorism changed this initial optimism to a fear that, rather than being unnecessary, deterrence might no longer be feasible. A number of researchers have responded to these challenges by reexamining the workings of deterrence and putting forward proposals for how to apply this strategy in the current security environment. This work has produced a fourth wave in research on deterrence.

During the Cold War, discussions of Western deterrence strategy focused on one particular actor, the Soviet Union, in what became a relatively symmetrical situation of mutual deterrence. Academic research was broader, but still dealt almost exclusively with interstate conflicts involving rivals with similar power profiles. The fourth wave has been driven by efforts to determine the potential efficacy of deterrence in a different environment characterized by multiple potential threats, from both states and non-state actors, in which the relationships are more asymmetrical.

In this sense, the fourth wave resembles the first. It arose in response to real-world developments and has been policy- rather than theory-oriented. Because the fourth wave came after the second and third, however, it has also drawn on insights from those previous waves. The fourth wave can be distinguished from them because it has had to deal with somewhat different substantive questions, starting with the basic question of whether deterrence is even relevant anymore.

Given how much scepticism has been expressed publicly about this question, there are some surprising areas of consensus or near consensus in the fourth wave. Most fundamentally, there is widespread agreement that deterrence remains relevant and potentially usable, although there are still differences among researchers in how

effective they think it will be overall. Because, in contrast to the Cold War, deterrence failure does not involve the risk of nuclear Armageddon, there is less focus on how to make deterrence foolproof and more on how to increase the marginal effectiveness of deterrence, particularly in dealing with terrorism.

The most significant development to emerge from this literature is movement toward a broader conception of deterrence. Fourth-wave recommendations do not rely heavily on threatening nuclear retaliation. Instead, there is renewed interest in using deterrence by denial (especially against terrorism), while also retaining a role for deterrence by punishment. There is also extensive consideration of using not just non-nuclear but even non-military means as a basis for deterrence. The most novel example of this is deterrence by delegitimization or counter-narrative, which involves trying to use information and discourse to convince al Qaeda that WMD terrorism will cause a backlash from within its intended support base. Recent research has also emphasized making deterrence operate in indirect ways by using it to dissuade third parties from providing assistance that would facilitate terrorism or WMD proliferation. Collectively, research in the fourth wave is making it abundantly clear that the field of security studies needs to broaden its understanding of deterrence to include more than the threat of military retaliation, whether nuclear or conventional.

Overall, the fourth wave has made a persuasive case against giving up on deterrence, as many seemed inclined to do after 9/11, and has put forward a number of specific ideas for how to get some leverage from this strategy against both rogue states and terrorist groups. Nevertheless, the fourth wave also has weak points. Much of the literature consists of plausible suggestions, but in many cases the underlying theoretical logic has not been sufficiently developed and the ideas have not been tested against empirical evidence. It will be important to investigate more systematically the non-military forms of deterrence that have been proposed, including political, economic, legal, and informational sources of leverage. There is also a need for more research on how far tailoring deterrence to individual cases is likely to be necessary or more effective than more generic deterrent postures.

Given the uncertainties and disagreements evident in discussions of how to deter nuclear terrorism, another issue that needs to be analysed more fully is how to respond in the event the worst does happen. The atmosphere of chaos, fear, and public anger in the aftermath of a nuclear attack will not be conducive to identifying the most appropriate and effective response. There needs to be more explicit discussion in advance about what responses to threaten in different circumstances, such as varying levels of certainty about attribution or different degrees of state culpability in allowing nuclear weapons to fall into terrorist hands. Further research and analysis that can help policymakers and the public think through the issues ahead of time is a pressing need.

While proposals for deterring terrorism display creative new thinking, discussions of the prospects for deterring rogue states instead involve great continuity from Cold War-era debates. Just as there were earlier debates about whether the Soviet Union or Mao's China would be deterred by the risk of losing large numbers of people in a nuclear war, so too the fourth wave has involved sharp disagreements about

whether states like Iran or North Korea can reliably be deterred, and whether Iraq under Saddam would have been deterrable. The debate has implicitly relied on a simple dichotomy. Evidence of non-rational or unreasonable behaviour by state leaders is taken to imply a high risk of deterrence failure, while evidence of strategic or rational thinking is taken to prove the likelihood of deterrence success. But rational actors still sometimes challenge deterrence, while leaders prone to misperception or grandiose objectives still sometimes refrain from launching attacks. This suggests rationality or its absence is not alone determinative. A broader, multivariate approach to estimating the likelihood of deterrence success or failure will be needed. On balance, this review finds the arguments for expecting a high probability of success in deterring rogue states persuasive, but more rigorous analysis is clearly needed to move the debate forward.

This part of the literature remains inconclusive in part because scholars do not always make clear what it is they want to deter. If one wishes to prevent all forms of misbehaviour, the difficulties can be greater than if one only aims to deter a narrow range of actions. With respect to proliferation, for example, efforts to deter Iraq, North Korea, and Iran from crossing certain thresholds in nuclear development or to compel them to comply fully with non-proliferation commitments have often failed. Some observers have inferred from this that these states will cross all red-lines and hence are not adequately subject to deterrence.¹²² Yet none of these states has ever launched a nuclear attack nor, to our knowledge, ever supplied WMD to terrorists. In short, deterring weapons acquisition is harder than deterring use, so that difficulties preventing the former might not imply anything about preventing the latter.

It is hard to coerce states not to acquire new capabilities because they might see these as important for their own security. But if their capabilities might subsequently be used to attack the other side, then the other side clearly has overriding national interests at stake. Deterrence is hence more credible when it seeks to prevent states from using their capabilities unprovoked. And preventing attacks remains the most important goal for deterrence. Although one might wish to stop all acts of defiance toward the United States or the international community, it is not necessary to deter every act of defiance because most of them do not directly kill people. Rather than lump a range of policy goals together when discussing the prospects for deterrence, there is a need to differentiate and be clearer about the intended goals of a deterrence strategy.¹²³

Folk wisdom in the strategic community holds that those involved in the planning process should ask themselves whom they wish to deter from doing what, and by what means. The recent move toward tailored deterrence has led to even greater emphasis on starting the deterrence planning process by developing a profile of the specific adversary.¹²⁴ Putting the question of who is to be deterred first, without specifying what to deter, could lead to a focus on trying to prevent all forms of defiance and misbehaviour by those adversaries. This approach also encourages a focus on actor idiosyncrasies and the difficulties of ascertaining what the actor values that could be held at risk. All of this is likely to lead to scepticism about the prospects for deterring the actor at all. The difficulties of understanding other

actors should not be minimized, but it makes no sense to ask whether an actor will be easy or hard to deter if one has not specified what actions one seeks to prevent. Rather than *whom*, the first question should be *what* to deter. It is inherently more plausible – and more important – to deter some actions than others. Efforts to deter WMD attacks or WMD transfers to terrorists will automatically appear more credible, and generally matter more, than efforts to deter lesser provocations. 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.

Despite the weaknesses discussed here, the fourth wave has generated valuable innovations in deterrence thinking. Indeed, the number and diversity of the studies make this the most exciting period for deterrence research in several decades. The disappearance of the Soviet Union and emergence of new threats from rogue regimes and terrorism did not spell the end for deterrence as either a strategy or a subject of theorizing. Instead, these developments have spurred a move toward a broader conception in which either military or non-military means, or a combination, could be considered part of a deterrence strategy. If the fourth wave fulfils its potential, it could lead to changes in both deterrence theory and practice.

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NOTES

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4. Keith B. Payne, *Deterrence in the Second Nuclear Age* (Lexington, KY: University Press of Kentucky, 1996); Naval Studies Board, National Research Council, *Post-Cold War Conflict Deterrence* (Washington, DC: National Academy Press, 1997); Max G. Manwaring (ed.), *Deterrence in the 21st Century* (London: Frank Cass, 2001); Stephen J. Cimbala (ed.), *Deterrence and Nuclear Proliferation in the Twenty-First Century* (Westport, CT: Praeger, 2001).
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6. See, for example, Ivo H. Daalder and James M. Lindsay, *America Unbound: The Bush Revolution in Foreign Policy* (Washington, DC: Brookings Institution Press, 2003), p. 125.
7. For an early call to expand deterrence theory beyond its traditional 'focus on military tools', see Ted Hopf, *Peripheral Visions: Deterrence Theory and American Foreign Policy in the Third World, 1965–1990* (Ann Arbor, MI: Michigan University Press, 1994), p. 241. For more on the case for adopting a broader concept of deterrence, see Jeffrey W. Knopf, 'Three Items in One: Deterrence as Concept, Research Program, and Political Issue', in T.V. Paul, Patrick M. Morgan and James

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 10. Colin S. Gray, 'Maintaining Effective Deterrence', Strategic Studies Institute, US Army War College, Carlisle, PA, August 2003, p. v.
 11. Lawrence Freedman, *Deterrence* (Cambridge: Polity Press, 2004), pp. 75–6. Others who make this point include C. Poppe *et al.*, 'Whither Deterrence? Final Report of the 2001 Futures Project', Lawrence Livermore National Laboratory, Livermore, CA, 1 May 2002, pp. 17–18; Michael Quinlan, 'Deterrence and Deterrability', *Contemporary Security Policy*, Vol. 25, No. 1 (April 2004), p. 17; and James J. Wirtz, 'Disarmament, Deterrence, and Denial', *Comparative Strategy*, Vol. 24, No. 5 (December 2005), p. 384.
 12. Patrick M. Morgan, *Deterrence Now* (Cambridge: Cambridge University Press, 2003), pp. 284–5. For similar arguments, see also Freedman, *Deterrence* (note 11), p. 116; Gray, 'Maintaining Effective Deterrence' (note 10), p. ix; and Klaus-Dieter Schwarz, 'The Future of Deterrence', SWP Research Paper, German Institute for International and Security Affairs, Berlin, June 2005, p. 36.
 13. Alexander L. George and Richard Smoke, *Deterrence in American Foreign Policy: Theory and Practice* (New York: Columbia University Press, 1974); Robert Jervis, *Perception and Misperception in International Politics* (Princeton: Princeton University Press, 1976), Ch. 3; Richard Ned Lebow, *Between Peace and War: The Nature of International Crisis* (Baltimore: Johns Hopkins University Press, 1981); Janice Stein, 'Deterrence and Reassurance', in Philip Tetlock *et al.* (eds), *Behavior, Society and Nuclear War*, Vol. 2 (New York: Oxford University Press, 1991).
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 15. Elbridge Colby, 'Restoring Deterrence', *Orbis*, Vol. 51, No. 3 (Summer 2007), pp. 417, 414; see also p. 421.
 16. Lebovic, *Deterring International Terrorism and Rogue States* (note 14), p. 148; Colby, 'Restoring Deterrence' (note 15), pp. 420, 423.
 17. For an explicit argument that Cold War-era deterrence research has relevance to efforts to apply deterrence in 'the long war', see Austin Long, *Deterrence: From Cold War to Long War – Lessons from Six Decades of RAND Research* (Santa Monica, CA: RAND, 2008).
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 22. Derek D. Smith, *Deterring America: Rogue States and the Proliferation of Weapons of Mass Destruction* (Cambridge: Cambridge University Press, 2006), p. 7; Gerard Alexander, 'International Relations Theory Meets World Politics', in Stanley A. Renshon and Peter Suedfeld (eds), *Understanding the Bush Doctrine* (New York: Routledge, 2007), p. 49.
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 30. Smith, *Deterring America* (note 22), pp. 110, 115, 120; Gray, 'The Reformation of Deterrence' (note 19), p. 452.
 31. Smith, *Deterring America* (note 22), pp. 39, 41.
 32. Alexander, 'International Relations Theory Meets World Politics' (note 22), p. 52. Making a similar observation but with more balanced language, Patrick Clawson and Michael Eisenstadt conclude that in the case of Iran, 'Deterrence is not some easy, low-risk alternative that is obviously preferable to preventive military action'. Patrick Clawson and Michael Eisenstadt (eds), *Deterring the Ayatollahs: Complications in Applying Cold War Strategy to Iran*, Policy Focus #72 (Washington, DC: Washington Institute for Near East Policy, 2007), p. 34.
 33. Knopf, 'Wrestling with Deterrence' (note 26), p. 251.
 34. Lebovic, *Deterring International Terrorism and Rogue States* (note 14), pp. 2, 71, emphasis in original.
 35. Poppe *et al.*, 'Whither Deterrence?' (note 11), p. 7; Gray, 'Maintaining Effective Deterrence' (note 10), pp. 21, 31; Jervis, 'Deterrence, Rogue States, and the Bush Administration' (note 18).
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 39. Jeffrey S. Lantis, 'Strategic Culture and Tailored Deterrence: Bridging the Gap between Theory and Practice', *Contemporary Security Policy*, Vol. 30, No. 3 (December 2009), p. 476.
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49. See, for example, Davis and Jenkins, *Deterrence and Influence in Counterterrorism* (note 45), pp. 19–20.
50. Colby, 'Restoring Deterrence' (note 15), p. 421; see also Davis and Jenkins, *Deterrence and Influence* (note 45), pp. 10, 60.
51. Davis and Jenkins, *Deterrence and Influence in Counterterrorism* (note 45), p. 5.
52. In theory, the United States could threaten to increase the intensity of its efforts to eradicate al Qaeda's leadership if there is a future mass-casualty attack on US soil, while implicitly promising not to intensify its efforts otherwise, but it is hard to imagine that such a fine-grained message would have much impact on al Qaeda's behaviour.
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54. Davis and Jenkins, *Deterrence and Influence in Counterterrorism* (note 45), pp. xii, 15; see also p. 59.
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59. Brad Roberts, 'Deterring Terrorism: Terrorist Campaigns and Prolonged Wars of Mutual Coercion', in Institute for Defense Analyses, *Deterring Terrorism: Exploring Theory and Methods*, August 2002 (For Official Use Only); Gordon Drake, Warrick Paddon and Daniel Ciechanowski, 'Can We Deter Terrorists from Employing Weapons of Mass Destruction on the U.S. Homeland?', John F. Kennedy School of Government, National Security Program Discussion Paper Series, 2003; Bowen, 'Deterrence and Asymmetry' (note 48); David P. Auerswald, 'Deterring Nonstate WMD Attacks', *Political Science Quarterly*, Vol. 121, No. 4 (Winter 2006/2007); S. Paul Kapur, 'Deterring Nuclear Terrorists', in Paul *et al.*, *Complex Deterrence* (note 7).
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61. Gray, 'Maintaining Effective Deterrence' (note 10), p. viii; see also p. 28. For another example of a senior scholar who makes this point see Freedman, *Deterrence* (note 11), pp. 123–4.
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63. Lee E. Dutter and Ofira Seliktar, 'To Martyr or Not to Martyr: Jihad Is the Question, What Policy Is the Answer?', *Studies in Conflict & Terrorism*, Vol. 30, No. 5 (May 2007), pp. 435–6. Despite this observation, the authors (p. 438) still see tactical deterrence by denial as likely to be the most feasible approach.

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75. Roberts, 'Deterring Terrorism' (note 59), p. IV-32; Auerswald, 'Deterring Nonstate WMD Attacks' (note 59), p. 548; Lebovic, *Deterring International Terrorism and Rogue States* (note 14), p. 125.
76. Scott Helfstein *et al.*, 'Terrorism, Deterrence and Nuclear Weapons', White Paper Prepared for the Secretary of Defense Task Force on DoD Nuclear Weapons Management, Combating Terrorism Center, US Military Academy, West Point, NY, 31 October 2008, p. 32; Adam Garfinkle, 'Does Nuclear Deterrence Apply in the Age of Terrorism?', *Footnotes: The Newsletter of FPRI's Wachman Center*, Vol. 14, No. 10, Foreign Policy Research Institute (May 2009).
77. Report by the National War College Student Task Force on Combating Terrorism (note 60), p. 42.
78. Alex S. Wilner, 'Targeted Killings in Afghanistan: Measuring Coercion and Deterrence in Counterterrorism and Counterinsurgency', *Studies in Conflict and Terrorism*, Vol. 33, No. 4 (April 2010).
79. Roberts, 'Deterring Terrorism' (note 59), p. IV-55.
80. Report by the National War College Student Task Force on Combating Terrorism (note 60), p. 44.
81. Bruno S. Frey, *Dealing with Terrorism – Stick or Carrot?* (Cheltenham: Edward Elgar, 2004). Frey is one of the few fourth-wave analysts who rejects the use of deterrence against terrorism; he advocates reliance on positive incentives instead. While his proposal to improve the peaceful alternatives to terrorism makes sense (and is compatible with a deterrence strategy), other recommendations in the book are peculiar to say the least. For example, Frey proposes decentralizing society by dispersing government and population so as to reduce the number of high-value targets for terrorist attack. Whatever its theoretical merit, this is a practical non-starter.
82. Daniel Whiteneck, 'Deterring Terrorists: Thoughts on a Framework', *Washington Quarterly*, Vol. 28, No. 3 (Summer 2005); Colby, 'Expanded Deterrence' (note 15); Kapur, 'Deterring Nuclear Terrorists' (note 59).
83. Whiteneck, 'Deterring Terrorists' (note 82), pp. 194, 196; Colby, 'Expanded Deterrence' (note 15), p. 49; Kapur, 'Deterring Nuclear Terrorists' (note 59).
84. Colby, 'Expanded Deterrence' (note 15).
85. Helfstein *et al.*, 'Terrorism, Deterrence and Nuclear Weapons' (note 76), pp. 3–5, 18–21.
86. Roberts, 'Deterring Terrorism' (note 59), pp. IV-23–IV-24; Quinlan, 'Deterrence and Deterrability' (note 11), pp. 15–16; Jonathan Stevenson, 'Reviving Deterrence', in Brimmer (ed.), *Five Dimensions* (note 9), p. 51. In an important forerunner to these suggestions from before 9/11, Joseph Leggold noted that efforts to delegitimize terrorist methods or political objectives could have deterrent

- effects, but he did not elaborate on how this might be done. 'Hypotheses on Vulnerability' (note 66), p. 144.
87. Lewis A. Dunn, 'Can al Qaeda Be Deterred from Using Nuclear Weapons?', Occasional Paper 3, Center for the Study of Weapons of Mass Destruction (Washington, DC: National Defense University Press, July 2005), pp. 2, 11.
 88. *Ibid.*, p. 24. See also Dunn, 'Deterrence Today' (note 74), pp. 20–2.
 89. Brad Roberts, 'Deterrence and WMD Terrorism: Calibrating its Potential Contributions to Risk Reduction', Institute for Defense Analyses, Alexandria, VA, June 2007, p. 18.
 90. Helfstein *et al.*, 'Terrorism, Deterrence and Nuclear Weapons' (note 76), p. 30.
 91. Wilner, 'Deterring the Undeterrable' (note 64).
 92. Evan Braden Montgomery, *Nuclear Terrorism: Assessing the Threat, Developing a Response* (Washington, DC: Center for Strategic and Budgetary Assessments, 2009), pp. 68–72, quote at p. 70. This letter is also cited by Stevenson, 'Reviving Deterrence', p. 50, and Lewis A. Dunn, 'Influencing Terrorists' Acquisition and Use of Weapons of Mass Destruction: Exploring a Possible Strategy', in Kamp and Yost, *NATO and 21st Century Deterrence* (note 40), pp. 135–6.
 93. Garfinkle, 'Does Nuclear Deterrence Apply?' (note 76).
 94. Kapur, 'Deterring Nuclear Terrorists' (note 59). Montgomery notes that all efforts to secure or reduce the availability of nuclear materials add to deterrence by denial, with the ultimate goal being to convince terrorists that obtaining a nuclear device is simply not a realistic option. *Nuclear Terrorism* (note 92), p. 72.
 95. Robin M. Frost, 'Nuclear Terrorism after 9/11', *Adelphi Papers*, No. 378 (Abingdon: Routledge, December 2005), p. 9; Auerswald, 'Deterring Nonstate WMD Attacks' (note 59), p. 555; Litwak, *Regime Change* (note 26), p. 304; Vera L. Zakem and Danielle R. Miller, 'Stop or Else: Basic Concepts to Deter Violent Non-State Actors', in Russell D. Howard and James J.F. Forest (eds), *Weapons of Mass Destruction and Terrorism* (New York: McGraw Hill, 2008), p. 351.
 96. Jervis, 'The Confrontation between Iraq and the US' (note 28), p. 332, n. 8; Castillo, 'Nuclear Terrorism' (note 29), p. 429; Record, 'Nuclear Deterrence, Preventive War, and Counterproliferation' (note 26), p. 20; Frost, 'Nuclear Terrorism after 9/11' (note 95), p. 64; Auerswald, 'Deterring Nonstate WMD Attacks' (note 59), p. 555; Knopf, 'Wrestling with Deterrence' (note 26), p. 250.
 97. Castillo, 'Nuclear Terrorism' (note 29), p. 429; Frost, 'Nuclear Terrorism after 9/11' (note 95), pp. 64, 70; Litwak, *Regime Change* (note 26), p. 304; Knopf, 'Wrestling with Deterrence' (note 26), p. 250; Zakem and Miller, 'Stop or Else' (note 95), p. 352.
 98. Whiteneck, 'Deterring Terrorists' (note 82), pp. 192–3.
 99. Alexander, 'International Relations Theory Meets World Politics' (note 22), p. 49; Matthew Phillips, 'Uncertain Justice for Nuclear Terror: Deterrence of Anonymous Attacks through Attribution', *Orbis*, Vol. 51, No. 3 (Summer 2007), p. 439.
 100. For an overview of nuclear forensics intended for a general audience, see Michael Miller, 'Nuclear Attribution as Deterrence', *Nonproliferation Review*, Vol. 14, No. 1 (March 2007).
 101. Michael A. Levi, 'Deterring Nuclear Terrorism', *Issues in Science and Technology* (Spring 2004), available at www.issues.org/20.3/levi.html (accessed 5 July 2005); see also Graham Allison, 'Nuclear Accountability', *Technology Review* (July 2005). Jay Davis of Livermore Lab (and a former director of the Defense Threat Reduction Agency) was another early proponent of investing in nuclear forensics. Like Levi, he implied that deterrence would flow automatically from forensics, but he did acknowledge that there are technical and organizational challenges in attribution. See Jay Davis, 'The Grand Challenges of Counter-Terrorism', Center for Global Security Research, Lawrence Livermore National Laboratory, 2001, available at cgsr.llnl.gov/CGSR/Document.jsp?T=D&ID=28 (accessed 14 November 2008), and 'The Attribution of WMD Events', *Journal of Homeland Security* (April 2003).
 102. Levi, 'Deterring Nuclear Terrorism' (note 101); Robert L. Gallucci, 'Averting Nuclear Catastrophe: Contemplating Extreme Responses to U.S. Vulnerability', *Annals of the American Academy of Political and Social Science*, No. 607 (September 2006), pp. 57–8; Miller, 'Nuclear Attribution as Deterrence' (note 100), pp. 52, 54; Caitlin Talmadge, 'Deterring a Nuclear 9/11', *Washington Quarterly*, Vol. 30, No. 2 (Spring 2007), p. 29.
 103. Talmadge, 'Deterring a Nuclear 9/11' (note 102).
 104. Miller, 'Nuclear Attribution as Deterrence' (note 100), pp. 33, 52; Talmadge, 'Deterring a Nuclear 9/11' (note 102), pp. 30–1; Kapur, 'Deterring Nuclear Terrorists' (note 59), p. 124; Michael A. Levi, *Deterring State Sponsorship of Nuclear Terrorism*, Council Special Report No. 39 (New York: Council on Foreign Relations, September 2008), p. 27.

105. Anders Corr, 'Deterrence of Nuclear Terrorism: A Negligence Doctrine', *Nonproliferation Review*, Vol. 12, No. 1 (March 2005).
106. Gallucci, 'Averting Nuclear Catastrophe' (note 102), pp. 57–8 (Gallucci also published an earlier, slightly shorter version of the article in *Harvard International Review*, Vol. 26, No. 4 [Winter 2005]; this and subsequent references are to the 2006 article in *Annals*, cited above).
107. Colby, 'Expanded Deterrence' (note 15).
108. Gallucci, 'Averting Nuclear Catastrophe' (note 102), p. 58, emphasis in original.
109. Corr, 'Deterrence of Nuclear Terrorism' (note 105), p. 129, emphasis in original.
110. Whiteneck, 'Deterring Terrorists' (note 82), pp. 191–2, 198; Gallucci, 'Averting Nuclear Catastrophe' (note 102), p. 57; Dunn, 'Influencing Terrorists' Acquisition' (note 92), p. 138.
111. Corr, 'Deterrence of Nuclear Terrorism' (note 105), p. 136. Others who advocate threatening regime change as a way to deter states from transferring WMD to terrorists include Fisher, 'Deterrence, Terrorism and American Values' (note 71), p. 6; and Knopf, 'Wrestling with Deterrence' (note 26), p. 255.
112. Whiteneck, 'Deterring Terrorists' (note 82), p. 191.
113. Miller, 'Nuclear Attribution as Deterrence' (note 100), p. 48.
114. Gallucci, 'Averting Nuclear Catastrophe' (note 102), p. 58; Litwak, *Regime Change* (note 26), p. 318; Colby, 'Expanded Deterrence' (note 15), p. 57.
115. Phillips, 'Uncertain Justice for Nuclear Terror' (note 99), p. 442.
116. See also, for example, Levi, *Deterring State Sponsorship* (note 104), p. 18.
117. Levi, *Deterring State Sponsorship* (note 104). Montgomery (*Nuclear Terrorism*, note 92, p. 91) also warns against threatening military retaliation after nuclear leakage for similar reasons.
118. Auerwald, 'Deterring Nonstate WMD Attacks' (note 59), pp. 557–9.
119. *Ibid.*, pp. 561, 565, 567.
120. *Ibid.*, pp. 567–8.
121. Anne-Marie Slaughter and Thomas Wright, 'Punishment to Fit the Nuclear Crime', *Washington Post*, 2 March 2007, p. A13.
122. Smith, *Deterring America* (note 22), Part II; Graham Allison, 'Deterring Kim Jong Il', *Washington Post*, 27 October 2006, p. A23. Keith Payne also seems to draw this inference, but his wording is ambiguous. He could be making the related point that having allowed Iran to cross a series of red-lines without significant consequences, the United States has undermined its own deterrent credibility. 'Deterring Iran: The Values at Stake and the Acceptable Risks', in Clawson and Eisenstadt, *Deterring the Ayatollahs* (note 21), p. 3. But it is unlikely that getting away with adding a few centrifuges will lead Iran to believe it could launch a nuclear attack with impunity.
123. The importance of clearly defining and communicating red-lines is also stressed by Michael S. Gerson, 'Concepts of Deterrence in the 21st Century: Some Things Old, Some Things New', in Kamp and Yost, *NATO and 21st Century Deterrence* (note 40), pp. 168, 170.
124. See, for example, Gregory F. Giles, 'Waging Deterrence against Iran', p. 118, and Jonathan Trexel, 'Concepts for Deterrence Operations', pp. 198–9, both in Kamp and Yost, *NATO and 21st Century Deterrence* (note 40).