

The New Era of Nuclear Weapons, Deterrence, and Conflict

We have published a series of articles in recent years about the role of nuclear weapons in international politics.¹ Taken together, these articles advance two main arguments: First, technological innovation has dramatically improved the ability of states to launch “counterforce” attacks—that is, military strikes aimed at disarming an adversary by destroying its nuclear weapons. Second, in the coming decades, deterring the use of nuclear weapons during conventional wars will be much harder than most analysts believe. Both of these arguments have important implications for the US nuclear weapons modernization effort currently underway, and both have generated discussion and criticism in the nuclear analytical community. Thus, we offer here a brief summary of our main points and rebuttal to several of the criticisms.

The Counterforce Revolution and US Nuclear Primacy

The first set of arguments is about an important, yet virtually unnoticed, consequence of changes in military technology and the balance of power. In a nutshell, the same revolution in accuracy that has transformed *conventional* warfare has had equally momentous consequences for *nuclear* weapons and deterrence.² Very accurate delivery systems, new reconnaissance technologies, and the downsizing of arsenals from Cold War levels have made both conventional and nuclear counterforce strikes against nuclear arsenals much more feasible than ever before. Perhaps most surprising, pairing highly accurate delivery systems with nuclear weapons permits target strategies that would create virtually no radioactive fallout, hence, vastly reduced fatalities.

For nuclear analysts weaned on two seeming truths of the Cold War era—that nuclear arsenals reliably deter attacks via the threat of retaliation, and that nuclear weapons use is tantamount to mass slaughter—the implications of the counterforce revolution should be jarring.

The conventional view linking nuclear weapons to stalemate and slaughter was correct during the latter decades of the Cold War. By the mid 1960s, a truly effective nuclear counterforce strike by either side—that is, a disarming blow by one superpower against the nuclear arsenal

of the other—had become impossible.³ Each of the superpowers wielded an enormous arsenal, which was deployed on a diverse set of delivery systems. The sheer number of targets that would have to be destroyed, combined with the limitations of contemporary guidance systems, virtually guaranteed that any disarming attack would fail, leaving the enemy with a large number of surviving weapons with which to retaliate. Furthermore, any significant counterforce strike would have produced enormous quantities of lethal radioactive fallout and hence caused millions of civilian casualties.⁴ Most Cold War strategists—many of whom are still active in the nuclear analytical community today—came to instinctively associate nuclear weapons with stalemate and nuclear use with Armageddon.

But nuclear weapons—like virtually all other weapons—have changed dramatically over the past four decades. Modern guidance systems permit nuclear planners to achieve “probabilities of damage” against hardened nuclear targets that were unheard of during the Cold War. And heightened accuracy also permits nontraditional targeting strategies that would further increase the effectiveness of counterforce strikes and greatly reduce casualties.⁵ The revolution in accuracy and sensors, and the relatively small contemporary arsenals, mean that nuclear balances around the world—for example, between the United States and China, the United States and North Korea, and perhaps in the future between Iran and Israel—bear little resemblance to the Cold War superpower standoff.

To illustrate the revolution in accuracy, in 2006 we modeled the hardest case for our claim: a hypothetical US first strike on the next largest nuclear arsenal in the world, that of Russia. The same models that were used during the Cold War to demonstrate the inescapability of stalemate—the condition of “mutual assured destruction,” or MAD—now suggested that even the large Russian arsenal could be destroyed in a disarming strike.⁶ Furthermore, the dramatic leap in accuracy—which is the foundation for effective counterforce—is based on widely available technologies within reach of other nuclear-armed states, including Russia, China, Pakistan, and others. Our overriding message is not about the US-Russian nuclear balance per se. Rather, our point is that key beliefs about nuclear weapons have been overturned; scholars and analysts need to reexamine their underlying assumptions about nuclear stalemate and deterrence.

Since 2006, we have discussed these issues with many nuclear analysts, US government officials, and military officers involved with the nuclear mission. Almost everything we learned reinforced our views about the

counterforce revolution and suggests our earlier work *understated* the leap in US counterforce capabilities—with one exception. We previously argued that US “nuclear primacy”—the ability to use nuclear weapons to destroy the strategic forces of any other country—appeared to be an intentional goal of US policymakers. We noted that even as the United States greatly reduced its nuclear arsenal, it retained, and in some cases improved, those nuclear forces that were ideally suited to the counterforce mission. Based on what we have subsequently learned, we would recast and sharpen this part of our argument to contend that the United States is intentionally pursuing “*strategic primacy*”—meaning that Washington seeks the ability to defeat enemy nuclear forces (as well as other WMD)—but that US nuclear weapons are but one dimension of that effort. In fact, the effort to neutralize adversary strategic forces—that is, achieve strategic primacy—spans nearly every realm of warfare: for example, ballistic missile defense, antisubmarine warfare, intelligence-surveillance-and-reconnaissance systems, offensive cyber warfare, conventional precision strike, and long-range precision strike, in addition to nuclear strike capabilities.

In sum, two fundamental “truths” about nuclear weapons—they reliably produce stalemate and their use would necessarily create mass casualties—have been quietly overturned by changes in technology and dramatic force reductions. Unfortunately, many contemporary analyses of nuclear politics seem to rest on the assumption that nuclear deterrence still functions as it did in the 1970s. The stipulation of mass slaughter under MAD conditions may be true for some nuclear relationships in the world but not for others. And new conditions generate new questions: for example, how is deterrence likely to work when nuclear use does not automatically imply suicide and mass slaughter? In particular, what are the implications for US nuclear policy?

The Problem of Coercive Escalation and US Nuclear Modernization

A second set of arguments stems from the problem of nuclear escalation and the future of the US nuclear arsenal. Our main claim is that deterring nuclear conflict will be much more difficult in the coming decades than many analysts realize. As nuclear weapons proliferate, it becomes increasingly likely that the United States will find itself in conventional

conflicts with nuclear-armed adversaries. Those adversaries understand the consequences of losing a war to the United States—prison or death typically awaits enemy leaders.⁷ Coercive nuclear escalation as a means of creating stalemate and remaining in power is one of the only trump cards available to countries fighting the United States.

Some analysts might scoff at the notion that a rational leader would use nuclear weapons against a superpower like the United States. But that retort conflates the logic of peacetime deterrence with the logic of war, and it ignores history. During peacetime, almost any course of action is better than starting a nuclear war against a superpower. But during war—when that superpower’s planes are bombing command and leadership sites, and when its tanks are seizing territory—the greatest danger may be to refrain from escalation and let the war run its course. Leaders of weaker states—those unlikely to prevail on the conventional battlefield—face life-and-death pressures to compel a stalemate. And nuclear weapons provide a better means of coercive escalation than virtually any other.

The notion of countries escalating conflict to avoid conventional defeat may sound far-fetched, but it is well grounded in history. When nuclear-armed states face overwhelming conventional threats—or worry about the possibility of catastrophic conventional defeat—they often adopt coercive escalatory doctrines to deter war or stalemate a conflict that erupts. Pakistan openly intends to use nuclear weapons to counter an overwhelming conventional Indian invasion. Russia claims it needs theater nuclear weapons to counter NATO’s conventional advantages. Israel expects to win its conventional wars but retains the capability for nuclear escalation to prevent conquest in case its conventional forces suffer a catastrophic defeat.

The discussion of coercive nuclear escalation should sound familiar to Western analysts, as it was NATO’s strategy for three decades. From the mid 1960s until the end of the Cold War, NATO planned to deter war, and stalemate it if necessary, through coercive nuclear escalation. NATO understood that—by the mid 1960s—it could no longer win a nuclear war against the Soviet Union, but it still based its national security strategy on coercive escalation because it believed Warsaw Pact conventional forces were overwhelming.

In short, the escalatory dynamics that existed during the Cold War exist today—and they are just as powerful. States still face the same critical

national security problem they faced during the Cold War and throughout history: namely, how to prevent stronger countries from conquering them. The high-stakes poker game of international politics has not ended; the players and the cards dealt have merely changed. Those who were weak during the Cold War are now strong, and another set of militarily “weak” countries—such as North Korea, Iran, Pakistan, and even China and Russia—now clutch or seek nuclear weapons to defend themselves from overwhelming military might, just as NATO once did.

What can the United States do to mitigate the problem of escalation? Ideally, it should avoid wars against nuclear-armed enemies. But that option may not be possible given current US foreign policy and alliances. War may erupt on the Korean Peninsula, ensnaring the United States in a battle against a desperate nuclear-armed foe. In the future, Washington may fight a nuclear-armed Iran over sea lanes in the Persian Gulf. And the United States could someday be dragged into war by a clash between Chinese and Japanese naval forces near disputed islands.

Alternatively, the United States could seek to develop conventional war plans designed to wage limited war without triggering enemy escalation. Development of alternative plans is sensible, but history shows that wars are difficult to contain, and modern conventional warfare is inherently escalatory.

A third option to mitigate these dangers is to retain, and improve, US nuclear and nonnuclear counterforce capabilities. Fielding powerful counterforce weapons may help deter adversary escalation during war—by convincing enemy leaders to choose a “golden parachute” rather than escalation—and would give US leaders better response options if deterrence failed. In particular, the United States should retain and develop nuclear weapons that bring together three key characteristics of counterforce: high accuracy, flexible yield, and prompt delivery.

To be clear, sharpening US counterforce capabilities is not a “solution” to the problem of adversary nuclear weapons. Although, *ceteris paribus*, it would be better to have excellent counterforce capabilities than to lack them, given enough time and motivation, many countries could greatly increase the survivability of their forces. But given the plausible prospect that the United States will find itself waging war against nuclear-armed states, and given the powerful incentives of US adversaries to brandish or use nuclear weapons, it would be reckless to proceed without a full suite of modern nuclear and nonnuclear counterforce capabilities.

Response to Our Critics

A recent conference panel devoted to our work raised several criticisms, some familiar and others new.⁸ Below we summarize the main objections and offer our response.

“The United States is not seeking to neutralize adversary deterrent forces.”

Some critics argue that the United States is not seeking strategic primacy. They reject any intent behind the emergence of US nuclear primacy and downplay the effort to neutralize adversary deterrent forces in US military strategy. Instead of the United States bolstering its counterforce capabilities, critics emphasize how it is minimizing the role of nuclear weapons in national security strategy—as only this is consistent with international arms control and nonproliferation efforts aimed at convincing other states to forego strategic weapons, reduce existing arsenals, or cancel modernization programs. The implication is that we have mistakenly imputed sinister motives to US defense programs and planning.

Disavowal of the US pursuit of strategic primacy comes most frequently from those who work inside or outside the government on arms control and nonproliferation policy. Yet, those who work on US regional war plans and counterproliferation policy typically see nothing controversial in our claim that the United States seeks the ability to neutralize adversary strategic weapons. In fact, this effort appears to be official US policy. As a simple Internet search shows, the US government does not hide the wide range of research and planning efforts underway that fall under the rubric of “defeat WMD” or “combatting WMD.” And the underlying logic behind those efforts is simple: deterrence may fail, especially during conventional wars, and therefore the United States needs the ability to defend US forces, allies, and the US homeland from enemy WMD using, depending on the circumstances, conventional strikes, missile defenses, special operations, offensive cyber attacks, and in extreme cases nuclear strikes. In short, “defeating WMD” and “seeking strategic primacy” are essentially synonymous: protecting oneself from others’ strategic weapons (which sounds reasonable) and neutralizing others’ strategic deterrent forces (which sounds more malicious) are simply two phrases describing the same behavior.

Current US grand strategy—which takes an expansive definition of national interests and is committed to a global network of alliances—

means that the United States may be drawn into wars with WMD-armed adversaries. We agree with many US government officials that the ability to neutralize those adversary capabilities in such a conflict may be critical. Others are free to disagree. But all analysts should recognize that current US efforts to neutralize adversaries' deterrent forces are inherently threatening to those states, and few should be surprised when those adversaries treat US pleas for greater arms reductions with considerable skepticism.⁹

“Nuclear weapons are unnecessary; conventional weapons can do the job.”

A second criticism is that retaining (or improving) specific US nuclear weapons for the counterforce mission is unnecessary. The idea is that modern delivery systems are now so accurate that even conventional weapons can reliably destroy hardened targets. The key, according to this argument, is simply knowing the location of the target: if you know where it is, you can kill it with conventional weapons; if you do not, even nuclear weapons will not help. The implication is that even though counterforce capabilities are crucial, nuclear weapons are not needed for this mission.

This criticism is wrong, because there is a substantial difference between the expected effectiveness of conventional strikes and the expected effectiveness of nuclear strikes against a range of plausible counterforce targets. Even the most powerful conventional weapons—for example, the GBU-57 “Massive Ordnance Penetrator”—have an explosive power comparable to “only” 3–5 tons of TNT. By comparison, the least-powerful (according to open sources) nuclear weapon in the US arsenal explodes with the equivalent power of roughly 300 tons of TNT.¹⁰ The higher yield of nuclear weapons translates to greater destructive radius and higher likelihood of target destruction.¹¹ Against ordinary targets, the accuracy and destructive power of conventional weapons is sufficient. Against nuclear targets—if success is defined by the ability to destroy *every* weapon targeted—the much greater destructive radius of nuclear weapons provides a critical margin of error.

Furthermore, in real-world circumstances delivery systems may not achieve their usual levels of accuracy. Jammers that degrade the effectiveness of guidance systems and active defenses that impede aircraft crews or deflect incoming missiles can undermine accuracy. Even mundane things

like bad weather can degrade wartime accuracy. Against hardened targets, conventional weapons must score a direct hit, whereas close is good enough when it comes to nuclear weapons. Lastly, many key counterforce targets are mobile. In those cases, nuclear weapons allow for greater “target location uncertainty” (when the target has moved since being observed) compared to their conventional counterparts.¹²

It is true that modern guidance systems have given conventional weapons far greater counterforce capabilities than ever before, but there is still a sizable gap between what nuclear and conventional weapons can accomplish.

“These arguments undermine US arms control and nonproliferation policy.”

Finally, some critics suggest that whatever the truth of our claims, an open discussion of these issues is counterproductive because it undermines US arms control and nonproliferation objectives. They worry that our analysis emboldens defense hawks in other countries (particularly in Russia and China), undermines informal “Track II” diplomacy, and may catalyze foreign nuclear arms modernization. More broadly, by drawing too much attention to the leap in US nuclear capabilities and the utility of nuclear weapons for relatively weaker states, we undermine US efforts to delegitimize and prevent the spread of the nuclear weapons.

This critique is misguided for three reasons. First, other countries understand that the United States wields enormous counterforce capabilities and seeks to enhance them. For example, defense analysts in Russia and China closely watch and frequently comment on changes in US military capability. Moreover, potential US adversaries understand that nuclear weapons are uniquely suitable tools to deter a superior adversary or prevent catastrophic conventional defeat. This is why Pakistan relies on nuclear weapons to deter India; why Russia says it needs theater nuclear weapons; why Israel will not abandon the “Samson Option”; and why North Korea clings at such great expense to its nuclear weapons.

Second, stifling discussion of these issues is detrimental to US national security. For example, some defense analysts seem to have adopted the assumption that no country would deliberately use nuclear weapons against the United States, even though deliberate escalation was US policy when NATO felt it was too weak to defend itself against a Soviet invasion of Europe. If analysts continue to hold a false sense of the irrelevance of nuclear weapons even as US adversaries cling to them to

try to keep the United States at bay—and if analysts convince enough policymakers to do the same—there is a real danger the United States could stumble into a nuclear war. The lack of open discussion about the role of nuclear weapons is compounded by the constraints of security classification, which further limits the ability of policymakers to explain important issues. In short, ignoring these issues—not discussing them—is the real danger.

Finally, unless they recognize the strategic incentives faced by countries like North Korea, Pakistan, Iran, and China, US leaders are susceptible to misattributing malign and aggressive intentions from those countries' efforts to acquire nuclear weapons or modernize delivery systems and arsenals. Unless US leaders understand that other countries rely on nuclear systems to keep more powerful potential adversaries in check—and unless they acknowledge to themselves that the United States is working steadily to neutralize adversary deterrent forces—they are more likely to misperceive enemy efforts to develop a robust deterrent force as a clear sign of hostility and as evidence that the other country is out of step with international standards of behavior. Simply put, the United States may prefer that its adversaries disarm or remain unarmed and thus leave themselves vulnerable to US power, but the fact that they often do not should not be misperceived as a sign of aggression.

Conclusion

The arguments we advance here raise new puzzles for scholars and pressing issues for policymakers. Scholars need to reexamine much of the established wisdom about nuclear deterrence. From Schelling's early works to the present, many scholars have explored nuclear deterrence dynamics by modeling coercion under conditions of mutual vulnerability. Those models suggest that deterrence success depends principally upon resolve rather than capabilities (because the capability of each side to inflict unacceptable damage is an assumption of the model). Schelling's formulation made sense when he developed it—to explore the challenges of Cold War deterrence under conditions of MAD—but the same analytic framework is still used today even though many nuclear dyads are not characterized by nuclear stalemate. The counterforce revolution means that nuclear exchanges may not lead to mutual devastation—one party may suffer far less or even be spared entirely. Analytical models and conclusions derived from them (for example, about the importance

of resolve over capabilities for deterrence success) need to be reexamined and updated.

The challenges facing US policymakers, given the changes in the nuclear landscape, are profound. They must find a way to build sufficient counterforce capabilities to protect the United States and its allies from quite plausible adversary escalatory strategies—all the while avoiding building so much capability that it triggers a Cold War–style arms race with Russia and China. They must direct the US military to develop concepts for waging *conventional* war against nuclear-armed adversaries that would permit the United States to achieve its military objectives yet reduce the incentives for adversary escalation.

Perhaps most fundamentally, US leaders must encourage a more transparent and public debate about the roles and missions of US nuclear forces—and the capabilities that must be retained in the arsenal to execute those missions. Unfortunately, many contemporary nuclear analysts, policy advocates, and policymakers seek to minimize discussion about nuclear weapons and simply assert that nuclear weapons are not particularly useful in the twenty-first century. That is a dangerous approach. The very reason the United States relied on nuclear weapons in the past is the reason potential US adversaries will rely on them now and in the future: nuclear weapons are a powerful deterrent against conventionally superior adversaries. In short, we need to be honest about why states rely on nuclear weapons, as we once did, and the dangers this poses for the United States and its allies. **SSQ**

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Notes

1. See Keir A. Lieber and Daryl G. Press, "The Rise of U.S. Nuclear Primacy," *Foreign Affairs* 85, no. 2 (March/April 2006): 42–54; Lieber and Press, "The End of MAD? The Nuclear Dimension of U.S. Primacy," *International Security* 30, no. 4 (Spring 2006) 7–44; Peter C. W. Flory, Keith Payne, Pavel Podvig, Alexei Arbatov, Lieber, and Press, "Nuclear Exchange: Does Washington Really Have (Or Want) Nuclear Primacy," *Foreign Affairs* 85, no. 5 (September/October 2006): 149–57; Jeffrey S. Lantis, Tom Sauer, James J. Wirtz, Lieber, and Press, "The Short Shadow of U.S. Primacy?" *International Security* 31, no. 3 (Winter 2006/07): 174–93; Lieber and Press, "U.S. Nuclear Primacy and the Future of the Chinese Nuclear Deterrent," *China Security Quarterly*, no. 5 (Winter 2006/07): 66–89; Lieber and Press, "Superiority Complex: Why America's Growing Nuclear Supremacy May Make War with China More Likely," *Atlantic Monthly* 300, no. 1 (July/August 2007) 86–92; Lieber and Press, "The Nukes We Need: Preserving the American Deterrent," *Foreign Affairs* 88, no. 6 (November/December 2009): 39–51; Jan Lodal, James M. Acton, Hans M. Kristensen, Matthew McKinzie, Ivan Oelrich, Lieber, and Press, "Second Strike: Is the U.S. Nuclear Arsenal Outmoded?" *Foreign Affairs* 89, no. 2 (March/April 2010): 145–52; and Lieber and Press, "Obama's Nuclear Upgrade: The Case for Modernizing America's Nukes," *Foreign Affairs* (July 2011, Postscript).

2. We use "revolution in accuracy" as shorthand for a broad set of changes (still underway) that stem from the integration of computers into warfare. Among other things this has led to vastly improved guidance, surveillance, and command and control systems. Each of these improvements has greatly increased the ability to locate targets and precisely deliver munitions.

3. It is essential to differentiate the 1950s—during which the United States possessed a potent disarming capability against the Soviet Union—from the subsequent era of Cold War stalemate. During the 1950s, the US nuclear force far outmatched the meager Soviet arsenal. Until 1956, the Soviet Union had no weapons with the range to reach the United States, and even in the latter parts of the decade Moscow's rudimentary long-range nuclear arsenal was highly vulnerable to a nuclear disarming strike. The United States recognized its huge advantage and planned to fight and win World War III—if it occurred—by launching a massive nuclear disarming strike on the Soviet Union. Ironically, the era that spawned the term "mutual assured destruction (MAD)" was not characterized by the condition of MAD; nuclear stalemate only emerged later. See Lieber and Press, "Nuclear Weapons and International Politics," unpublished book manuscript.

4. See, for example, the fallout models in William Daugherty, Barbara G. Levi, and Frank von Hippel, "The Consequences of 'Limited' Nuclear Attacks on the United States," *International Security* 10, no. 4 (Spring 1986) 3–45; and Levi, von Hippel, and Daugherty, "Civilian Casualties from 'Limited' Nuclear Attacks on the USSR," *International Security* 12, no. 3 (Winter 1987/88): 168–89.

5. The accuracy revolution has greatly increased the probability that a given warhead will destroy a hardened target, but the full range of consequences is much broader. For example, high accuracy allows targeteers to assign many weapons to a given target, greatly increasing the odds of a successful strike. In the past, "many-on-one" targeting was difficult because weapons that missed their targets—but which detonated nearby—might create dust clouds that would shield the target from additional incoming warheads. This problem of "fratricide" has been essentially eliminated by the leap in accuracy. See discussion in Lieber and Press, "End of MAD?" 20–22. Additionally, the revolution in accuracy permits planners to target an enemy's hardened nuclear sites using low-yield weapons, set to detonate as airbursts, thereby vastly reducing fallout and collateral damage. See Lieber and Press, "The Nukes We Need," including the "Technical Appendix." We have subsequently redone the calculations underpinning

our models of hypothetical counterforce strikes using the US Department of Defense VNTK (Vulnerability Number for Thermonuclear Kill) damage assessment system, and the core results are confirmed. (Contact authors for information on those results.)

6. Our analysis turned out to be a highly provocative exercise for some, including many Russian policymakers and analysts. See, for example, “Russian Media See Article on U.S. Nuclear Primacy as Provocation,” *OSC Analysis*, 3 April 2006; “Replying to Foreign Affairs Article, Expert Mulls Nuclear Arms Programs,” *Krasnaya Zvezda*, 12 April 2006, translated in OSC, Doc ID: CEP20060411330004; Pavel K. Baev, “Moscow Puts PR Spin on its Shrinking Nuclear Arsenal,” *Eurasia Daily Monitor*, 17 April 2006; “Moscow Rejects U.S. Authors’ Claims of U.S. First-Strike Capability, as Putin Protects Nuclear Weapons Infrastructure,” *WMD Insights*, issue 5 (May 2006): 17–21; and “Chinese Media Discusses U.S. Nuclear Superiority,” *ibid.*, 15–17.

7. The experience of leaders who recently lost wars to the United States is enlightening. In 1989 the United States conquered Panama and arrested its leader, Manuel Noriega; he has so far spent 23 years in prison. Saddam Hussein lost power, his sons were killed, and he was humiliated and hung in front of cheering enemies. Muammar Qaddafi spent his last days hiding from US-supported rebels, who eventually found him and beat him to death on the side of a road. Even leaders whose countries were never conquered—i.e., they only suffered “limited” military defeats—often paid a high price. The Bosnian Serb leaders Radovan Karadzic and Ratko Mladic are in prison in The Hague, where Serbia’s former leader, Slobodon Milosevic, died in detention.

8. “Roundtable on U.S. Nuclear Posture: Assessing the Lieber-Press Series in *Foreign Affairs*,” Annual Conference of the International Security Studies Section (ISSS) of the International Studies Association and the International Security and Arms Control Section (ISAC) of the American Political Science Association, in conjunction with the Triangle Institute of Security Studies, 5 October 2012, Chapel Hill, North Carolina.

9. During the 2011 military intervention in Libya, the North Korean government proclaimed that NATO’s action “teaches the international community a serious lesson” about the consequences of “nuclear dismantlement”—namely, it meant for Libya that the United States “swallowed it up by force.” “Foreign Ministry Spokesman Denounces U.S. Military Attack on Libya,” *Korea News Service*, 22 March 2011. The US State Department response—that NATO’s action in Libya “has absolutely no connection with [Libya] renouncing their nuclear program or nuclear weapons”—obfuscates the issue because the North Korean claim was that the lack of Libyan nuclear weapons *permitted* (not triggered) NATO’s attack. *New York Times*, 24 March 2011. That the North Korean regime’s statement was more frank than the US one indicates the deep contradictions in US policy between the lofty proposals for nuclear disarmament and the desire to be able to use military force effectively against adversaries around the globe.

10. According to open sources, the lowest-yield setting of the B61 bomb is 0.3 kilotons, which means the equivalent of 300 tons of TNT. The GBU-57 explodes with roughly 1 percent of the B61’s explosive power.

11. As a rule of thumb, destructive radius typically varies as a function of “yield” to the one-third power, so the B61 would have roughly 4.5 times the destructive radius of the most powerful conventional weapon.

12. Low-yield nuclear weapons could be detonated at altitudes that would create a sufficiently large lethal area on the ground against mobile missile systems to account for the target location uncertainty that is often created by lags between “sensor,” “shooter,” and “munition arrival” without subjecting large areas of enemy territory to destruction and without creating fallout.