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NEOOPTIMISTS AND THE ENDURING PROBLEM OF NUCLEAR PROLIFERATION

PETER D. FEAVER

IS THE SPREAD of nuclear weapons a good thing? While most U.S. policymakers believe this question to be settled in the negative, the academic security studies community continues to debate it. The case for believing that the spread of nuclear weapons might not be as disastrous as the policy community believes, the optimists' brief, has long rested on the observation that nuclear weapons appeared to dampen escalation worries between the superpowers during the cold war. The opposite view, the pessimists' brief, derived from two observations: first that the superpower nuclear balance was more precarious than optimists claim due to command and control worries and second, in any case, that these command and control problems are likely to be even more pronounced in emerging nuclear nations. Recently, the optimists' brief has been revived by several analysts who collectively advance what may be considered the "neooptimists' brief:" the claim that although the superpower nuclear balance may have been marked by command and control pathologies, the new proliferators are *less* likely to suffer these problems.[1] In this article, I explore the logic and evidence marshaled by neooptimists and conclude that, though it represents

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1. David J. Karl, "Proliferation Pessimism and Emerging Nuclear Powers," *International Security* 21, no. 3 (winter 1996/97): 87–119; Jordan Seng, "Less Is More: Command and Control Advantages of Minor Nuclear States," *Security Studies* 6, no. 4 (summer 1997): 49–91. One may also include Bradley Thayer as a fellow-traveler, although his conclusions about command and control in emerging nuclear nations are considerably more guarded, if not somewhat pessimistic. See Bradley Thayer, "The Risk of Nuclear Inadvertence: A Review Essay," *Security Studies* 3, no. 3 (spring 1994): 428–93.

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an advance over earlier arguments in favor of nuclear proliferation, it is still unpersuasive.

My argument proceeds in six stages. First, I compare the new version of nuclear optimism with its Waltzian forebear, concluding that the new optimism constitutes a persuasive rejection of the old optimism, even though it is not intended as such. Second, I evaluate whether minor proliferators will develop as safe and simple arsenals as neooptimists suppose; here I conclude that the alleged advantages of minor proliferators largely evaporate when the ceteris paribus condition is relaxed. Third, I consider whether the arsenals will be as survivable as neooptimists claim and whether it matters; I argue that proliferators will worry about survivability more than neooptimists recognize. Fourth, I examine and reject the neooptimists' claim that minor proliferators will easily solve the custody and physical protection problems associated with nuclear proliferation and domestic instability. Fifth, I review the neooptimists' arguments about the virtues of nuclear opacity and show how these advantages derive from an insupportable definition of opacity. Finally, I conclude by advancing a set of competing hypotheses derived from the arguments of neooptimists and neopessimists to guide future empirical work on the subject.

NEOOPTIMISTS VS. PALEOOPTIMISTS VS. NEOPESSIMISTS

IT IS CUSTOMARY to begin the intellectual history of the debate with the 1970s pessimists enjoying the status of conventional wisdom,[2] which Kenneth Waltz challenges with an optimistic assessment that more may be better insofar as the spread of nuclear weapons goes.[3] Waltz's optimistic

2. Thus the "original" pessimists would include Lewis Dunn, *Controlling the Bomb: Nuclear Proliferation in the 1980s* (New Haven: Yale University Press, 1982); and Leonard Spector, *Nuclear Proliferation Today* (New York: Vintage, 1984). The debate, in fact, is much older, as is explained in Peter Lavoy's excellent review of the literature: Peter R. Lavoy, "The Strategic Consequences of Nuclear Proliferation: A Review Essay," *Security Studies* 4, no. 4 (summer 1995): 695–753.

3. Kenneth N. Waltz, *The Spread of Nuclear Weapons: More May be Better*, Adelphi Paper no. 171 (London: International Institute for Strategic Studies [IISS], 1981); and Kenneth N. Waltz, "Nuclear Myths and Political Realities," *American Political Science Review* 84, no. 3 (September 1990): 731–45. As Lavoy demonstrated, Waltz's argument was largely derivative of the work of an earlier generation of strategic analysts, especially Pierre Gallois. Pierre Gallois, *The Balance of Terror* (Boston: Houghton Mifflin, 1961). At about the same time Waltz published his more famous optimist manifesto, other scholars were advancing similar arguments: Michael D. Intriligator and Dagobert L. Brito, "Nuclear Proliferation and the Probability of Nuclear War," *Public Choice* 37, no. 2 (1981): 247–59; and Bruce Bueno de Mesquita and William Riker, "An Assessment of the Merits of Selective Nuclear Proliferation," *Journal of Conflict Resolution* 26, no. 2 (1982): 283–306.

view was subsequently echoed, albeit with more caveats, by John Mearsheimer and, to a lesser extent, Stephen Van Evera.[4] This optimistic view of nuclear proliferation was challenged first by studies that showed that the superpower balance was more precarious than Waltz admitted,[5] and then by analyses that hypothesized that emerging nuclear nations would have even more problems managing their nuclear arsenals than did the superpowers.[6] Collectively, this later school has been called neopessimism. Enter now the neooptimists who concede neopessimists' first point but debate the second.

The recent revival of nuclear optimism is noteworthy in several respects. On the one hand, the neooptimists quite explicitly distance themselves from the reductionist logic of the paleooptimists, notably Waltz. Waltz's optimism relied more or less on a rudimentary application of rational deterrence theory, bolstered by the guileless export of one undeniable fact from the superpower experience: despite all the worry, the superpowers managed to avoid war. The paleooptimists' case was not complicated with references to how the superpowers behaved otherwise with respect to nuclear weapons: for example, the large build-up, the problematic operational practices, the near accidents, and so on. As I have argued elsewhere, it was remarkably innocent of the empirical critique of U.S. nuclear operations, ignoring most of the now-sizable literature analyzing the command and control problems which plagued both superpowers. Neooptimists explicitly reject such an approach. They chastise pessimists for ignoring evidence from new

4. John J. Mearsheimer, "Back to the Future: Instability in Europe After the Cold War," *International Security* 15, no. 1 (summer 1990): 38; Stephen Van Evera, "Primed for Peace: Europe after the Cold War," *International Security* 15, no. 3 (winter 1990/91): 54.

5. Paul Bracken, *The Command and Control of Nuclear Forces* (New Haven: Yale University Press, 1983); Bruce G. Blair, *Strategic Command and Control: Redefining the Threat* (Washington, D.C.: Brookings, 1985); Ashton B. Carter, John D. Steinbruner, and Charles A. Zracket, *Managing Nuclear Operations* (Washington, D.C.: Brookings, 1987); Peter D. Feaver, *Guarding the Guardians: Civilian Control of Nuclear Weapons in the United States* (Ithaca: Cornell University Press, 1992); Bruce G. Blair, *The Logic of Accidental Nuclear War* (Washington, D.C.: Brookings, 1993); and Scott D. Sagan, *The Limits of Safety: Organization, Accidents and Nuclear Weapons* (Princeton: Princeton University Press, 1993).

6. Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security* 17, no. 3 (winter 1992/93): 160–87; Peter D. Feaver, "Proliferation Optimism and Theories of Nuclear Operations," *Security Studies* 2, no. 3/4 (spring/summer 1993): 160–65; Scott D. Sagan, "The Perils of Proliferation: Organizational Theory, Deterrence Theory, and the Spread of Nuclear Weapons," *International Security* 18, no. 4 (spring 1994): 66–107; Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate* (New York: Norton, 1995); Peter D. Feaver, "Optimists, Pessimists, and Theories of Nuclear Proliferation Management," *Security Studies* 4, no. 4 (summer 1995): 754–72; Stephen R. David, "Risky Business: Let Us Not Take a Chance on Proliferation," *Security Studies* 4, no. 4 (summer 1995): 773–78; and James G. Blight and David A. Welch, "The Cuban Missile Crisis and New Nuclear States," *Security Studies* 4, no. 4 (summer 1995): 833–45.

nuclear powers and for exporting from superpower experience; by extension, they must also be criticizing their optimistic forebears who were even more guilty of these sins.[7] Likewise, neooptimists concede that operational challenges matter for nuclear outcomes, something that paleooptimists did not consistently recognize.[8]

On the other hand, the new arguments are not quite as new as one might think. In defending his claim that new arsenals will be safe and secure, Waltz did invoke the very advantages of small size now claimed by neooptimists: the ease of hiding small arsenals, the irreducibility of existential deterrence, and so on.[9] Even recognition of the importance of command and control is not entirely absent in paleooptimism. Indeed, the paleooptimists' brief has always included an escape clause: proliferation is only safe if new proliferators adopt safe behaviors—of course, Waltz hastened to add that they will do so because they have every reason to do so and safe behaviors are easily accomplished.[10] What was wrong about nuclear optimism was not ignorance of the kinds of nuclear behaviors needed for favorable nuclear outcomes but rather naiveté about the inevitability of those desirable nuclear behaviors.

Taken altogether neooptimists make fairly good critics of paleooptimism. All of the criticisms they make with respect to the methods and assumptions of pessimists apply a fortiori to paleooptimists. Neooptimists concede much of the conceptual and theoretical ground previously defended by paleooptimists. In other words, now we share a common set of explanatory factors (for example, the size of the arsenal, the survivability countermeasures, etc.) but differ on the content or weighting of those factors and also on the way those factors may interrelate. Such a level of disagreement is a good thing, evidence that the overall debate has advanced beyond an initial statement of gainsaying positions. If neooptimists make fairly good critics of paleooptimism, however, it does not necessarily follow that they also make good critics of neopessimism.

7. Karl, "Proliferation Pessimism," 94. Karl is not so explicit on how his critique of neopessimism applies a fortiori to paleooptimism. He rather skims over the obvious point that nuclear optimism is entirely dependent on the two things he apparently does not like: (1) deduction from axioms, and (2) extrapolation from the superpower case.

8. Seng, "Less Is More," 52–53.

9. Waltz argues: "Hiding nuclear weapons and keeping them under control are tasks for which the ingenuity of numerous states is adequate" (in Sagan and Waltz, *The Spread of Nuclear Weapons*, 20). See also the discussion in ibid., 19–26, 96–99, and 109–10.

10. In Sagan and Waltz, *The Spread of Nuclear Weapons*, 21. Mearsheimer, on the other hand, explicitly limited his endorsement of nuclear proliferation to those cases where the state had adequate resources to maintain a sophisticated arsenal (Mearsheimer, "Back to the Future," 37–38).

The case for nuclear neopessimism is this: First, there is reason to think that many emerging nuclear nations will have more severe command and control problems than did the established nuclear powers. Second, even if new states match the command and control systems of established powers procedure for procedure, this is not necessarily cause for complacency since what is known about cold war practices suggests that there were more near misses and "dumb" practices than is popularly believed. Third, these problems are likely to be more acute with some proliferators than with others; there are steps states can take to address rudimentary problems, but no countermeasures exist that can eliminate the tradeoffs entirely.[11] While the arguments are fleshed out with many subpoints and illustrations, the pessimists' case reduces to those common claims.[12]

Against this analytical core, neooptimists make two basic claims. First, safe nuclear behavior is more easily achieved than neopessimists claim, especially for new nuclear nations who will have small arsenals. Second, the extant empirical record of nuclear behavior by minor proliferators supports the optimistic view; proliferators have been careful to avoid adopting the kinds of arsenals and operational procedures pessimists worry about. In so doing, neooptimists seek to turn the neopessimist argument on its head. The features of minor proliferators that neopessimists worry about should be, if properly understood, sources of great comfort. Neooptimists even reverse the management paradox—that efforts to stop proliferation contribute to making proliferation unsafe; according to neooptimists, the nonproliferation regime reinforces precisely those features that make the minor proliferators safe, for instance, the small size of the arsenal and the desirability of keeping the program covert.[13] These claims can be disaggregated into a series of propositional statements, summarized in Table 1. In the next several sections, I will address each in turn.

11. Peter D. Feaver and Emerson M. S. Niou, "Managing Nuclear Proliferation: Condemn, Strike, or Assist?," *International Studies Quarterly* 40 (June 1996): 209–34.

12. I have repeatedly stressed a fourth point, one which has not been challenged by neooptimists and so does not require further discussion: even if new nuclear states have the same lucky record that the superpowers had—successfully avoiding a truly catastrophic command-and-control failure—there is reason to oppose nuclear proliferation as a matter of U.S. policy. A nuclear-armed adversary is a more capable foe, better able to thwart U.S. interests.

13. Seng, "Less Is More," 90.

Table 1

PRINCIPAL PROPOSITIONS OF NUCLEAR NEOOPTIMISM

Neooptimists' Claim	Supporting Rationale
New nuclear states will develop only small arsenals.	Large arsenals cost too much and are not needed anyway.
Small arsenals are safe and responsive arsenals.	Small arsenals are simple arsenals, easier to protect against unauthorized use and hostile take-over and more flexible in a crisis so there is no need for rigid SOPs.
Small arsenals are not as vulnerable as neopessimists claim.	Preventive war is too difficult to execute so states need not worry about it. Small arsenals are easily made survivable. New nuclear states will rely on concealment rather than predelegation, or at least predelegation will not be problematic.
Far from being a source of danger, domestic instability in minor proliferators increases assertive control.	Authoritarian states are good at monitoring behavior within their borders and so can keep closer watch over their arsenals than did the United States which was hampered at least somewhat by concern for civil liberties.
Opacity fosters healthy nuclear command and control.	Opacity reinforces the advantages of small arsenals, such as the likelihood that central leaders will maintain tight control over the arsenals or the likelihood that nuclear operations will not become commingled with the regular military. Opacity does not inhibit learning.

The optimist/pessimist debate is partly a debate between larger theoretical approaches. The paleooptimists largely base their arguments on the classical rational actor paradigm. Neopessimists also draw on the rational actor paradigm, but supplement it with insights drawn from organizational theory and political psychology.[14] Neooptimists use both rational actor and organization theory, and since they have largely ignored the political psychology critique I will base my analysis primarily on flaws with their arguments that can be identified entirely within their chosen paradigms.[15]

Will States Develop Small Arsenals, and Are They Safe and Responsive?

Both Seng and Karl lean heavily on the putative virtues of a small and simple arsenal.[16] They concede that command and control problems attend large and complex arsenals, but claim this is precisely why we need not worry about minor proliferators. The small size and simple procedures associated with the arsenals of minor proliferators effectively neutralize most of the historical analogies proffered by nuclear pessimists. Every example of dangerous nuclear behavior by one of the superpowers can be explained away as the obvious, perhaps unavoidable consequence of trying to maintain a large and unwieldy nuclear force posture. From the point of view of rhetoric, this is a shrewd tactical withdrawal on the part of nuclear optimists; it concedes a large and mounting pile of evidence that neither superpower behaved as chastely as rational deterrence theory would expect, but neatly dismisses all of these implications as irrelevant.[17] Such a concession, however, undermines a core assumption of nuclear optimism (neo- and paleo-), namely that when states are faced with nuclear options they will pick ones that lead to more-safe rather than less-safe behavior (on which more later).

14. Sagan draws primarily on insights from organizational theory, while Blair and myself use an amalgam of rational actor and organizational theory approaches. Among proliferation pessimists, James Blight and David Welch make the most extensive use of political-psychological arguments.

15. Karl only cites the organizational theory-based arguments Blight and Welch make, while ignoring the rest of their psychological critique of proliferation optimism. Karl, "Proliferation Pessimism," 114 n. 101. Seng does not cite Blight and Welch; neither does Thayer, whose contribution to the proliferation debate preceded that of Blight and Welch.

16. Seng "Less Is More," 63–66; Karl, "Proliferation Pessimism," 103–15.

17. To my knowledge, no one has challenged the empirical validity of the pessimists' critique of superpower nuclear behavior. The only matter in dispute is the significance of these findings: are they mortal or venal sins?

Small and simple arsenals are, ceteris paribus, easier to protect against unauthorized use and are less prone to the kind of "normal accidents" problems afflicting large, tightly connected systems.[18] Whether the states have small and simple arsenals, however, and whether they will always remain so, is debatable. For instance, the Israeli arsenal may in fact be much larger than one hundred weapons as claimed by Seng, if the information from Vanunu can be believed.[19] Even at one hundred, the Israeli arsenal would be considerably larger than Israel needs if the rest of the neooptimists' argument about the ease of hiding weapons and the impossibility of preventive war is correct; viewed this way, the arsenal appears relatively large, raising doubt as to whether Israeli leaders are as sanguine about the virtues of extremely small arsenals as are the neooptimists.

As for how simple the arsenal will be (meaning how many different launch vehicles and how elaborate the deployment patterns are), neooptimists tend to disagree among themselves. Karl thinks financial constraints will dictate a reliance on air-delivery.[20] Seng thinks financial constraints, coupled with the widespread proliferation of missile technology, dictate a reliance on mobile missiles. On the one hand, they imply that minor proliferators will probably rely on proven technologies, probably deployed on a few dedicated bases, and well-insulated from the regular conventional military.[21] On the other hand, Seng stresses that use of mobile missiles "adds diversity to a state's nuclear arsenal and increases the places where warheads can be hidden and the opportunity for deploying decoys."[22] Yes, but it also adds complexity. In the end, about the only thing neooptimists agree on concerning the size and scope of the nuclear arsenals is that minor proliferators are unlikely to purchase ballistic-missile submarines and are unlikely to maintain twenty-four-hour airborne alerts. Most neopessimists would accept that, but such limits leave considerable room for the kind of complexity that neopessimists identify as pathological.

Neooptimists thus see a virtue where pessimists have seen a vice. Financial constraints, neooptimists argue, will keep arsenals small and simple.

18. Of course, smaller arsenals are easier to target and destroy in a preventive or preemptive attack, but neooptimists have an answer for this: small arsenals are easier to hide. I will address this argument later in the text.

19. Seng, "Less Is More," 63, cites Leonard Spector, *The Undeclared Bomb* (Cambridge, Mass.: Ballinger, 1988), 180–83. Jailed Israeli nuclear technician Mordechai Vanunu released information suggesting that Israel had produced enough weapons-grade material for an arsenal as high as 200 weapons ("Between the Bomb and a Hard Place," *Economist*, 25 March 1995, 23–25).

20. Karl, "Proliferation Pessimism," 105.

21. Seng, "Less Is More," 63 and 68; Karl, "Proliferation Pessimism," 113.

22. Seng, "Less Is More," 69; Karl, "Proliferation Pessimism," 109.

The factors that constrain the size of the arsenal, however, such as financial pressures and the effects of the nonproliferation regime, also affect other features of the arsenal directly related to desirable nuclear behaviors. The constraints may tend to keep arsenals small but they also tend to keep the arsenals untested, unproven, and probably unsafe. Smallness and simplicity are not intrinsically preferable (except for the fact that fewer numbers of warheads would translate into a statistically lower probability of accidents, provided that the small size has not encouraged risk-prone deployment patterns and ceteris paribus). Smallness and simplicity may make safe behaviors more affordable and assertive control more tractable, ceteris paribus, but they do not in and of themselves constitute safe behavior. It is one thing to say that minor proliferators will find it easier to maintain smaller arsenals than they would larger arsenals. It is another thing to say that they will, in fact, maintain small arsenals adequately. The Iraqi "arsenal" was so small that it was nothing more than a laboratory design, but we know from postwar inspectors that it would have been prone to accidental use if it had been built—perhaps precisely because Iraq was forced to design its weapon in secret and with scant resources.[23]

Are rudimentary arsenals really less prone to hostile take-over? Neooptimists argue that small arsenals should be easier to keep track of and are easier to keep under centralized supervision. For this reason, Seng says, we should not worry that minor proliferators will lack PALs and other use-control devices.[24] These devices are only needed, Seng claims, when the central leadership is of necessity removed from direct supervision of the weapons; they are not needed when "central leaders can maintain broad operational access with just a handful of domestic phone calls."[25] Leaving aside the dubious reliability of many Third World phone systems, Seng's analysis betrays a misunderstanding of the utility of PALs and how use-control procedures work. The PAL separates the ability to detonate and use the weapon from physical possession of the weapon, provided that the PAL codes are not co-located with the weapon. Although the PAL was conceived of as a way to improve political control over the weapon, PALs per se do not confer political control, unless the PAL codes are kept by, and only by, the political leaders.[26] PALs are still useful, however, even if the code man-

23. Gary Milhollin, "Building Saddam Hussein's Bomb," *New York Times Magazine*, 8 March 1992, 32.

24. Seng, "Less Is More," 73.

25. Ibid.

26. This is unlikely to be the case because of decapitation concerns. Although decapitation concerns should militate against excessively assertive code management, some states may accept a system that will be fail-impotent. South Africa evidently adopted such a system. See

agement scheme does not confer control to the political leaders because it is still a useful thing to separate the ability to use the weapon from the ability to have physical custody of the weapon. PALs can minimize use-them-or-lose-them pressures that might otherwise cause a base commander who is about to be overrun to contemplate unauthorized use. PALs are particularly useful for addressing terrorist takeover concerns. PALs can also supplement control if used in conjunction with a dual chain of command, where the nuclear operators have possession and launch responsibilities but a separate unit (perhaps an entirely separate paramilitary organization like the secret police) have PAL code responsibilities. Seng is thus right that the smaller arsenal could facilitate political control by eliminating intermediary levels of command and having fewer numbers of weapons for the political leaders to worry about (of course, counterbalanced by the opacity concerns discussed below), but the ease of phone calling would not deal with the problems a PAL best addresses.

Are small and simple arsenals really more responsive in a crisis? Neooptimists dismiss some of the most damning near-nuclear accidents from the cold war era as merely a consequence of the rigid and complex standard operating procedures associated with the large superpower arsenals. Seng claims, with rather unjustified enthusiasm, that smaller arsenals should be able to "spin on a dime."[27] He overstates his case. Given a certain level of operational skill, it is easier to improvise with a smaller than a larger arsenal. Will minor proliferators, however, have the kind of military that is proficient enough to improvise at all? Some will and some will not. Doctrinal skill varies widely across different militaries and even within different subelements of the same military.[28] Of course, the nuclear operators may be the better trained elements of the minor proliferator, but not under condi-

Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: Woodrow Wilson Center, 1995), 13. To be sure, South Africa, perhaps alone among plausible proliferators, faced the least daunting strategic environment, at least insofar as needing to protect an arsenal against a preemptive strikes goes.

27. Seng, "Less Is More," 74.

28. Stephen Biddle and Robert Zirkle, "Technology, Civil-Military Relations and Warfare in the Developing World," *Journal of Strategic Studies* 19, no. 2 (June 1996): 171–212. For instance, they document that poor discipline and inadequate training rendered Iraq's state-of-the-art air-defense system virtually useless against coalition forces during the Gulf War. The coalition's victory in the air derived as much from superior exploitation of technology as from superior technology, per se. Far from "spinning on a dime," Biddle and Zirkle concluded that "the Iraqi air defense system...demonstrated little or no capacity to adapt during either 'Desert Storm' or the Iran-Iraq War" (186). For a careful analysis of the role skill and doctrinal virtuosity (vice technology) played in determining Iraqi performance in the Gulf War, see Stephen Biddle, "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict," *International Security* 21, no. 2 (fall 1996): 139–79.

tions of opacity. Improvisation and operational flexibility are not simply a matter of size; they must be trained into military units.

This argument points to a limitation of small-N comparative static analyses. Holding everything constant and then varying the size of the arsenal yields an expectation that command and control problems will ease. If you take the exact same country with the exact same deployment and skill profile, it will find controlling a smaller arsenal easier than controlling a larger arsenal. Counterfactual reasoning supports this logic, but since there are so few cases of nuclear proliferation to study we cannot be very confident of the magnitude of the effect.[29] Since the purpose of neooptimism is to assuage us on the safeness of minor proliferators, it is not sufficient to know whether a certain kind of proliferation is relatively safer than another. We must also know how much safer—that is, whether it is safe enough to compensate for other problems. One must also examine whether the factor that is driving the smallness will also result in changes in other relevant parameters, for instance the alert level of the arsenal or the reliability of the weapon's design. One must also have some sense of the magnitude of effect and of other necessary conditions; the smaller size may only afford a meaningful improvement in nuclear command and control during a crisis if it is coupled with a competent military. Weighing all the factors in the U.S. case, for instance, it is not at all certain that nuclear operations were safer in the late-1950s than in the late-1960s; the arsenal was smaller in the earlier period, but the advantages of size were offset by a variety of unsafe operational practices including airborne alerts, a relatively wide scope of predelegated authority, an absence of use-control devices, and a general ignorance among top-level civilian leaders about operational realities.

In sum, neooptimists have helpfully fleshed out the ways in which small size facilitates command and control. In so doing, however, they may be overstating both the virtues of smallness and simplicity and the likelihood that minor proliferators will adopt the specific kinds of small and simple arsenals necessary for the rosy scenario.

29. As the N gets smaller (that is, since there are so few examples of nuclear proliferation on which to base this causal argument), the standard error around the estimated coefficient gets larger. Thus, we cannot be confident about just how large an effect the explanatory variable (size of arsenal) has on our dependent variable (assertiveness of command and control system).

WILL SMALL ARSENALS BE AS SURVIVABLE AS NEOOPTIMISTS CLAIM AND DOES IT MATTER?

NEOOPTIMISTS DO devote considerable attention to rebutting one of the limitations usually associated with small arsenals: that because they are easier to destroy in a preventive attack they will generate crisis instabilities. Here, neooptimists concede that a simple comparative static analysis works against them; they agree that a small arsenal is, ceteris paribus, easier to destroy. They go on, however, to adopt the two analytical techniques I advocate above: they allow other things to vary in tandem with size (notably survivability countermeasures) and then focus on the overall magnitude of the net effect, asking whether the arsenals will be vulnerable enough to make a meaningful difference in the probability of preventive war.[30] While the analysis is more sophisticated, it still suffers from logical errors and, in any case, the data do not seem to support the principal claims.

Neopessimists worry that the interaction of the small size, constrained deployment, and the adverse strategic environment many minor proliferators are likely to face will raise doubts about the survivability of the arsenal. The possessor of the arsenal, seeking to address this survivability problem, may be tempted to adopt undesirable countermeasures, particularly predelegated deployment schemes or accelerated alert procedures that may faildeadly in a crisis. The enemies of the minor proliferators, at the same time, will face tremendous pressure to precipitate a war early in the development cycle so as to rid the region of the nuclear competitor before the arsenal is too far along. Either or both of these developments make proliferation far more dangerous than optimists claim.

Not so, say neooptimists, since minor proliferators can make their arsenals survivable by hiding them and, in any case, regional enemies will be unable to pull off a splendid first strike because they are as constrained in their military capabilities as the minor proliferators themselves.[31] Minor proliferators only need a handful of survivable weapons to achieve minimum deterrence and they can be assured that some weapons will survive if they hide them; indeed, the small size of the arsenal may make hiding even

30. Neooptimists do not make much use of the distinction between preventive war and preemption. They argue that the same basic factor—the doubtfulness of the success of a first strike—will inhibit both. Traditionally, of course, strategic analysts have emphasized that a higher level of doubt was needed to deter preemption since some inhibitions on going to war would be lifted in the context of a crisis.

31. Karl, "Proliferation Pessimism," 95–103; Seng, "Less Is More," 89.

more doable.[32] With minimum deterrence they will not need to worry about preemption, especially not from their regional adversaries who will be unlikely to have the overwhelming conventional superiority needed to pull off a splendid first strike. Moreover, financial constraints will push minor proliferators to adopt force postures that are themselves not useful for a first strike against their enemy. Karl calls these constraints "blessings in disguise," because they will dictate that minor proliferators rely on air-delivered systems which are less likely to deliver a knockout blow because they must penetrate air defenses—presumably, however, the constraints are not so daunting as to eliminate the possibility that enough will sneak through to deter an attack credibly.[33]

Thus, the neooptimists' case reduces to the same argument paleooptimists advanced. The spread of nuclear proliferation is stabilizing, they claim, because even the most backward minor proliferator will have an arsenal capable of providing some minimal existential deterrence—and states, recognizing this, will never try to provoke the minor proliferator. Since the proliferator will never be provoked, the proliferator will never feel compelled to worry about the reliability of his nuclear arsenal and will never adopt unsafe practices designed to boost its deterrent value. I remain unpersuaded by this logic for five reasons.

First, no state I know of has ever relied on existential or minimum deterrence for very long. Certainly, none of the first generation nuclear powers ever acted as if they believed in true minimum deterrence. Even France and China spent the money to buy a fairly robust missile capability. If neoop-

32 I am not entirely persuaded that the small size of a new arsenal enhances hiding, as neooptimists claim. It may be easier to hide an *entire* small arsenal than it is to hide an *entire* large arsenal. In either case, however, the number of weapons that survive through hiding, and thus the efficacy of such a strategy, is determined entirely by the availability of good hiding spots, not the size of the arsenal. Of course, smaller weapons (as distinct from a smaller arsenal) *are* easier to hide, but they are also very costly to develop and involve precisely the kind of extensive testing regimen that optimists say is not necessary for an adequate nuclear deterrent.

33. Karl, "Proliferation Pessimism," 104. Of course, most minor proliferators also have missile programs—indeed, Seng thinks that financial constraints will push them to rely on *missile* delivery—but Karl dismisses these programs as themselves constrained by tight budgets and dependence on foreign technology, and thus unlikely to be destabilizing. Why dependence on foreign technology makes the missiles less destabilizing is not explained. Nevertheless, Karl's hunch may find some support in India's apparent decision to cut back on its Agni/Prithvi missile program, although this decision is still hotly debated in India and the government has been at pains to stress that the missile program is still ongoing. See Kenneth J. Cooper, "India Halts Development of Medium-Range Missile; Project Had Long Been Opposed by U.S.," *Washington Post*, 6 December 1996, A46; Sanjeev Miglani, "Empty-Handed Missile Rhetoric Leaves India Without a Credible Deterrent," *Asia Times*, 16 January 1997, 8; and "India's PM Backs Troubled Agni Missile Project," *Reuters North American Wire*, 4 March 1997.

timists code these countries—each with at least four hundred weapons aboard a wide mix of delivery systems kept at fairly high levels of readiness—as the minimum deterrent models for minor proliferators, then neooptimists have to admit of all the organizational and complexity concerns pessimists have raised.[34] The acid test will be in South Asia and that test is in its infancy (on which more in the conclusion). The fact is that states have shown a proclivity for worst-case strategizing and this leads them to distrust existential deterrence schemes.

Second, although preventive wars are hard to do and perhaps unlikely, they are not as remote a possibility as neooptimists claim. On the one hand, as neooptimists remind us, there are some important dogs that have not barked. India did not launch a preventive war to prevent the final development of a Pakistani nuclear capability, nor has the United States launched a war against North Korea. Both cases would have met the pessimist criteria of a likely case for preventive war. On the other hand, there are examples of attacks that approximate a preventive war. Israel engaged in something resembling a preventive covert war to stop Egypt's nuclear arsenal;[35] Israel famously launched a preventive strike against Iraq; the United States exploited Iraq's invasion of Kuwait to wage a preventive war against Hussein's arsenal. Moreover, the more we learn about nuclear history, the more evidence we find that states took the planning for preventive war seriously.[36] The jury is still out on a number of cases that also might meet the criteria for most-likely; what, for instance, would China's reaction be to credible evidence that Taiwan or Japan were developing nuclear weapons?

34. Both France and China developed a full triad—bombers, land-based missiles, and submarine-launched ballistic missiles—although France has indicated that it will stand-down its land-based missiles. "British, French, and Chinese Nuclear Forces," *Bulletin of Atomic Scientists* (November/December 1996): 64–67.

35. See Ian Black and Benny Morris, *Israel's Secret Wars: A History of Israel's Intelligence Services* (New York: Grove Weidenfeld, 1991), 194–99; and Isser Harel, *The Crisis of the German Scientists* (in Hebrew) (Tel Aviv: Ma'ariv, 1982). I am indebted to Benjamin Frankel for directing my attention to this example.

36. In addition to the cases that are already well known—U.S. planning against the Soviet Union, Soviet planning against China, U.S. planning against North Korea—there is also intriguing evidence that Egypt seriously planned for a preventive war to destroy Israel's nascent nuclear program at Dimona. Though it may have been only public posturing, President Gamal Abdul Nasser publicly warned as much in 1966. Hedrick Smith, "Warning on Bomb Given by Nasser," *New York Times*, 21 February 1966, as cited in Avner Cohen, "Cairo, Dimona, and the June 1967 War," *Middle East Journal* 50, no. 2 (spring 1996): 197. Cohen concludes that Dimona played only a marginal role in precipitating the 1967 war. At the very least, however, Cohen documents that the United States was preoccupied with the possibility that Egypt might launch a preventive war over Israel's nuclear program, and he argues persuasively that Israel's nuclear program figured more prominently in the war than has been generally believed.

Third, minor proliferators may have more reason to worry about their strategic environment than the neooptimists claim. Neooptimists base their rosy analyses of regional competition on the capabilities of the regional players alone. Neooptimists assume that minor proliferators only worry about regional enemies who themselves will be constrained by financial considerations.[37] Since all the actors in the picture are equally financially strapped, neooptimists reason that no player need worry about first-strike instabilities. The proliferators' arsenals might be small enough to make a tempting target, but the counterproliferators' arsenals are also too small to execute a first strike. The weakness on offense cancels the weakness on defense; deterrence remains because the arsenals are "proportional."[38] If Iran only worried about Iraq or Israel, if Iraq only worried about Iran, if North Korea only worried about South Korea, if Libya only worried about Egypt: in short, if regional competitors were all that mattered, the neooptimists' confidence might be more warranted.

Of course, all of those proliferators worry about at least one other player, one whose arsenal is anything but proportional: the United States. Worrying about the United States makes eminent sense from the point of view of the minor proliferator and, although the neooptimists have missed the point, only the most imprudent proliferator would fail to factor U.S. capabilities into its strategic calculus. The United States has explicitly identified the arsenals or potential arsenals of most minor proliferators as a major threat, the legitimate target of the U.S. military; indeed, one of the missions reserved for the post–cold war U.S. nuclear arsenal is to target minor proliferators.[39] In a glossy new publication, *Proliferation: Threat and Response*, the Department of Defense lays out the proliferation challenge posed by many of the minor proliferators of interest to the optimist/pessimist debate. Significantly, in a section describing the U.S. response to proliferation, the report discusses counterforce options which commit the DoD to the "development of military capabilities to target (using battlefield surveillance and other intelligence assets), plan attacks, seize, disable, destroy, disrupt, interdict, neutralize, or deny the use of NBC weapons and launch platforms

37. Karl, "Proliferation Pessimism," 105; Seng, "Less Is More," 65.

38. Seng, "Less Is More," 88–89.

39. As part of the Non-Proliferation Treaty, the United States has committed not to be the first to use nuclear weapons against a non-nuclear signatory to the NPT. The pledge implicitly reserves the right to use nuclear weapons against (and therefore to target) those states that do hold nuclear weapons. Moreover, the Clinton administration appears to have expanded the category of targetable states to include those with any chemical or biological weapons as well. George Bunn, "Expanding Nuclear Options: Is the U.S. Negating Its Non-Use Pledges?" *Arms Control Today* (May/June 1996): 7–10.

and their supporting command, control, and communications (C3)...Attack options include action by air, land, sea, space, and special operations forces."[40] Moreover, many of the minor proliferators also have a worldview and geopolitical aspirations that are anathema to U.S. interests; many are, in the purest sense, enemies of the United States. Since they must consider how to protect their nuclear delivery capability against the United States as well as any regional competitors, their small arsenals are not nearly as desirable as neooptimists claim. While the United States may not have a guaranteed first-strike capability—the United States doubted its ability to launch a surgical preventive strike against North Korea in 1993–94[41]—it nevertheless has a formidable capability. Even if proliferators believe that the nuclear taboo is great enough to deter any nuclear attack from the United States, they still have to worry about a massive conventional attack. Recent attention paid to the information dominance of the United States, supposedly prefigured in the Gulf War and alleged to be the defining military capability of the next era, only exacerbates these concerns.[42] It is reasonable to think that the same worst-case planning that would cause the United States to hesitate in launching a preventive strike would also cause the minor proliferator to worry about just such a preventive strike. The United States has to worry that every break in the attack will go the proliferator's way, leaving the proliferator with enough of a retaliatory capability to strike back with unacceptable damage; the minor proliferator has to worry that every break in the attack will go the United States' way, rendering any retaliation impossible. In other words, small proliferators will have reason to worry about survivability and to seek ways of assuring that they have a retaliation capability.

Fourth, even if an enemy splendid first strike is a remote possibility, it can still have perverse effects on the command and control decisions of minor proliferators. Pessimists worry about preventive war for two reasons: (1) states might wage preventive war; (2) in an effort to counter the preventive war problem states may take command and control short-cuts that prove destabilizing. The fact that an outside analyst concludes that the

40. Office of the Secretary of Defense, *Proliferation: Threat and Response* (Washington, D.C.: U.S. GPO, April 1996), 52. After considerable bureaucratic infighting over what material to include, the final report only discusses the proliferation programs of "problem" states; for instance, Israel's nuclear arsenal is rather prominently missing from the "Middle East and North Africa" chapter.

41. See discussion in Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: Woodrow Wilson Center, 1995), 258–60.

42. Joseph S. Nye Jr. and William A. Owens, "America's Information Edge," *Foreign Affairs* 75, no. 2 (March/April 1996): 20–36.

arsenal is survivable does not dispose of the possibility that senior leaders will feel compelled to take steps to hedge against the danger. Moreover, some of those steps may be almost as bad as the risks of preventive war in the first place, such as placing the arsenal on higher states of alert and predelegating use authority to lower-echelon commanders.[43]

Fifth, the evidence so far about whether states will rely on concealment rather than on unsafe behaviors like predelegation is at best mixed. The exemplar neooptimists cite is Saddam Hussein's successful foiling of the massive Scud hunt during the Gulf War. Despite the strenuous efforts of the Allies, despite a total command of the air and overhead reconnaissance (an advantage no regional competitor will ever have), despite thousands of sorties, Iraq was still able to fire off Scuds well after the rest of the Iraqi defense plan collapsed. Therefore, neooptimists reason, no minor proliferator should ever doubt its ability to retaliate and no minor proliferator should ever feel the need to adopt unsafe survivability measures.

Of course, Saddam Hussein very much doubted his ability to retaliate with his weapons of mass destruction arsenal. That is precisely why it appears he predelegated authority to use chemical weapons and distributed at least some of his arsenal to field commanders in advance of the U.S. attack. The public record on the extent of any Iraqi predelegation remains sketchy. Intelligence sources during the Gulf War told reporters that Hussein had predelegated authority to use chemical weapons to his division commanders.[44] Early after action reports, however, seemed to indicate that chemical weapons were not deployed in the combat theater, making any predelegation of authority moot.[45] More recently, and based on more comprehensive evidence, the United Nations Special Commission (UNSCOM) tasked with investigating Iraq's weapons of mass destruction has concluded that Hussein had both predelegated authority and predeployed chemical and biological weapons "in a pattern corresponding to strategic and offensive use through surprise attack against perceived enemies."[46] While Iraqi lead-

43. I develop this argument in greater detail in Peter D. Feaver, "Correspondence," *International Security* 22, no. 3 (winter 1997/98, forthcoming).

44. Earl Lane, "No Chemicals: Yet Analysts Warn of Iraqi Guard's Capability," *Newsday*, 26 February 1991, 15. See also William M. Arkin, "Calculated Ambiguity: Nuclear Weapons and the Gulf War," *Washington Quarterly* 19, no. 4 (autumn 1996): 7.

45. Rick Atkinson, "No Chemical Arms Found on Battlefields," *Washington Post*, 7 March 1991, 1. I cited this preliminary evidence elsewhere when I concluded that Hussein's rigid command structure had impeded his ability to make effective use of his weapons of mass destruction, but in light of further evidence I withdraw that conclusion. See Peter Feaver, "Lessons From Desert Storm: Iraqi Style," *IUS Newsletter* (winter 1996): 15–16.

46. *Report of the Secretary-General on the Status of the Implementation of the Special Commission's Plan for the Ongoing Monitoring and Verification of Iraq's Compliance With Relevant Parts of Section C of*

ers claimed that the predelegated authority was limited only to retaliation should the United States have used nuclear weapons against Baghdad, there were apparently no physical safeguards that would have prevented use under other conditions. Some believe that Iraq did not use its WMD only because Coalition forces interdicted supply lines, and may even have preemptively destroyed a remote-controlled MiG airplane that Iraqi forces were allegedly rigging with a chemical payload for a kamikaze mission.[47]

In any event, the evidence is suggestive that in the face of a dire external threat, even a country with extremely pathological civil-military relations like Iraq can give in to temptations to predelegate use-authority so as to preserve the survivability of its WMD arsenal. The point is not that Hussein was crazy to take these risks. Indeed, as events turned out, this was a predictable and plausible response to Iraq's strategic inferiority. The point is, rather, that in the process of addressing its strategic inferiority, Iraq felt compelled to take steps that necessarily compromised the command and control over its weapons of mass destruction.

To be fair, Seng does admit of this inconvenient fact. Indeed, after touting the benefits of concealment over other means of assuring a retaliation capability, notably predelegation, Seng admits that leaders in minor proliferators will have to predelegate authority.[48] He dismisses predelegation, however, as only worrisome if it is combined with time pressures and, Seng reasons, there is no need for minor proliferators to feel any urgency.[49] Concealment guarantees the survival of the arsenal and minor proliferators will have ample time to weigh their decision. Indeed, Seng describes an almost leisurely process wherein before the order to launch is given, central leaders check and recheck information, pass commands back and forth between field and headquarters, develop supplemental intelligence sources, and so on.[50] Whether Iraq believed it did not face time pressures is impossible to say, but there are intriguing indications that Iraq felt time pressure.[51]

Security Council Resolution 687 (1991) (New York: United Nations Publications), 11 October 1995, 28.

47. Arkin cites this view, although he does not endorse it, in "Calculated Ambiguity," 8–9.

48. Seng, "Less Is More," 78. He does not discuss how this admission cuts against his general claim that minor proliferators will be so sure of their retaliatory capability that they will not have to take unsafe measures.

49. Seng, "Less Is More," 78–80.

50. Seng, "Less Is More," 78.

51. There are tantalizing reports that Iraq accepted tremendous safety risks in order to continue to use its one politically effective terror weapon, Scud missile strikes on Israel. David Welch speculates that Hussein must have held the Scud crews at gunpoint to force them to continue firing because, "in order to minimize the time during which a mobile launcher had to reveal itself in order to fire, Iraqi crews fueled the missiles *before* transporting and erecting them. Given the volatility of the Scud's liquid fuel and the extreme danger of

Moreover, it is hard to believe that any leader who witnessed the 1991 Gulf War would believe he is likely to have the command, control, communications, and intelligence apparatus needed to mosey through Seng's decision-making protocol.[52] Even conceding, for the sake of argument, that a minor proliferator would have this luxury, is predelegation, absent time pressures, as untroubling as neooptimists claim?

Predelegation perforce increases the risk of unauthorized use because ability must be transmitted with authority. Such predelegation is still subject to the "crazy Colonel" and "normal accidents" scenarios that raised concerns about unauthorized use in the superpower arsenals.[53] Even if Seng's improbable timeline's can be trusted, the *best* that could be hoped for is a ride-it-out-and-retaliate strategy akin to the role played by U.S. ballistic submarines. This satisfies neooptimists: "...insofar as the history of submarine control is widely acknowledged as a favorable one, the similarities are encouraging and instructive."[54] Many cold war analysts, however, including myself, had reservations about the submarine ride-it-out-and-retaliate strategy.[55] In fact, the adequacy of command and control for submarines was *the* biggest single controversy in the nuclear use-control field during the late cold war. Submarines raised all sorts of problems about unauthorized use or unintended use under conditions of communications failures that appeared to mimic a legitimate predelegated use scenario but were in fact only the result of a technical breakdown. Indeed, the submarine control was problematic enough that a blue-ribbon panel convened by the Bush administration recommended that PAL-type devices be placed on submarines;

explosion, no knowledgeable crew would have done this willingly" (David A. Welch, "The Politics and Psychology of Restraint: Israeli Decision-Making in the Gulf War," in *Choosing to Cooperate: How States Avoid Loss*, ed. Janice Gross Stein and Lewis. W. Pauly [Baltimore: Johns Hopkins University Press, 1993], 140 n. 29).

52. Seng does recognize that information dominance poses a problem for his theory. His solution, presented as a policy recommendation, is a nonstarter. "A focus on concealment potentials suggests that far-sighted limitations on satellite and high-altitude reconnaissance technologies may be more crucial to strategic accords than many other elements of arms control" ("Less Is More," 90). Such an arms-control proposal works against the other kinds of transparency and confidence-building measures that promote regional stability. Moreover, one should always be skeptical about the viability of proposals that rely on a country, in this case the United States, unilaterally abandoning one of the central priorities of its military establishment, in this case enhanced Information Warfare capabilities. Since the United States is unlikely to make such a unilateral gesture, we cannot expect much more from other states with nascent IW programs.

53. For instance, Sagan has documented how, because they possessed the predelegated authority to scramble interceptor aircraft, NORAD overreacted to a false warning generated by a faulty message format. See Sagan, *Limits of Safety*, 240–43.

54. Seng, "Less Is More," 35.

55. Feaver, *Guarding the Guardians*, 231–35. See also Desmond Ball, et al., *Crisis Stability and Nuclear War* (Ithaca: Cornell University Peace Studies Program, 1987), 76.

the recommendation was finally implemented in 1996, well after the cold war urgency had passed.[56]

Concealment, then, far from being the magic cure that solves proliferation problems, may actually exacerbate command and control problems. At best, concealment may save the launchers. Such a strategy, however, and the strategic environment that pushed it (namely, reason to fear that a successful first strike is possible otherwise) would work against all the other desirable features of small arsenals upon which neooptimists rely. For instance, separating the warheads from the delivery systems would be inadvisable since the enemy might be able to destroy components in transit.[57] To make concealment work, it is probable that everything that is needed for actually using the weapons would be collocated. Ability and authority, however, would likely be predelegated and the tight central control supposedly possible with a small arsenal would in effect be abandoned. If concealment alone satisfies concerns about survivable retaliation, then neooptimists may have a point. If concealment only works in conjunction with predelegation of authority, then minor proliferators will have the same kinds of always/never problems that afflicted superpower arsenals.

In the end, neooptimists rely on the same rosy analysis Waltz uses to dismiss these safety concerns: "In any case, despite the intense strategic pressures of a military invasion by the United States and the prospects of sudden defeat, [Iraq's WMD-armed] missiles were not launched."[58] In other words, optimists claim that all the aggravating conditions expected by pessimists came true in the Iraqi case, but somehow, for reasons we can only speculate about, we avoided a catastrophe. Hardly a ringing endorsement for optimism.

Is Domestic Instability as Unalloyed Advantage in Controlling Nuclear Weapons?

Neooptimists turn the domestic political vices of minor proliferators into command and control virtues. Precisely because domestic instability is potentially troubling, neooptimists argue that minor proliferators

56. The work of the commission, called the Federal Advisory Committee on Nuclear Fail-Safe and Risk Reduction and chaired by Jeanne Kirkpatrick, is described in "'Crimson Tide' Roils Navy; Military, Nuclear Weapons Experts Disagree on Danger Armed Subs Pose," *Rocky Mountain News* 28 May 1995, 32A. The Navy decision to place coded-control devices aboard submarines is reported in "U.S. 'Boomers' to be Equipped with PALs," *Armed Forces Newswire Service*, 4 January 1995.

57. Presumably, this concern caused Hussein to predeploy chemicals to the battlefield.

58. Seng, "Less Is More," 80.

who have reason to worry about this will take countermeasures that have the net effect of tightening control over the weapons.[59] The empirical record is perhaps too thin to settle the issue. On the one hand, to my knowledge no nuclear power has ever lost control of one of its nuclear weapons even under conditions of extreme domestic instability. On the other hand, domestic instability is rightly viewed as raising the risks of a catastrophic collapse of Russia's nuclear command and control system.[60]

Here it would be helpful to clarify a confusion about the determinants of command and control systems and, in particular, to distinguish between what may be called "enabling" and "motivating" factors. Enabling factors are ones that actually facilitate the behavior; "motivating" factors are ones that create incentives for certain behavior, without necessarily making that behavior any easier. Enabling and motivating factors can work at cross-purposes. Domestic instability has precisely such a cross-cutting effect. It is true that domestic instability is a motivating factor for assertive control, but it is not an enabling factor. Indeed, domestic instability undercuts the ability of states to secure tight control over nuclear forces. Thus, I was careful to hedge my prediction that countries with volatile civil-military relations would have assertive command and control positions with the caveat that countries with especially volatile civil-military relations may not be able to achieve as assertive a command system as it is in their interests to adopt.[61]

This deductive indeterminacy permits neopessimists and neooptimists to draw different inferences from the same historical event. Consider the now-famous case of the French Algerian generals revolt in 1961. Recall that during the coup attempt, rebellious generals sought to gain access to the nuclear test site but were stymied by central authorities.[62] Neooptimists point to the event and argue that France took the proper precautions of insulating the military custodians from the rest of the Army precisely because they had reason to worry. Such appropriate prophylactic measures reassure neooptimists that functionalist logic will prevail; leaders who have

59. Seng argues, for instance, that, "if, as pessimists worry, minor proliferators will tend to suffer from domestic instabilities, then central leaders are likely to keep nuclear control organizations as insulated and tightly held as possible" (75–76).

60. Certainly, if the public statements of Igor Rodionov, then Russian minister of defense, can be believed, there is ample reason to worry about the security of the nuclear arsenal in the face of enduring domestic instability. Of course, neooptimists dismiss the Russian case as irrelevant because minor proliferators are unlikely to build an arsenal as large and complex as did the Soviet Union. See David Hoffman, "Russia Warned of Crisis Over Scant Military Funding," *Washington Post*, 26 October 1996, 24.

61. Feaver, "Command and Control in Emerging Nuclear Nations," 177–78.

62. Leonard Spector, *Going Nuclear: The Spread of Nuclear Weapons, 1986–1987* (Cambridge, Mass.: Ballinger, 1987), 28–32.

every reason to adopt safe nuclear behaviors will do so.[63] The neopessimist can look at the case and see reasons to doubt that nuclear weapons will ever be entirely insulated from domestic political factors, however segregated the command and control system may be.[64]

It should be possible, however, to agree that domestic political factors at the very least cut both ways. Consider the case of personnel reliability programs, which neooptimists confidently assert will be easier to maintain by minor proliferators because the numbers of personnel involved will be so small.[65] To this advantage, one might add that authoritarian regimes are likely also to have an edge over countries like the United States where the niceties of civil rights restrictions complicate efforts to monitor nuclear custodians. Unstable regimes, with greater reason to worry, are even less likely to let considerations of human rights frustrate their efforts to control the people handling nuclear weapons. Against these advantages must be weighed the corrosive effects regime instability has on military professionalism. Nuclear command and control consists of hardware (use-control technologies), software (administrative procedures) and wetware (the quality of the personnel involved). The reliability of the wetware determines the reliability of the software which bounds the control benefits any given level of technology can provide.[66] Domestic instability directly undermines wetware. The factionalist intrigue that characterizes many of the political systems of proliferators of interest would cut against human reliability programs. By analogy, in some ways it is easier to monitor drug use in prisons (because prisoners have fewer rights to privacy and access is controlled); on the other hand, prison populations have more incentives to use drugs and

63. Seng "Less Is More," 81–82. The issue here, however, may be one of fact, not interpretation. It is not at all clear that the nuclear custodians were insulated as Seng claims. Spector alleges that the test-site commander, General Thiry, reported to the regular joint services commander, General Mentre. Moreover, General Mentre sided with the coup-plotters, at least for part of the crisis. It is true that loyalist forces were at pains to secure control of the nuclear weapon once the crisis started. It is by no means certain, however, that prudent measures taken *before* the crisis began contributed to the benign outcome, as neooptimists claim. Spector, *Going Nuclear*, 30.

64. This particular part of the debate may be fundamentally unresolvable. Everyone agrees and knows that there has been no catastrophic unauthorized use of nuclear weapons, yet. Most participants in the debate also know that there have been incidents where safety and security measures were compromised, to some extent. Optimists see the compromises and lapses and point to the fact that none has produced the catastrophe pessimists fear. Pessimists point to the lapses and say the system is not perfect and can fail. Both are correct. The half-full glass *is* also half-empty.

65. Seng, "Less Is More," 81.

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

fewer personal disincentives. The anecdotal evidence seems to suggest that the net result is that drug use in prison mirrors drug use in society.[67]

Is Opacity Good or Bad for Nuclear Command and Control?

Neooptimists lean rather heavily on the alleged advantages opaque proliferation has over more traditional open proliferation. Opaque proliferation refers to those cases where the development of the nuclear arsenal is never openly acknowledged, even after its existence is widely known.[68] The virtues neooptimists cite, however, derive from rather narrow definitions of opacity and are more than countered by vices that neooptimists slight or ignore.

Karl's branch of neooptimism essentially defines opaque proliferation as "non-weaponized proliferation."[69] If the proliferator never weaponizes the arsenal, the neooptimists reason, they will not confront the operational trade-offs that make regular proliferation so worrisome. The logic here is sound but misses the point.[70] The problem is that nonweaponized states will face tremendous pressure to weaponize if their strategic environment worsens. This type of weaponization is particularly dangerous for two reasons. First, it is happening under conditions of heightened tension, so the problems of preventive war, preemption, and crisis instability will be especially acute. Second, the opacity of the proliferation thus far also likely dampened serious and widespread nuclear learning within the relevant political and military organizations. In other words, if opaque proliferation is defined as non-weaponized proliferation, it is benign only insofar as an

67. Maureen O'Connor, "Out to Crack Addiction," *Independent*, 6 April 1995, 30.

68. Benjamin Frankel coined the term "opaque proliferation" in "Notes on the Nuclear Underworld," *The National Interest*, no. 9 (fall 1987): 122–26.

69. Karl, "Proliferation Pessimism," 115–16. At one end of the weaponization continuum is the most nascent of nuclear research programs (Algeria); at the other end is a large, fully developed arsenal openly deployed aboard a complex mix of appropriate delivery systems (the United States).

70. The empirical evidence supporting permanent nonweaponized status for minor proliferators is certainly ambiguous. Karl claims rather confidently that India and Pakistan have no plans to weaponize beyond their current status. There is at least some evidence to suggest otherwise, however, and the evidence is not limited to the bombast of a few former Indian generals as Karl implies. India has apparently tried to purchase use-control technology. Although these efforts offer some solace in the form of Indian nuclear learning about command and control issues, they also raise serious doubts about India's commitment to nonweaponized status. Why purchase use-controls if one never intends to weaponize? Karl, "Proliferation Pessimism," 108 and 99, respectively. Blair alludes to Indian efforts to purchase missile safeguards technology from Russia in Bruce Blair, *Global Zero Alert for Nuclear Forces*, Brookings Occasional Papers (Washington, D.C.: Brookings, 1995), 9 n. 9.

opaque proliferator *never* weaponizes. For this reason, neooptimists must make an auxiliary assertion to the effect that opaque proliferators enjoy enough existential deterrent value from their shrouded nuclear program that they never need to cross further weaponization thresholds. Put another way, the so-called virtue of opacity touted by this school of neooptimism is nothing more than the uncontroversial and unhelpful claim that if a state never weaponizes it will not face many command and control problems.[71]

Seng's branch of neooptimism defines opacity so as to allow for weaponization—but also for everything else that opacity is thought to preclude, including rehearsals, regularized training exercises, doctrinal debates, and so forth.[72] This, of course, empties opacity of almost all its distinctiveness. Take the issue of rehearsing nuclear options, which Seng claims opaque proliferators can do underneath their shroud.[73] Under most situations, nuclear rehearsals will undermine opacity. If the delivery vehicle is tactical aircraft like the F-16 (as distinct from high-altitude strategic bombers), then it is also particularly demanding on pilot skill and so will require extensive training that is especially difficult to hide. If the delivery vehicle is dual-use ground-launched missiles, or if the warheads are kept separate as a way of providing assertive control over the arsenal, then the rehearsals will involve further distinctive markers such as the delivery of the warheads and other specialized handling procedures.

If, as Seng claims, opaque proliferators can still build large arsenals, can still rehearse the full range of nuclear options, can still review, debate, and experiment with different nuclear doctrines, what is left of opacity?[74] About the only thing left to opacity is the lack of public scrutiny—and yet even this is enough to be troubling.[75] Lack of public scrutiny hinders *political*

71. This is the only way to make sense out of Karl's curious argument about the desirability of a weak or nonexistent strategic debate. He must be assuming that opaque proliferators never weaponize because he offers no solutions to the other problems of opacity. Karl, "Proliferation Pessimism," 115–16.

72. Seng, "Less Is More," 83–88.

73. Ibid., 86–87.

74. Neooptimists are probably correct in stressing that a determined proliferator can hide a considerable portion of its nuclear program from the outside world. The further along the weaponization continuum the state goes, however, the more difficult such a deception campaign gets. For a disturbing review of Iraq's remarkably successful effort in deceiving foreign inspectors for over a decade, see David A. Kay, "Denial and Deception Practices of WMD Proliferators: Iraq and Beyond," *Washington Quarterly* 18, no. 1 (winter 1995): 85–105.

75. Moreover, Seng's rosy assessment of opacity depends in part on the proliferators never making their arsenal more complicated. In this light, it is curious that Seng correctly chastises Karl for assuming that states will remain nonweaponized, while he himself assumes that the lack of complexity *is* immutable. Karl says countries can resist pressures to weaponize. Seng says they will not be able to resist the weaponization in the beginning, but once they have a small arsenal they will resist all further weaponization pressures. Neither

control.[76] There are many examples from the non-nuclear world. Consider the National Reconnaissance Office debacle, where the opacity of the U.S. intelligence community enabled the NRO to defy central authorities on fiscal matters.[77] The cloak of secrecy surrounding U.S. nuclear operations likewise undermined civilian control in the nuclear arena. The problems are likely to be much worse in an opaque system, where the cloak of secrecy is that much more suffocating.

Opacity also works to erode some of the advantages otherwise accruing to states that keep their arsenals small and simple. Neooptimists note that small arsenals allow for more direct command and control by the senior leadership with fewer intermediary levels.[78] Opacity, however, works the other way. A secret, opaque program increases the likelihood that the senior political leaders will be kept in the dark, especially if the political leadership changes several times over the life cycle of the nuclear program.[79] The combination of small size *and* opacity may actually reduce the level of direct command and control, at least by political leaders.

Neooptimists counter that opacity will aid in keeping the nuclear programs of minor proliferators insulated from the conventional military. Keeping the delivery systems separate reduces the problems of tightly coupled complexity that made cold war nuclear operations so risky. Such insulation may indeed occur during the preweaponization phases of opaque proliferation. As the arsenal weaponizes, however, it will be harder to do that, especially given other cost considerations confronting small proliferators. The Israeli arsenal is considerably less opaque now than it used to be, in part because the arsenal has grown and in part because the Israelis have increasingly weaponized their arsenal, for instance, by practicing nuclear

justifies his confident prediction about where minor proliferators will stop along the weaponization continuum. Seng, "Less Is More," 85–86.

76. The kind of opacity Seng envisions would also probably rule out a robust arms control regime. Avner Cohen and Marvin Miller, "How to Think About—and Implement—Nuclear Arms Control in the Middle East," *Washington Quarterly* 16, no. 2 (spring 1993): 110–13.

77. Joseph C. Anselmo, "NRO Lost Track of $4 Billion," *Aviation Week and Space Technology*, 20 May 1996. All this, in an organizational setting that had formalized and stringent procedures for review and oversight. Intelligence oversight in the United States is opaque compared to other national security issues. It is far less opaque than the nuclear programs of interest to this debate.

78. Seng, "Less Is More, " 72–73; Karl, "Proliferation Pessimism," 109. I agree; indeed, I make essentially the same point. Feaver, "Command and Control," 172. This benefit must be weighed against the increased danger that with a small and opaque arsenal the custodians and the authorizer/enablers are the same. Under conditions of extreme domestic instability, as was demonstrated during the abortive Soviet coup of 1991, nuclear adventurism can be inhibited if custody, enabling ability, and authority are all kept separate.

79. A case in point is Brazil's secret nuclear program, allegedly pursued without the cognizance of the senior political leadership. Reiss, *Bridled Ambition*, 48–52.

missions and engaging in other behavior which gets noticed by intelligence services.[80] Minor proliferators cannot dedicate portions of their Air Force or their missile forces to a nuclear-only mission because they do not have a large enough inventory of planes and missiles. It is more likely that as they weaponize, fiscal pressures will compel them to go for dual-use capabilities leading to the inevitable increase in complexity. Neooptimists may be right that minor proliferators will probably not quickly spread the nuclear mission to all branches of the military—the navy might not get the mission in minor proliferators—but for the same reasons of fiscal constraint they are unlikely to create an entirely separate nuclear strike force.

As for whether opacity reduces the likelihood that a weapon would be stolen or compromised in domestic instability, as neooptimists claim, it is not possible to say definitively.[81] It is probably true in a statistical sense that if fewer people know about the details of the program, there are fewer people who are in a position to steal a weapon. If a true civil war erupted, however, one which split the military and pitted different units against each other, whoever was controlling the weapons would perforce be involved in a political fashion. The nuclear custodians would be faced with an inevitable choice: support the rebels, support the central government, or do nothing. Even if the arsenal were opaque, it is possible that some rebel units would know enough about the program for them to force the issue and put the arsenal in play politically. If no rebels knew and if the arsenal were otherwise tightly controlled by central authorities (which would not necessarily be the case in opaque proliferation, as I argue above), then neooptimists are probably right that opacity would reduce the likelihood that the weapon would be stolen. It would, however, be politicized if only because drastic instability politicizes every act of omission and commission by the military. It is hard to imagine a situation where the presence of a nuclear arsenal, even an opaque nuclear arsenal, makes domestic instability *less* dangerous than it already is. At best, neooptimists can argue that opaque

80. Seng seems to suggest that Israel has not weaponized further, at least insofar as Israel has chosen to maintain "the insulation of nuclear operations throughout their nuclear history to the present" ("Less Is More," 76). In support of this position, he cites Cohen and Miller, but they are rather more equivocal on this point than Seng's citation admits. They do assert, contra Seymour Hersh, for example, that Israel has not developed any nuclear use doctrine more involved than the ultimate "psychological insurance policy for last resort contingencies," but they cannot provide any evidence to prove this negative. Moreover, they also appear to concede that the Israeli arsenal probably includes advanced low-yield weapons tailored for battlefield use. They further argue that technological and bureaucratic momentum pressures to expand the arsenal and the nuclear options are surely stronger in opaque countries like Israel than in the United States. These concessions cut more sharply against the neooptimists' claim than Seng acknowledges. Cohen and Miller, "How to Think," 107–10.

81. Seng claims this, "Less Is More," 81–82.

proliferation helps block at least one pathway whereby nuclear weapons would be drawn into a domestic conflict. This is at most a modest corrective to the pessimists brief.

It is with this enhanced appreciation of the problems of opacity that one must examine the now-famous 1973 Israeli near-use of nuclear weapons. Neopessimists cite this case as evidence that opaque proliferators will confront operational dilemmas under acute crisis conditions that do not lend themselves to safe management. Neooptimists point in general to the benign outcome (nuclear use was considered and then rejected when Israel's strategic situation improved) and specifically to the apparent emphasis on negative control, the discussion of various options, and even the strategic improvisation as evidence that minor proliferators can wield their small arsenals more responsibly than the superpowers did.[82] There is probably insufficient reliable evidence publicly available to decide between the different interpretations. Certainly Hersh's sketchy account does not resolve categorically whether there was operational confusion, as I suspect, or whether there was operational virtuosity, as Seng suggests.[83] As we have learned in the Cuban Missile Crisis case, however, about which much more was known even before the remarkable revelations of the past ten years, the crisis proved to be far more dangerous for the kinds of reasons neopessimists emphasize (operational snafus, command and control tradeoffs, etc.) than for any dangers of intended use.[84] Based on the currently available evidence on the Israeli case, I am inclined to withhold final judgment. I would be interested to know, however, what lessons if any the Israeli central command drew from the incident. Did they conclude, as did Seng, that operational flexibility was a good thing and that the risks of overrun were sufficiently manageable so as to justify eschewing a more hair-trigger response? Or did they conclude that the battle for the Golan Heights was a near thing and that their strategic environment dictated the kinds of delegative fixes both the United States and the Soviet Union adopted during the cold war? Moreover, in light of recent evidence that Israel may have rushed the weaponization of the arsenal six years earlier during the 1967 war, what lessons, if any, carried over from the earlier crisis.[85] Of course, we do not

82. Seng, "Less Is More," 87–88.

83. Seymour Hersh, *Samson Option: Israel's Nuclear Arsenal and American Foreign Policy* (New York: Random House, 1991), 225–40.

84. Sagan, *Limits of Safety*, 53–155; James G. Blight and David A. Welch, "Risking 'The Destruction of Nations': Lessons of the Cuban Missile Crisis for New and Aspiring Nuclear States," *Security Studies* 4, no. 4 (summer 1994): 811–50.

85. See the intriguing discussion in Cohen, "Cairo, Dimona, and the June 1967 War," 208–10.

know the answers to these questions, nor are we likely to given the secrecy shrouding the Israeli arsenal. Nevertheless, I would predict that the Israeli military did not view the 1973 case as sanguinely as did Seng. I would expect that they responded by introducing more of the kinds of nuclear scripts that Seng and I agree are dangerous. Moreover, I would further predict that because of opacity the political control and understanding of the operational tradeoffs involved in these options was more marginal in Israel than it was in the United States—and we know that such control was far from the optimists' ideal in the United States.

CONCLUSION: EXISTENTIAL DETERRENCE, THE SCARCITY OF SECURITY, AND HYPOTHESES FOR THE FUTURE

THE NEOOPTIMIST/neopessimist debate is at its core a debate about existential deterrence and the scarcity of security in the international system. Neooptimists think that new nuclear states will rely on existential deterrence. If they do so, then the problems faced by superpowers will not arise. Existential deterrence is safer and in theory sufficient for the security goals of all minor proliferators. While I concede the theoretical advantages of existential deterrence, I doubt that states will rely on it alone.

First, the initial wave of nuclear proliferators never did. Countries with as diverse strategic requirements as the United States, the Soviet Union, Great Britain, France, and China all adopted more robust nuclear postures than the requirements of existential deterrence dictated. Maybe neooptimists are correct that the egregiously large arsenals of the superpowers are not the best models for assessing the command and control problems new proliferators will face. They are useful because we know relatively much about them, but it would be even better to have similar access to the records of the French, British, and Chinese programs. I suspect that a Chinese Scott Sagan or a French Bruce Blair would find similar problems, but of course I cannot know that for certain. I do know, however, that the benefits neooptimists cite only accrue if the arsenals remain significantly less weaponized than was the case for first generation proliferators.

Second, the inevitable move away from existential deterrence is partly a matter of technological or bureaucratic imperatives and partly a matter of responsiveness to a shifting strategic environment. Neooptimists would dismiss such arguments as determinism but it is not deterministic to observe that the interaction of technology and bureaucracies puts pressures on leaders to logroll decisions and to pursue weapons programs beyond

theoretically optimal minimum levels.[86] Moreover, there are also good strategic reasons why minor proliferators will find it difficult to rely on existential deterrence. Chief among these is the fact that these small states must factor in the United States as an enemy against whom they must construct operational plans. While fiscal constraints may prevent them from adopting the response the Soviet Union did when it was in a similar position, namely an endlessly spiraling arms race, those same fiscal constraints may compel them to adopt cheap and dangerous command and control "fixes."

Third, whether they ought to or not, states tend to overstate the scarcity of security. Note that I am not directly claiming that security is, in fact, scarce in the international system. "Defensive" realists have critiqued this latter claim and asserted that, since prevailing technologies favor the defense over the offense, security is relatively plentiful.[87] Nuclear optimists are essentially making claims about the relative abundance of security. Do states, however, in fact act as if they believe security is as plentiful as these academicians claim it to be? The great powers do not. Great powers build nuclear arsenals that are hard to justify by rational deterrence theory.[88] States worry about their relative power position even when they should not worry.[89] Military organizations plan for contingencies that are implausible in

86. Moreover, in evaluating determinist arguments, one must distinguish between vertical proliferation, that is, growth in the size and complexity of the arsenal, and horizontal proliferation, that is, the spread of nuclear weapons. Waltz adopted a determinist argument about horizontal proliferation, comparing it to the inexorable advance of the tides in Sagan and Waltz, *The Spread of Nuclear Weapons*, 112. In fact, however, horizontal proliferation is anything but inevitable, as the examples of Ukraine, Belarus, Kazakhstan, South Africa, Argentina, Brazil, not to mention Germany and most other Western countries, clearly demonstrate. Vertical proliferation, however, is probably harder to resist. Proliferation can be reversed, even when there are apparent security reasons for developing nuclear weapons, as in the case of Ukraine. Once a state has made a decision to develop nuclear weapons, however, then the security imperative becomes that much harder to resist. Part of this is a selection effect: states that have developed nuclear weapons in spite of a strong norm against the development of nuclear weapons have already shown a strong imperative for nuclear weapons. If anything, the burden of proof should be on neooptimists who say that the urge to develop opaque arsenals may prove too great to resist but then the urge to develop beyond opacity can be easily resisted.

87. See Frankel's concise summary: Benjamin Frankel, "Restating the Realist Case: An Introduction," *Security Studies* 5, no. 3 (spring 1996): ix–xx.

88. This is why Jervis, among others, was particularly apoplectic about the size and deployment patterns of the superpower nuclear arsenals. Robert Jervis, *Illogic of American Nuclear Strategy* (Ithaca: Cornell University Press, 1984).

89. In the famous debate about relative gains, one striking fact went underappreciated; though it is economically irrational to feel this way, a remarkable percentage of the American public prefer scenarios where both the United States and Japan grow at slow but similar rates to a scenario where the U.S. growth is faster while the Japanese growth is faster still. See Michael Mastunduno, "Do Relative Gains Matter? America's Response to Japanese Industrial Policy," in *Neorealism and Neoliberalism: The Contemporary Debate*, ed. David A. Baldwin (New York: Columbia University Press, 1993), 250–51. This viewpoint is not limited to the

the extreme.[90] States' tendency to act as if security were scarcer than academicians think it to be cuts against the confident claim of neooptimists that states will rely on existential deterrence.[91] If enough states act as if security is scarce, the interaction of their individual defensive measures can produce relative insecurity (that is, a scarcity of security) at the system level. It is precisely this kind of interaction effect in the realm of nuclear command and control that makes nuclear proliferation so dangerous.

The debate may only be resolvable at an empirical level, and it is in their recognition of this that neooptimists have made their greatest advance beyond paleooptimist dogma. Neooptimists have sought to use the admittedly scanty empirical record of minor proliferators to evaluate the existing competing claims. While I judge the empirical record to be mixed, I agree that this is precisely the sort of examination that is needed from this point on. To facilitate this exercise, I propose the following set of competitive hypotheses, each derived from optimist or pessimist theory and compiled in Table 2. These are not mere gainsaying hypotheses. Each can be traced back to the theoretical core of the two camps. The theoretical core of optimism is rational deterrence theory: states will adopt those procedures, and only those procedures, necessary to achieveg minimum rational deterrence.

mass public. Ole Holsti has found evidence of similar views among the foreign policy opinion leaders. In his 1992 survey of more than 2,300 members of the foreign policy elite, 42 percent said that they preferred a world where the American economy grew at a 1 percent rate if the Japanese grew at 1.1 percent, to a world where the American economy would grow at 2.5 percent and the Japanese would grow at 6.5 percent, compared to 49 percent with the opposite preference. The gap narrowed in the 1996 survey, with 35 percent favoring slower growth, 36 percent favoring fast growth, and a remarkable 29 percent unsure. Ole Holsti, "Foreign Policy Leadership Project," survey results, Duke University, 1992 and 1996.

90. Surely some of the most egregious examples are the U.S. Army's planning exercises for a war with Great Britain and Canada which were ongoing as late as 1935. See "War Plan Red," in Records of the Joint Board, 1903–1947, Roll 10, J.B. 325, Serial 435-641, National Archives, as cited in Richard Preston, *The Defence of the Undefended Border: Planning for War in North America, 1867–1939* (Montreal: McGill-Queen's University Press, 1977), 213–33, and 277.

91. This is, in a sense, a claim that Jervis' spiral model is a better predictor of the doctrinal and operational choices of the military than is the deterrence model. Jervis frames the problem in terms of how states will respond to external challenges; the deterrence model predicts that a strong threat will deter another state, the spiral model predicts that a strong threat will antagonize another state. Jervis argued that the historical record supported both models—the First World War appeared to match the expectations of the spiral model, while the Second World War appeared to confirm the expectations of the deterrence model. I frame the issue in terms of what doctrinal and operational responses a military is likely to make in the face of an external threat and argue that the empirical record generally supports the spiral model. Even when the state makes a concession at the level of foreign policy (as predicted by the deterrence model), the military establishment of that state is likely to make doctrinal or operational adjustments in order not to be vulnerable to such coercion in the future. Paradoxically, the military is more likely to be persuaded by the logic of the deterrence model and so behave in a way expected by the spiral model. Robert Jervis, *Perception and Misperception in International Politics* (Princeton: Princeton University Press, 1976), 58–113.

The theoretical core of pessimism is a theory of decision making, which claims that organizational, psychological, and strategic pathologies will necessarily corrupt RDT expectations. Some of the hypotheses involve "predicting" past historical facts that have yet to come to light. Others involve events yet to unfold. To the extent that future research supports or undermines these hypotheses, the optimist/pessimist can be resolved.

In the end, the neooptimists' contribution consists of a sensible observation: to evaluate fully whether nuclear proliferation will produce good or bad consequences it is necessary to balance all the pros and all the cons against each other. Neopessimists have accused paleooptimists of seeing only the pros; neooptimists now accuse neopessimists of seeing only the cons. Seng compares this to a hypothetical analysis of the risks medical doctors face.[92] Pessimists would see only the doctor's daily exposure to dangerous diseases and conclude that a doctor is particularly at risk of spreading pestilence. Not so, says Seng, for doctors also have many advantages, not the least of which is access to better precautionary measures. Seng's observation is commonsensical, and the analogy should apply. Surely enough is known about the difference between safe and risky nuclear behaviors, so that any country bent on getting nuclear weapons will avail itself of all necessary prophylactic procedures? While it hardly proves the case against neooptimists, the analogy is more telling than Seng knows. The medical profession is, in fact, notorious for unsafe practices in the spreading of disease. Being an expert is no guarantee of safe behavior.[93] Sometimes even those who should know better do not follow common sense.

92. Seng, "Less Is More," 62.

93. A perennial concern in medical professional journals is the need to prevent nocosomial (that is, hospital-acquired) infections. One review article evaluated the findings of over 91 articles written between January 1986 and June 1993 each examining the possible link between inadequate hand washing and nocosomial infections. The review concluded, "It seems clear, based on the marginal success of many interventions in influencing hand washing behavior, that the hand washing practices of health care professionals will continue to be suboptimal without stronger mandates and monitoring" (Jacalyn L. Bryan et al., "Hand Washing: A Ritual Revisited," *Critical Care Nursing Clinics of North America: Infection and Control in Critical Care* 7, no. 4 [December 1995]: 617–25). See also, Steven T. Dorsey et al., "Is Handwashing Teachable?: Failure to Improve Handwashing Behavior in an Urban Emergency Department," *Academic Emergency Medicine* 3, no. 4 (April 1996): 360–65; Howard Hall, "Handwashing in Medicine: Infrequent Use of an Ancient Practice," *International Journal of Psychosomatics* 42, no. 1–4 (1995): 44–47; and Rozila Horton, "Handwashing: The Fundamental Infection Control Principle," *British Journal of Nursing* 4, no. 16 (1995): 926–32. It is generally accepted that rates of compliance are lower among doctors than among nurses. See Robert C. Pritchard and Raymond F. Raper, "Doctors and Handwashing: Instilling Semmelweis' Message," *Medical Journal of Australia* 164 (1 April 1996): 389–90. I am indebted to Andrew Barton for suggesting this point to me.

Table 2

COMPETING HYPOTHESES

Empirical Question	Neooptimist Hypotheses	Neopessimist Hypotheses
Will states rely on existential deterrence?	• Israel's arsenal is no more weaponized today than it was ten years ago. • states will be satisfied with a retaliatory force of a handful of weapons. • minor proliferators will not move to higher alert status in a crisis or, if they do, it will only be a signal and will be so tightly controlled that no unintended consequences can arise.	• Israel's arsenal has become more weaponized and operational alerting procedures and targeting plans exist. • states that develop nuclear weapons will also seek missiles because of the uncertainty associated with air delivery. • absent extensive arms control measures that change the regional strategic balance, the Pakistani and Indian nuclear arsenals will become progressively more weaponized.
How will opacity affect nuclear learning?	• the Israeli lessons-learned process following the 1973 war produced more political awareness and control over the nuclear arsenal. • opaque proliferators will learn from others' experience (eg., will hide their capabilities from overhead sensors as did Iraq). • opaque proliferators will have relatively assertive command and control especially by political leaders.	• the Israeli lessons-learned process following the 1973 war produced more military rigidity in nuclear operations than it produced political awareness and control over the nuclear arsenal. • Pakistan has taken steps to make its nuclear arsenal more responsive following the 1990 crisis. • opaque proliferators will have more command and control pathologies for a given size of nuclear arsenal.

How will preventive war concerns shape operational decisions?	• minor proliferators will rely on hiding their arsenal and will not predelegate use authority.* • the nuclear arsenal will always be kept insulated from the rest of the military, particularly from warning systems.	• where there is enduring regional strategic instability, organizational pressures will push states to weaponize opaque arsenals. • minor proliferators will predelegate use authority and the arsenals will become integrated with the warning systems. • minor proliferators plan against the remote possibility that they would suffer a preventive attack from the United States.
How will domestic instability affect the risks of accidental or unauthorized use?	• regardless of the domestic environment, minor proliferators will not lose possession of nuclear weapons	• if there is a loss of nuclear custody, it will happen in a state marked by domestic unrest.
What role will civil-military relations play in nuclear operations?	• operational behavior will not vary significantly with changes in patterns of civil-military relations.	• states with undeveloped civilian control or outright military leadership will keep forces on a higher state of readiness than will states with robust civilian control given the same international situation.

* Seng does admit that this kind of predelegation is possible but he does not recognize how it cuts against the neooptimist thesis.