

CHAPTER 7

NUCLEAR COMMAND AND CONTROL IN CRISIS: OLD LESSONS FROM NEW HISTORY

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The four case studies in this volume are usefully evaluated through two distinct lenses. First and foremost is the lens of theory: What do the case studies reveal about prevailing debates among theorists of nuclear proliferation, especially the optimist-pessimist debate? Second is the lens of policy: What do policy-makers need to learn from the case studies?

WHAT DID WE KNOW AND WHY DID WE THINK WE KNEW IT?

For the theory lens, of course, what one sees depends on who is doing the looking. Some 2 decades ago, the field was locked in a dialectic over the consequences of proliferation. I identified at least four schools:¹ Paleo-pessimists, who thought that new nuclear states would be destabilizing because they would feature irrational leaders;² paleo-optimists, who thought new nuclear states would enhance stability because of the robustness of rational deterrence theory;³ neo-pessimists, who thought that new nuclear states would be destabilizing because they would face daunting command and control problems;⁴ and neo-optimists, who thought that new nuclear states would enhance stability because they would face easier command and control challenges and adopt safer measures to confront them.⁵ There has been a vigorous theoretical debate in

the intervening years, but most of it has focused on the determinants of proliferation—why and how a state develops nuclear weapons rather than to what effect.⁶ Recently, however, the old optimist-pessimist debate has been revived by large-n studies of the effects of proliferation on the initiation and resolution of crises.⁷

A widely acknowledged limitation of the earlier literature was its near-total reliance on evidence from the two first nuclear powers—above all, the then-emerging and now-extensive record of U.S. nuclear history. The recent statistical studies, of course, address this problem to some degree, but in so doing, they introduce the inevitable limitations of large-n work—abstracting away granular detail about the way nuclear powers manage their nuclear arsenal and coding as similar cases that might have important, but fine-grained, distinctions. Significant empirical contributions have extended our understanding of relevant nuclear operations in other countries, approximating the granularity achieved decades ago in the U.S. and Soviet cases.⁸ Yet, the four case studies commissioned for this project are an important step forward in this process of widening and deepening the public analysis of nuclear history and are especially valuable for zeroing in on a topic of special concern: nuclear security, specifically, the risks of accidental or unauthorized use of nuclear weapons arising out of a compromise in nuclear custody. Each of the case studies makes valuable contributions to that area by identifying lessons learned from the peculiar history of individual countries. The theoretical literature foreshadows what those lessons might be.

Optimists (whether paleo or neo) expect the cases to confirm several different expectations:

1. Regardless of what they say before they get nuclear weapons, states will recognize the distinctiveness of nuclear weapons.⁹

2. New nuclear powers will develop robust and careful procedures that minimize command and control problems.¹⁰

3. New nuclear states will adopt best practices, adapted to their specific needs.¹¹

4. Apparent “near misses” will, upon closer inspection, turn out to be not such close calls after all.¹²

5. The nuclear command systems will bend and not break when stressed.¹³

Pessimists (paleo or neo), in contrast, expect the cases to confirm:

1. Wetware trumps software, which trumps hardware.¹⁴ The effectiveness of technological devices will be determined by administrative procedures. The effectiveness of administrative procedures will be determined by the reliability of individuals tasked with implementing them.

2. Political and cultural factors will distort the normalizing and homogenizing logic of rational deterrence theory.¹⁵

3. Countries will undergo nuclear learning, involving trial and error.¹⁶

4. Material factors – such as the size of arsenal or financial constraints – will shape command and control choices, which may have downsides.¹⁷

5. The combination of complexity and unavoidable improvisation will result in “normal accidents.”¹⁸

How do these expectations hold up in our cases?

RUSSIA

Nikolai Sokov analyzes a series of close calls during the breakup of the Soviet Union. None produced a catastrophic breakdown of the command and control system, and there were some aspects that reinforced the optimistic line. Yet, on balance, the post-Soviet experience seems to confirm the expectation of pessimists; Sokov echoes very closely the pessimist line: “. . . control of nuclear weapons in each case hung on a very thin thread, and next time we might not be as lucky.”¹⁹

Optimists could read in Sokov’s case one very important and reassuring fact: Political chaos can produce fissures in the military system without fracturing it. The nuclear custodians were touched by politics but also were inoculated with a professional sense that provided at least some immunity. But this immunity can be quite limited, for, as Sokov rightly emphasizes, this professionalism was forged in the context of loyalty to an existing state. If that state disappears, as happened to the Soviet Union, it is less clear what will be the object of professional loyalty.²⁰

Optimists could also note how the prevailing international system, and not just the prevailing distribution of power, constrained the choices of emerging states in the post-Soviet region. The distribution of norms—by which I mean the relatively powerful non-proliferation regime—constrained the leaders’ freedom to maneuver every bit as much as the distribution of power did, even in cases (like Ukraine) when the leaders clearly want to flout it. This normalizing influence is an important part of the optimists’ model and operated to some degree in shaping the nuclear trajectories of the post-Soviet republics.

Finally, optimists would draw attention to the beneficial role played by the United States, especially in resolving tensions over Ukraine's erstwhile nuclear ambitions. This could cut both ways. On the one hand, this shows how influential third parties can play a beneficial role; on the other hand, it raises the question of how a less adept third party might have made things worse. But in most pessimistic accounts, third parties merely muck things up. It is the optimists who have high hopes for wise outsiders.

To my reckoning, however, the new dots Sokov uncovers fit much more neatly in a portrait of pessimism. I count at least eight that could have been torn from the pages of the older theoretical literature:

1. *Leaders worried and had reason to worry about the integrity of their command and control system.* Moreover, they did so despite having several key advantages that might not show up in other cases. First, except for the incidents with Ukraine, the leaders had clear conventional superiority and sufficient control of overwhelming conventional force so as to be able to assert dominance in a crisis. Second, they had fairly good trust in the actions of the United States, which played its role with particular deft and care. It is not too much of a stretch to imagine how both of those "silent variables" could be turned in a negative direction in a similar crisis with, say, Pakistan.

2. *Ad hoc fixes introduced other problems.* The rapid and improvised transfer of weapons outside of danger zones resulted in unplanned compromises in safety, such as poor inventory accounting and crowding that put environmental controls at risk.

3. *The problem of a transition in authority is a real one.* While acknowledged in the literature, the transition problem has been (comparatively) undertheorized.

Sokov suggests one interesting hypothesis based on his study: Transfers of authority arising out of even a peaceful dissolution of a state tend to be slow and uneven, resulting in fairly long periods during which there is a vacuum at the top of autonomous command elements. The longer this endures, the greater the chance that nuclear security and safety will be compromised.

4. *Some degree of loss actually happened.* The Soviet authorities believed they had lost at least some crucial aspects of nuclear command and control during the Ukrainian crisis: the capacity to implement the withdrawal of nuclear weapons. This did not mean they had lost all control over the weapons, but they lost the ability – or at least believed they had lost that ability – to take certain measures. More consequentially, there was genuine loss of legitimate political control over strategic nuclear forces during the 1991 coup; for a period of time, the coup leaders had what they needed to give what appeared to be authoritative orders to change alert levels and perhaps even to launch nuclear weapons.

5. *Control over the nuclear weapons became a totem of power that the new political authorities found irresistible.* How do you know you are in charge? Whether or not you have control over the most powerful weapons on your soil. Sokov makes the interesting observation that Ukrainian and Kazakh elites were “used to living in a nuclear state,” and losing the prestige and influence that comes from holding that totem “is difficult to accept.”²¹ During the 1991 coup, control of the Cheget nuclear launch system was one of the most tangible, if short-lived, markers of the coup’s early success.

6. *Outsized consequences flow from trivial mistakes.* An apparent error that resulted in Ukrainian officers' receiving an order intended for only Russian officers (to make a loyalty oath to Russia) resulted in the Ukrainian political leadership intervening to block the withdrawal of tactical nuclear weapons and taking steps to gain access to launch control systems of strategic weapons. This hard-to-predict chain of events is precisely the sort of normal accident in a complex system that Sagan highlighted in his study of the U.S. system.²²

7. *Contradictions and conflicts between de jure vs. de facto arrangements are unavoidable and create secondary risks.* During the transition period following the collapse of the Soviet Union, the four nuclear weapons-holding states had a de jure arrangement that required the four leaders to confer by a secret communication channel before there was any use of a nuclear weapon. However, the de facto system allowed Russian President Boris Yeltsin to act without notifying the other three. This created pressure inside Ukraine to jury-rig a system that would restore Ukrainian de facto veto power. Out of this pressure came an effort by Ukraine to carve out zones of military autonomy within the chain of command where officers could and would resist higher Russian authorities.

8. *Military professionalism is partly a function of fiscal health.* The collapse of Soviet defense spending created perverse dynamics that undermined military professionalism, such as a burgeoning military trade union movement and the prospect of a disconnect between the nominal authorities (Russian) and the authorities actually able to provide pay and benefits (Ukrainian).

Of course, the case also re-inscribes the basic indeterminacy of the long-standing debate. Despite all of these problems, there was no breach of safety or security large enough to produce a catastrophe. Yet, Sokov is persuasive that there were close calls sufficient to motivate the pessimists.

FRANCE

The theme of an ambiguous close call is even more pronounced in the study of France's allegedly hastened nuclear test during the 1961 coup. Bruno Tertrais deals with the alleged problem head-on. Notwithstanding the strong claim by Brian Jenkins that the story is a myth,²³ Tertrais concludes that the conventional account is more true than not—that de Gaulle did order a hurried-up nuclear test in the midst of the coup, and the coup leaders did make at least some efforts to seize it for their own purposes. Tertrais amends the conventional account somewhat, claiming that the test was hastened primarily for the symbolic value of showing who was in charge rather than for preserving physical custody of the device and precluding the coup plotters from seizing it.²⁴ Moreover, weather proved a more significant factor in the timing of the test than did the machinations of the coup plotters or any alleged equivocation on the part of the local commanders.²⁵

The French case provides some support for the optimist brief. According to Tertrais, senior French leaders responded to the crisis and quickly identified the need to deal with the nuclear issue. They were able to preserve command authority even in the face of a coup. De Gaulle was decisive, and the local authorities

who had custody of the weapon ultimately followed his lead. Second, authorities exhibited a clear preference for fail-safe, and this pushed the system toward the “fail-impotent” side of the continuum. Probably because of the hastiness of the test, the detonation itself was a disappointing failure, with yields of only 5 percent of what had been planned.

At the same time, Tertrais finds greater support for pessimism:

1. *Hastily improvised measures resulted in serious safety and security compromises.* At a crucial point in the crisis, the nuclear device was transported to the test site not in the armed convoy – the convoy accompanied an empty truck – but rather in an engineer’s 2CV compact car.

2. *Competing priorities for the weapon meant that security was not paramount.* The test was “hasty but not hurried,” meaning that de Gaulle ordered that the test happen, not that the device be destroyed. If physical custody of the weapon was the preeminent concern, de Gaulle could have demanded an immediate test without regard to conditions that would allow for the test to be scientifically useful. Instead, he ordered an acceleration of the timetable, but one that would have allowed a successful test. Tertrais plausibly hypothesizes that this order demonstrates that de Gaulle’s principal concern was the symbolic value of showing that he was still in control. However, the test ended up being a fizzle anyway, partly due to the decision to proceed even though the weather conditions were not ideal. Tertrais further (and just as plausibly) hypothesizes that this demonstrates that lower levels of command were concerned about physical custody. Moreover, the fact that local commanders ordered a fast test but not a test “as fast as possible” indicates that they themselves were conflicted.

3. *Uncertain communications contributed to uncertainty about nuclear security.* Tertrais says that satellite communications improvements make this less of a factor today, but I think it is just as possible for breakdowns to occur today.

4. *Complexity contributed to uncertainty.* Part of the crisis uncertainty arose out of the complex command arrangements established for managing nuclear weapons in peace time. There were regional commanders with responsibility for overall territorial security and for logistics support. There was a base commander responsible for base security and logistics. There was a test commander responsible for the test itself. Each had independent authority and channels of communication to higher authorities in Paris.

5. *Control of the nuclear devices was the key symbol of political power.* As with the Soviet case, the answer to the question "Who is in charge" was "He who has nuclear power." Intriguingly, unlike the Ukrainian leaders in the Soviet case, nuclear weapons were not seen as a preeminent concern for the coup plotters. The coup leaders did not time their coup nor organize their forces in a way that would maximize their opportunity to seize the nuclear device. Control over the nuclear device appeared to be an afterthought. Had it been a higher priority, the device might have been vulnerable. If the coup had succeeded, meaning that a controlling majority of French forces in Algeria sided with the coup leaders, it would have been quite possible to seize the device. However, they would have had only a device, not a usable weapon. It could only be detonated using the test equipment and would have required substantial re-engineering to be used in a different fashion. More probably, the device would have been a potent political symbol of power with potential blackmail uses.

CHINA

China has long been the optimists' favorite. If Mao managed the bomb safely, then why should we doubt that [fill in the blank] will do so? China's nuclear history does reinforce some optimistic conclusions, particularly the fact that until very recently, China opted for a comparatively small arsenal and avoided the escalatory arms race that captured the United States and the Soviet Union, along with the attendant crisis instability dynamics. With the caveat that we know far less detail about the China case than the U.S. or Soviet cases, Mark Stokes's case study reinforces another important optimistic insight: China has (apparently) consistently emphasized security over operational effectiveness—privileging the “never” rather than the “always” side of the command and control dilemma.²⁶

On the other hand, at a crucial phase in its nuclear history, China underwent more internal turmoil than any other nuclear power (until the collapse of the Soviet Union). Stokes focuses on this period, the decade-long Cultural Revolution, and argues that it may have had a lingering, chastening influence on China's command and control choices.

Stokes's findings, indeed, seem squarely on the cutting edge of the half-full/half-empty balance that marks the theoretical debate:

1. *The cultural upheaval infected all phases of the nuclear system . . . but the patient survived.* The engineers and weapons designers split into the factions of the Cultural Revolution in 1966. Regional military commanders near key nuclear installations likewise factionalized, leading to a bloody crackdown and martial law.²⁷

2. *Risky compromises were made in an ad hoc and possibly unauthorized manner . . . but no accident resulted.* In part due to a desire by the radicals to demonstrate revolutionary spirit in the nuclear realm, the Chinese conducted an especially dangerous test of a nuclear-tipped missile in 1966. While the test was successful, it involved flying the armed device over population centers and was seen by some as an unauthorized test.²⁸

3. *Control of nuclear weapons featured centrally in the civil-military crisis of the quasi-coup of Lin Biao . . . but the authorized leaders prevailed.* While the struggle between Mao and his designated successor, Lin Biao, had multiple dimensions, what brought the matter to a crisis point was Lin Biao's unauthorized decision to move the People's Liberation Army to a higher state of readiness vis-à-vis Soviet forces. Stokes argues that Mao interpreted Lin Biao's actions as a "move to take control of nuclear weapons and leverage their political value as the basis for usurping Mao's power."²⁹

4. *Traumatic formative experiences had a lingering effect on the command and control of the arsenal.* Because of the memory of this upheaval, Stokes argues, Chinese authorities centralized the nuclear storage and handling system and put it under very close party control and, moreover, instituted a relatively assertive (my word, not Stokes's) system that separated custodians from operators – and these choices remain operative to this day, as optimists would expect.³⁰

PAKISTAN

Pakistan probably heads anyone's list of "states of concern" when considering the nuclear security issue. Feroz Khan's case study offers an optimistic take,

even though he documents that Pakistan had the most convoluted political-military context regarding the pursuit of nuclear weapons of any of the cases under study. Despite that rocky history, so far as is known publicly, Pakistan has not had any close calls analogous to the ones covered in the other case studies.

Kahn bases his optimistic conclusion on the absence of evidence of accidents, as well as on Pakistani military professionalism, and claims “the existing command and control system [in Pakistan] is viewed as robust, institutional and professional.”³¹ Moreover, according to Kahn, the Pakistani case suggests the optimists’ conclusion that birthmarks need not be birth defects. The Pakistani nuclear program was birthed in a system marked by political turmoil. Even so, the development of the Pakistani nuclear program continued on a fairly straight-line trajectory. Pro-nuclear leaders were able to make deals based on at least a modicum of nuclear restraint, and transitions in political authority—even very abrupt transitions—generated more or less orderly transitions in nuclear authority.

Yet, the case also provides some insights that meet pessimists’ expectations:

1. *Control of nuclear weapons was control of government.* As with the other cases, one can trace who was the de facto power in Pakistan by tracing the line of power over the nuclear program. In a nuclear crisis, Pakistan is likely to face the same acute pressure to demonstrate that political leaders have control over nuclear weapons.

2. *A system that can produce the A. Q. Khan network was not a healthy system.* Despite high-level secret assurances to the contrary, Pakistan did produce the largest and most consequential illicit nuclear prolifer-

ation program: the A. Q. Khan network. It is not clear whether he relied on the permissive conditions of benign neglect, willful blindness, or some more proactive encouragement. Khan (the author) attributes the network more to perverse incentives to make the program financially sustainable and “a peculiar diffusion at the apex of political power” until the consolidation under Musharraf.³² But what A. Q. Khan was able to do undercuts strong optimism.

3. *The absence of evidence is not necessarily evidence of absence.* The Iraq weapons of mass destruction (WMD) failure gave a bad odor to Donald Rumsfeld’s insight about unknown knowns, but it does seem like Pakistan warrants a reapplication. Reports indicate that Pakistan’s protocols involve transferring nuclear weapons in unmarked delivery vans without armed escorts in the convoy. This underscores that we are still learning new and unsettling details about Pakistan’s nuclear custodial record.³³ In short, we may not know enough about the operational details in Pakistan to yet make a definitive judgment.

CONCLUSION: LOOKING THROUGH THE POLICY LENS

Early on in the academic debate, an important theory-praxis gap was identified. Even if the optimists were right in theory about how new nuclear states might behave, in practice U.S. policymakers might still oppose nuclear proliferation. To a policymaker, “system stability” meant “the United States cannot coerce that state because of mutual nuclear stalemate,” and such a world would be undesirable for all sorts of other policy reasons apart from the likelihood of a nuclear war.³⁴ It behooves us, therefore, to explore whether there might be separate expectations of the

cases from a policymaker's point of view. I suggest at least three:

1. The policymakers in the relevant historical episodes will not trust the functionalist logic of optimists—"It would be crazy if this were not so, so we can assume it is so." On the contrary, they will take pains to ensure that it is so rather than simply assume it.

2. The theorist's blithe "concentration of the mind" will be experienced as far more dire and alarming. As Sagan has observed, the airline passenger who survives a flight where the wing cracks, the engines fail, and the pressure system misfires, will be glad to be alive, but he will not celebrate the robustness of the airplane.³⁵

3. In any crisis in which there is even a faint prospect of "loose nukes," that fact will be a central preoccupation for the players in the crisis, regardless of the other factors driving the conflict.

All of the cases seem to bear out these expectations, at least partly. The policymakers involved all considered nuclear security concerns to be high-priority problems, especially during a crisis. Without the benefit of hindsight and not knowing the benign outcome, the participants experienced the challenges as more dire than the clinical academic treatments might capture. Yet, the exposure to danger did not produce strong nuclear allergies. Pakistan's policymakers appear to embrace Khan's optimistic conclusions. France did not abandon its *force de frappe*. To be sure, all of the former Soviet Republics except Russia gave up nuclear weapons, but that seems largely due to international pressure, not to fears about managing nuclear security.

Moreover, the four cases highlight an aspect I had not noticed in the literature before: a convergence in expectations between pessimists, optimists, and policymakers that nuclear weapons will be sharp focal points during a crisis. It is not just that nuclear weapons concentrate the mind, as optimists expect. It is that in a crisis in which nuclear weapons are present, they concentrate the mind on the weapons: where they are, who has them, and what they can do with them.

The case studies also suggest that policymakers do not have enough information yet to handle their nuclear security responsibilities in an optimal fashion. In that spirit, I close with three specific recommendations for better securing nuclear assets now and in the future:

1. *Deepen the case studies of nuclear operations and, where appropriate, nuclear accidents.* Even a case as familiar and long-established as the French 1961 coup yielded new empirical insights and policy-relevant items of interest. I understand the politicians' concern about probing painful subjects, but the stakes warrant erring on the side of greater candor rather than ignoring problems that we hope we will not have to confront.

2. *Broaden the nuclear learning.* As I have argued elsewhere, the logic behind helping nuclear states improve their nuclear safety and security is pretty compelling and likely trumps other concerns once a state has crossed the weaponization threshold. States like Pakistan will be very suspicious of our help, understandably fearful that any such assistance is a Trojan horse for efforts to target and neutralize their arsenal. But an engaging exposure to the problems that other states have faced may be a compromise that even Pakistan authorities might consider.

3. *Make a virtue out of inevitability.* The case studies reached a consensus on at least one important point: The custody and control of nuclear weapons was, and thus likely will be, the symbol of governing authority. Acknowledging this has the perverse result of making the seizure of custody and control that much more valuable. But acting like it is not so is not a solution to the problem. Instead, perhaps, should we be more explicit, developing a policy that states that the safe and secure management of nuclear custody is the essential ingredient for any successful pretender to power? Such a policy might, on the margins, further incentivize states to take precautionary action to secure weapons, as France did, and to clarify more clearly the nuclear custodial line, as the former Soviet Union did not.³⁶

ENDNOTES - CHAPTER 7

1. Peter Feaver, "Neooptimists and the Enduring Problem of Nuclear Proliferation," *Security Studies*, Vol. 6, No. 4, Summer 1997, pp. 93-125.

2. For a sample of paleo-pessimist thinking, see Lewis A. Dunn, *Controlling the Bomb: Nuclear Proliferation in the 1980s*, New Haven, CT: Yale University Press, 1982; Leonard Spector, *Nuclear Proliferation Today*, New York: Vintage, 1984; or Peter Lavoy, "The Strategic Consequences of Nuclear Proliferation: A Review Essay," *Security Studies*, Vol. 4, No. 4, Summer 1995, pp. 695-753.

3. For a sample of paleo-optimist thinking, see Kenneth Waltz, *The Spread of Nuclear Weapons: More May be Better*, Adelphi Paper Vol. 17, London, UK: International Institute for Strategic Studies (IISS), 1981; *Idem.*, "Nuclear Myths and Political Realities," *American Political Science Review*, Vol. 84, No. 3, September 1990, pp. 731-745; Michael Intriligator and Dagobert Brito, "Nuclear Proliferation and the Probability of Nuclear War," *Public Choice*, Vol. 37, No. 2, 1981, pp. 247-259; and Bruce Bueno de Mesquita and

William Riker, "An Assessment of the Merits of Selective Nuclear Proliferation," *Journal of Conflict Resolution*, Vol. 26, No. 2, 1982, pp. 283-306.

4. For a sample of neo-pessimist thinking, see James Blight and David Welch, "The Cuban Missile Crisis and New Nuclear States," *Security Studies* Vol. 4, No. 4, Summer 1995, pp. 811-850; Peter Feaver, "Command and Control in Emerging Nuclear Nations," *International Security*, Vol. 17, No. 3, Winter 1992/93; *Idem.*, "Optimists, Pessimists, and Theories of Nuclear Proliferation Management," *Security Studies*, Vol. 4, No. 4, Summer 1995, pp. 754-772; *Idem.*, "Neooptimists and the Enduring Problem of Nuclear Proliferation"; Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons*, Princeton, NJ: Princeton University Press, 1993; *Idem.*, "The Perils of Proliferation: Organizational Theory, Deterrence Theory, and the Spread of Nuclear Weapons," *International Security*, Vol. 18, No. 4, Spring 1994, pp. 66-107; and Sagan and Kenneth Waltz, *The Spread of Nuclear Weapons: A Debate*, New York: Norton, 1995.

5. For a sample of neo-optimist thinking, see David Karl, "Proliferation Pessimism and Emerging Nuclear Powers," *International Security*, Vol. 21, No. 3, Winter 1996/97, pp. 87-119; Jordan Seng, "Command and Control Advantages of Minor Nuclear States," *Security Studies*, Vol. 6, No. 4, Summer 1997, pp. 50-92; and Bradley Thayer, "The Risk of Nuclear Inadvertence: A Review Essay," *Security Studies*, Vol. 3 No. 3, Spring 1994, pp. 428-493.

6. See, for example, Sagan, "The Causes of Nuclear Weapons Proliferation," *Annual Review of Political Science*, Vol. 14, June 2011, pp. 225-244; Jacques Hyman, "Theories of Nuclear Proliferation: The State of the Field," *Nonproliferation Review*, Vol. 13, No. 3, 2006, pp. 455-465; Hyman, *The Psychology of Nuclear Proliferation: Identity, Emotions and Foreign Policy*, Cambridge, MA: Cambridge University Press, 2006; Sagan and Alexander Montgomery, "The Perils of Predicting Proliferation," *Journal of Conflict Resolution*, Vol. 53, No. 2, April 2009, pp. 302-328; and Matthew Kroenig, *Exporting the Bomb: Technology Transfer and the Spread of Nuclear Weapons*, Ithaca, NY: Cornell University Press, 2010.

7. See Victor Asal and Kyle Beardsley, "Proliferation and International Crisis Behavior," *Journal of Peace Research*, Vol. 44, No. 2, 2007, pp. 139-155; Kyle Beardsley and Victor Asal, "Winning with the Bomb," *Journal of Conflict Resolution*, Vol. 53, No. 2, 2009, pp. 278-301; Matthew Fuhrmann and Sarah Kreps, "Targeting Nuclear Programs in War and Peace: A Quantitative Empirical Analysis, 1941-2000," *Journal of Conflict Resolution*, Vol. 54, No. 6, 2010, pp. 831-859; Robert Rauchhaus, Matthew Kroenig, and Erik Gartzke, eds., *Causes and Consequences of Nuclear Proliferation*, Routledge, 2011; and Kroenig, "Nuclear Superiority and the Balance of Resolve: Explaining Crisis Outcomes," *International Organization*, Vol. 67, Issue 1, January 2013, pp. 141-171.

8. The best of these are James Wirtz, Lavoy, and Sagan, *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, and Chemical Weapons*, Ithaca, NY: Cornell University Press, 2000; and Hans Born, Bates Gill, and Heiner Hänggi, *Governing the Bomb: Civilian Control and Democratic Accountability of Nuclear Weapons*, Oxford, UK: Oxford University Press, 2010.

9. Waltz, *The Spread of Nuclear Weapons*.

10. *Ibid.*; and Karl, "Proliferation Pessimism and Emerging Nuclear Powers," p. 94.

11. *Ibid.*

12. Thayer, "The Risk of Nuclear Inadvertence," pp. 428-449.

13. *Ibid.*, p. 440.

14. Feaver, "Social Sources of Inadvertent Nuclear Use in the Former Soviet Union: Civil-Military Relations and the Black Market," in Carin Atterling Wedar, Intriligator, and Peeter Vares, eds., *Implications of the Dissolution of the Soviet Union for Accidental/Inadvertent Use of Weapons of Mass Destruction*, Tallinn, Estonia: Estonian Academy of Sciences, 1992.

15. Feaver, "Proliferation Optimism and Theories of Nuclear Operations," *Security Studies*, Vol. 2, No. 3/4, Spring/Summer 1993, pp. 169-174.

16. Feaver, "Command and Control in Emerging Nuclear Nations," pp. 170-74; and Sagan, *The Limits of Safety*.

17. Feaver, "Proliferation Optimism and Theories of Nuclear Operations," pp. 165-167.

18. Sagan, *The Limits of Safety*.

19. See Sokov chapter in this volume, p. 91.

20. See Sokov chapter in this volume. Moreover, the immunity arising from professionalism can push in positive or negative directions. Curtis LeMay made it clear that his professionalism would have led him to perform in certain escalatory ways if he had experienced an extreme crisis. Feaver, *Armed Servants: Agency, Oversight, and Civil-Military Relations*, Cambridge, MA: Harvard University Press, 2003, pp. 129-130.

21. See Sokov chapter in this volume, p. 119.

22. Sagan, *The Limits of Safety*.

23. Tertrais cites Brian Jenkins, *Will Terrorists Go Nuclear?* Amherst, NY: Prometheus Books, 2008, p. 144.

24. See Tertrais's chapter in this volume, pp. 41-42, 48.

25. *Ibid.*

26. See Stokes's chapter in this volume.

27. *Ibid.*

28. *Ibid.*, p. 69-70.

29. *Ibid.*, p. 74.

30. *Ibid.*, pp. 74-75.

31. See Khan's chapter in this volume, p. 179.

32. *Ibid.*, p. 172.

33. Goldberg and Ambinder, "The Pentagon's Secret Plans to Secure Pakistan's Nuclear Arsenal," *National Journal*, November 5, 2011, p. 1.

34. Feaver, "Optimists, Pessimists, and Theories of Nuclear Proliferation Management," pp. 770-771.

35. Sagan, *The Limits of Safety*, pp. 204-205, 248-249.

36. The proposal deserves more careful scrutiny than I can give it here. One perverse aspect of this proposal is that, had it been in place, it would have dictated that the United States recognize the 1991 Soviet coup leaders as the de facto government, given their temporary control over the arsenal. That was clearly not in the broader interests of the United States, and so was a strong argument against the policy. On the other hand, had the policy been in place and well-understood, it might have helped Gorbachev anticipate and take precautionary action.