Security Studies
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/fsst20

Proliferation Optimism and Theories of Nuclear Operations

Peter D. Feaver

Published online: 25 Nov 2010.

To cite this article: Peter D. Feaver (1993) Proliferation Optimism and Theories of Nuclear Operations, Security Studies, 2:3-4, 159-191, DOI: 10.1080/09636419309347523

To link to this article: http://dx.doi.org/10.1080/09636419309347523

Proliferation Optimism and Theories of Nuclear Operations

Peter D. Feaver

SOCIAL SCIENCE theory ought to shed light on the behavior of proliferating states after they develop nuclear weapons. This article proposes factors such a theory of nuclear proliferation must incorporate in order to explain one important component of behavior: nuclear operations. The result is admittedly tentative; I do not develop a completely specified theory, nor do I conclude with specific predictions about individual proliferators. But I do identify important relationships and suggest some plausible hypotheses of cause and effect. At a minimum, I hope to indicate the possibility for a more systematic analysis of nuclear operations – and therefore of nuclear behavior – than analysts of nuclear proliferation have hitherto attempted.

A theory of nuclear behavior is especially important as the focus of proliferation studies shifts from simply determining which states are developing nuclear weapons (and, by extension, how we can stop them from doing so), to understanding the political and strategic effects of regional proliferation (and so what can be done to mitigate or manage the negative consequences).[1] Analysts are attending more and more to the problem of dealing with those countries which successfully defy the nonproliferation regime.[2] Managing nuclear proliferation, however, begs a deeper understanding of nuclear behavior. How will the new states handle their new nuclear forces? Will the new nuclear nations control their weapons as the United States and the Soviet Union controlled theirs? Will the proliferators adopt similar strategic preferences, for example favoring secure second-strike capabilities designed to maximize stable deterrent postures? In short, how will nuclear behavior vary over the field of nuclear proliferators?

Some scholars, notably Kenneth Waltz and John Mearsheimer, have advanced a controversially optimistic answer to the question of nuclear behavior.[3] As explained in greater detail below, these iconoclasts argue that nuclear weapons have a pacifying affect on states and so the spread of nuclear weapons will result in the spread of stability and peace. In their starkest form, optimists view nuclear proliferation as a *solution* to concerns about state behavior, not a factor exacerbating those concerns. This line of argumentation makes the quest for a theory of nuclear behavior moot. Explaining the behavior of individual states is not a particularly interesting theoretical

puzzle if we already know that nuclear proliferation will spread peace. Thus, before advancing my proposal for developing a theory of nuclear behavior, I must address the argument that this entire exercise is unnecessary, given what we know about the pacifying effects of nuclear weapons. Along the way, I will show how some optimistic views of nuclear proliferation depend implicitly on the very elements I argue should form the basis of a theory of nuclear behavior: namely, state-level factors.

My argument proceeds in four stages. In section one, I briefly explain the derivation of proliferation optimism from basic rational deterrence theory. I also examine reasons for remaining pessimistic about nuclear proliferation, and so for remaining interested in explaining variance in the behavior of individual proliferators. In section two, I survey the three sets of factors shaping nuclear operations in proliferating countries: strategic systems, strategic environment, and strategic culture. In section three, I consider how the special features of "opaque" proliferation might modify nuclear operations. In section four, I conclude with a brief discussion of the research needed to resolve uncertainties still attending my argument about nuclear operations.

What, Me Worry?

Optimism about proliferation rests on two pillars, one theoretical and one empirical. In theoretical terms, the central logic of rational deterrence theory (RDT) gives good ground for being confident about nuclear proliferation: rational states will not go to war if their enemies can convince them that the expected costs of doing so will far exceed the expected benefits.[4] Deterrence success thus depends upon the defender's ability to make credible threats of such magnitude that the potential aggressor decides to abandon any plans for mischief. Deterrence can still fail, but it is unlikely to do so when the threats are sufficiently terrifying.

This logic, which holds generally across all forms of conflict, applies a fortiori to nuclear war where the costs are likely to be astronomical. Nuclear weapons make deterrence relatively easy because nuclear deterrence threatens certain and unacceptably horrible devastation. If both sides in a contest have nuclear weapons, they will reasonably conclude that escalating to nuclear use will result in the complete destruction of both societies. They will determine, accordingly, that nuclear weapons are inherently unusable and so will never initiate a nuclear strike. Nuclear nations will also become cautious about engaging in conventional war, calculating that any conflict has the potential to escalate to the nuclear level. They will, as a consequence,

avoid getting on any slippery slope; the outcome is general international stability.

Rational deterrence theory (RDT) is not, of course, without its detractors. RDT enthusiasts admit the theory is still under development; critics argue it is deeply flawed.[6] While an extensive review of the rational deterrence theory debate is obviously beyond the scope of this paper,[7] one criticism emerges as particularly relevant to the nuclear proliferation question: whether RDT pays inadequate attention to the role of key factors, psychological and otherwise, which complicate deterrence calculations. Rational leaders are nevertheless subject to miscalculation and misperception and so may misread otherwise credible deterrent threats. Moreover, not every leader will have the same degree of risk-acceptance. Thus, the same deterrent threat may be sufficient or insufficient to deter war, depending on whether the leader to be deterred has miscalculated or is willing to take a gamble.[8] RDT may only outline the conditions for deterrence success and failure under ideal circumstances rarely achieved in the real world.

But even if these criticisms have merit when applied to rational deterrence theory generally, they may not, in and of themselves, refute optimism about nuclear proliferation. Indeed, Waltz's fundamental claim is that the problems of deterrence are far more tractable under conditions of nuclear proliferation. Much the same way a hanging is said to concentrate the mind, the awesome destructive power of nuclear weapons compels countries to conform their behavior to the expectations of rational deterrence theory and so overcome petty psychological problems.[9] Nuclear weapons, McGeorge Bundy argues, can offer "existential" deterrence: the mere existence of nuclear weapons is enough to deter an adversary.[10]

The empirical pillar of proliferation optimism lends apparently confirmatory support to the claims of rational deterrence theory, at least with respect to nuclear weapons. The world has, after all, experienced many decades of nuclear peace. The records of leaders as singular as John F. Kennedy, Richard Nixon, Josef Stalin, Nikita Krushchev, Mao Tse-tung, and Chou En Lai tell a common tale: all brandished the nuclear sword without ever stumbling into a nuclear war. The world survived periods of nuclear monopoly, nuclear superiority, and nuclear parity, without a single nuclear calamity. Reasonably secure nations embarked on a nuclear development program (Brazil), as did rather insecure ones (Israel); no one besides the United States has actually exploded nuclear weapons in anger. It is tempting, therefore, to concede that nuclear proliferation conforms most closely with the expectations of rational deterrence theory.

If this logic is true, why worry about nuclear proliferation? Optimists say we should not, and yet we most certainly do. With the end of the cold war, nuclear proliferation has re-emerged as a priority topic in policy circles.

Political scientists and policy analysts are turning and returning to proliferation studies with renewed energy and purpose, as evidenced by this volume. If anything, there is a glut of proliferation studies which take as their point of departure the diametrically opposite assumption that nuclear proliferation is very worrying indeed. If nuclear proliferation will not increase the risk of nuclear war why worry about it?[11] What justifies this obstinate fretting about nuclear proliferation in the face of RDT's crystalline logic?[12]

One reason is disarmingly simple: nuclear deterrence *can* fail, so proliferation *could* lead to nuclear war. At best, rational deterrence theory can predict that nuclear deterrence should assure peace most of the time. Most is not all. Indeed, two of its more zealous defenders, Christopher Achen and Duncan Snidal, point out that if RDT could successfully predict peace 99.5 percent of the time it would therefore miss .5 percent of the time.[13] This would qualify RDT for the social science theory hall of fame, but it would not make nuclear proliferation trivial. In nuclear studies, as in seismology, it is axiomatic that extremely rare events are nevertheless extremely interesting and important. Given the stakes involved, it is reasonable to worry about nuclear proliferation – even if RDT is correct that most proliferators will avoid war most of the time. The "rare events are interesting" axiom makes proliferation an arresting policy problem, of course, but it is not by itself enough to make nuclear behavior an intriguing problem for theory.

The second justification for pessimism speaks more directly to the question of whether we need a theory of nuclear operations. Forty-five years without a superpower war is not ultimately conclusive evidence of the pacifying effects of nuclear weapons.[14] As all the participants in the lively debate acknowledge, many factors contributed to the long peace: the bipolar system structure, the absence of irredentist claims between the superpowers, the development and observance of "rules of the game," and so on. Many of these factors may be absent in the regions of nuclear proliferation. It remains an open question whether nuclear weapons will keep the peace under conditions that are decidedly *not* ceteris paribus. Indeed, Mearsheimer casts his broader argument in terms of a experiment in which unfolding events will serve as "laboratory" test of the reliability of the various theories' predictions.[15] Mearsheimer intends to test theories of war and peace, but ancillary theories about whether nuclear operations affect nuclear behavior and about how operations vary are also worthy candidates for the experiment – provided we can identify competing explanations of nuclear operations.

Finally, in championing their theory's policy relevance,[16] RDT enthusiasts indirectly provide the grounds for developing a theory of operations. RDT prescribes steps states should take to make deterrence more robust, and identifies pitfalls states should avoid lest they weaken their deterrent threats.

Significantly, the policy relevance extends to both conventional and nuclear deterrence. This implies, however, that not all nuclear postures are equal; some postures strengthen deterrence while others undermine it. RDT argues that rational states ought to, and will, adopt nuclear behavior which bolsters deterrence – but positing this statement as a prescription underscores the variance in possible nuclear behaviors, and the possibility that some countries may fail to adopt appropriate conduct. Indeed, proliferation optimists are careful to qualify their confidence; in their caveats lies the fertile ground for a theory of nuclear behavior. Waltz bases his conclusion that "the slow spread of nuclear weapons will promote peace and reinforce international stability" on the provisos that states can and surely will (since "they have every reason to do so") adopt secure, second-strike force postures.[17] Mearsheimer similarly concludes that "well-managed" proliferation in Europe may reduce prospects for war, but " ... mismanaged proliferation could produce disaster ... " He identifies four conditions of well-managed proliferation: the transition is peaceful, states adopt second-strike force postures, states adopt proper doctrines, and the arsenals are secure and safe.[18] Nuclear optimism, then, is predicated on the assumption that states will adopt proper postures and appropriate nuclear behavior; they might, but this begs a theory explaining how and why states choose among different patterns of deployment and behavior.

For Waltz, and presumably for other RDT-proliferation optimists, structural realism provides the answer: systemic variables, in this case the presence of other nuclear states, will constrain nuclear behavior. But in *Theory of International Politics*, Waltz is careful to point out that he does not offer a theory of foreign policy (state behavior); his theory tells us what a state will have to react to, but not exactly how a particular state will act.[19] At most, then, proliferation optimists can argue that rational states ought to exhibit certain nuclear behavior. As Waltz acknowledges, non-systemic factors play an important role in the formation of foreign policy and, by extension, nuclear behavior. To understand variations in nuclear behavior a theory must thus incorporate a wider array of components, including systemic and subsystemic elements.

Do variations matter? After all, despite big differences in the kinds of nuclear systems and behavioral patterns among the various nuclear powers, the outcome – if measured in numbers of nuclear wars – has been happily uniform: none. But, as noted above, even optimists concede that not all nuclear behavior is equally desirable. This concession is a tacit admittance of the importance of nuclear behavior, if only at the margins. Waltz cites as grounds for optimism the fact that the superpowers lived through the early cold war period, a time of relatively irresponsible nuclear behavior.[20] While this is evidence that survival is possible, surely it cannot serve as proof that

survival was predetermined. Scott Sagan, in reviewing the previously classified record of certain key nuclear operations during the cold war, documents several near-disasters that have hitherto escaped public notice.[21] Counterfactual arguments are never conclusive, but Sagan's findings corroborate the relevance of the very operational patterns we would expect to vary across different proliferating countries.

In sum, optimists and pessimists alike must rely on a theory of nuclear behavior, a theory of how states will deploy the new nuclear forces at their disposal. To explain variations in behavior, a theory must include more variables than structural realism allows; that is, a new theory is needed.[22] The next section offers a first cut at this project by identifying both important factors which the theory should incorporate and, where possible, the causal relationships between those factors.[23] To make the task manageable, I consider only one (albeit crucial) component of nuclear behavior: operations.

Explaining Nuclear Operations: Three Domains

Nuclear operations refers to the day to day management of nuclear weapons and the doctrinal concepts by which the military use nuclear weapons in peacetime and combat.[24] It is distinct from nuclear strategy, which rationalizes political goals with nuclear means, and also from nuclear force structure, which describes different mixes of weapons. There is considerable overlap and synergy between these three components of defense policy and a complete treatment of nuclear proliferation must incorporate each. I focus only on operations for three reasons. First, operations place an important constraint on nuclear behavior by defining (a) what is *possible* for a state to do, and (b) how the nuclear system is *likely* to perform in a crisis.[25] Second, toward the end of the cold war nuclear operations emerged as perhaps the liveliest sub-field of nuclear studies – especially with the declassification of key documents long held back from scholars – and so it is a particularly fruitful area for analysis. Third, it is the least-studied aspect of nuclear proliferation and thus a high research priority.

The operational angle has been slighted in proliferation studies, and the explanation goes to the heart of the problem of building useful theories: there are virtually no data available on operations in emerging nuclear nations. With no data, analysts are reluctant to make claims about operations in current or prospective proliferating countries.[26] However, as more is known about the history of nuclear operations during the cold war, it is possible to identify the general factors that drove superpower nuclear operations. The superpower experience, then, is a useful point of departure for a more general

theory of nuclear operations; this experience suggests that factors from three domains shape nuclear operations: the strategic environment, strategic culture and strategic systems. Particular aspects of these domains will vary across different countries and this will necessarily modify the way countries will respond to the "nuclear revolution," but the general classification holds.[27]

Strategic Systems

Strategic systems refers to the characteristics of the arsenal: its size, the type of weapons in it, their mode of delivery, and the character of the command and control system. Each of these features has an independent effect on political behavior generated by the nuclear revolution. The importance of these factors has not been lost on students of nuclear proliferation; even primarily inductive studies rely implicitly on theories about how differences in arsenal characteristics alter assessments about the effects of nuclear proliferation.[28]

Despite the implications of the title of Brodie's seminal work, *The Absolute Weapon*, politicians quickly decided that not all nuclear weapons were created equal. Late in the 1940s the United States countered the burgeoning Soviet nuclear program with two divergent engineering initiatives: one producing extremely high-yield thermonuclear weapons and the other producing low-yield weapons optimized for battlefield use. While both sets are immensely destructive in comparison to conventional weapons, their effects were sufficiently dissimilar that analysts theorized about distinctive political-military strategies based on different mixes of weapons.[29]

Just as different yields potentially recommend different strategies, so also do differences in the size and complexity of the overall arsenal suggest different patterns of state behavior. A country with a few clumsy weapons clustered in one or two depots is apt to consider its arsenal differently from a country that has tens of thousands of sophisticated weapons widely dispersed throughout its zone of strategic activity. The latter arrangement suggests more flexibility and more strategic options for state leaders. It also complicates command and control arrangements, as I discuss below.

Delivery systems vary according to five crucial features, each of which can influence state behavior by changing the capability of the arsenal in dramatic ways: *range*, *promptness*, *accuracy*, *pre-launch survivability*, and *post-launch survivability*. The shorter the range of the delivery system, the more constrained the options for the political leadership. Very short range systems allow only for a doctrine of deterrence by denial, while longer range systems allow for deterrence by punishment. Similarly, proliferators will vary in the promptness with which they can execute nuclear strikes. Traditional strategic theory argues that prompt delivery systems increase the relative

power of the country but greatly decrease the stability of strategic relationships by shrinking the time leaders will have to manage crises.[30]

The accuracy of the available delivery systems affects the kinds of enemy targets proliferators can hold at risk. In general, more accurate delivery systems permit counterforce strategies while less accurate delivery systems constrain the proliferator into countervalue targeting.

The pre- and post-launch survivability of the delivery vehicles can also constrain proliferators in important ways. If a delivery system is vulnerable to attack before it is launched, both sides will have a powerful incentive to strike first in any conflict. Similarly, if the post-launch survivability of a delivery system is considerably higher than its pre-launch survivability – that is, an enemy stands some chance of destroying the weapon on the ground but little chance in flight – the enemy may also have a strong incentive to strike first.

The command and control system is another broad component of the strategic system affecting behavior.[31] Command and control as used here refers to the social system designed to balance the always/never dilemma inherent in nuclear operations. Leaders want the nuclear weapon always available for use, but never detonated by accident or without authorization, and they rely on the command and control system to achieve these sometimes conflicting goals. The command system is comprised of three types of components: *hardware*, *procedures* for using the weapons, and the *people* in the chain of command. Hardware refers to engineering devices, often built into the weapon, which provide some physical assurance that the weapons cannot be easily misused. For instance, most modern weapons have Environmental Sensing Devices (ESDs) which block detonation until the weapon undergoes a prescribed environment (for example, achieves free-fall or reaches a certain altitude). This protects against an unwanted detonation triggered by an airplane crash or a weapon falling off a loading dock. Likewise, most modern weapons have Permissive Action Links (PALS) which block detonation until a code is inserted, effectively preventing the holder of the weapon from using it without authorization.

Administrative rules and procedures reinforce the engineering measures. Thus, both the Americans and the Soviets instituted a "two-man rule" which directed that every step in the delivery, maintenance, and launch sequence involve at least two people. Also, senior commanders often kept weapons components or launch codes apart from the delivery systems, thereby frustrating attempts at unauthorized use.

These engineering and administrative procedures are embedded in a social system comprised of fallible human beings. Consequently, human reliability received a lot of attention throughout the cold war in both the United States and the USSR. The Americans adopted the Personnel Reliability Program, an elaborate oversight and review system which monitored the behavior of all

individuals with nuclear responsibility in an effort to weed out irresponsible people and to make sure that the military operators would in fact obey an authorized order to execute a nuclear strike.

All these command and control components work together to insure that the nuclear weapons are *reliable*, that is, unlikely to fail at the moment when leaders want to use them, *safe*, that is, unlikely to detonate accidentally, and *secure*, that is, resistant to efforts by unauthorized people to detonate them. These goals are partially contradictory, however, and so every command system must cut some sort of balance among them. For instance, hardware and administrative configurations that minimize the chance of an unauthorized use of nuclear weapons also introduce vulnerabilities into the arsenal that a well-crafted and well-executed enemy strike could exploit.[32] Systems which are optimized to assure the always side are *delegative*; they are designed to minimize vulnerabilities to a disarming enemy first strike, but they necessarily raise the risk of an accidental or unauthorized use of nuclear weapons. Conversely, systems which are optimized to assure the never side are *assertive*; they minimize the chance of an accidental or unauthorized use but they increase one's vulnerability to an enemy first strike.

The strategic systems domain – consisting of arsenal size, weapon mix, and character of the command and control system – greatly influences the political-military behavior of a proliferating country. A proliferator with a small, slow, and assertively controlled arsenal would have a very different range of military options from a proliferator with a large, rapid, and delegatively controlled arsenal. An analysis of nuclear proliferation that glossed over these differences would likely misstate the range of nuclear behavior one could expect from a proliferating state. The relationships can be summarized in a series of propositions. Ceteris paribus, the smaller and cruder the arsenal, the more vulnerable it will be. The more vulnerable the arsenal, the greater the temptation for the proliferator to rely on delegative command systems. The more delegative the command system, the greater the chance for undesirable nuclear operations. This domain is not in itself determinative of all nuclear behavior, however; rather the features of the strategic system interact closely with the second general domain: strategic environment.

Strategic Environment

Strategic environment refers here to those aspects of a new proliferator's geostrategic situation which bound nuclear behavior. The strategic environment alters nuclear behavior by influencing the likelihood a state would feel the need to use nuclear weapons. A state facing no external threat would likely manage its arsenal differently from one threatened by aggressive

regional competitors. Two features of the strategic environment are of special importance: geopolitical stability and crisis stability.

Geopolitical stability is a function of the proliferator's position in the regional balance of power and the war-proneness of the region due to other factors, for example contested borders or incompatible demands for justice.[33] At one end of the continuum, one could imagine a local hegemon in a region where inter-state borders enjoy wide legitimacy (Brazil). At the other end of the continuum is a proliferator facing an overwhelming coalition of enemies each of which has a pressing irredentist claim against the new nuclear nation (Israel).

Obviously, the strategic environment places different strains on the nuclear arsenal at different points along the continuum. One would expect that the less secure a state's geostrategic position, the more pressure it would feel to wield its nuclear capability for immediate political benefit, either by adopting deployments and strategies that allow for ready use of nuclear weapons or by brandishing the weapon in exercises of nuclear diplomacy.[34] The pressure would grow even more acute as the threatened state exhausted other diplomatic and conventional military options.

Crisis stability refers to the special pressures a nuclear proliferator will feel if its relations with hostile neighbors escalate to the point of crisis. All other things being equal, a stable situation is one in which there are few or no military imperatives for resorting to the use of military force early in a crisis even as the political situation degenerates. In an unstable situation, the opposite obtains: as the political circumstances degenerate, pressures to use force increase dramatically. The greatest crisis instability is when one or both sides in a conflict have the capacity to deliver a knockout blow, *provided they strike first*. Under such a condition both sides have a strong incentive to escalate quickly to war lest their opponent seizes the advantage.

Crisis stability thus depends heavily on several of the factors noted earlier in the discussion on strategic systems. If a state's arsenal is small and assertively controlled, it is more susceptible to a knockout blow and so its strategic environment will be that much more crisis-unstable.[35] Crisis stability is also a function of the capabilities and disposition of a proliferator's enemy. A small, easily targeted nuclear force is not vulnerable (in a way that would affect crisis stability) if none of the proliferator's competitors has the military wherewithal to execute a credible first-strike.

Geopolitical stability and crisis stability collectively structure the strategic incentives facing a new nuclear proliferator in times of crisis and, in so doing, are important determinants of the state's behavior. The strategic environment sets the parameters for the proliferator's choice of nuclear doctrine, that is, the plans detailing how to use nuclear weapons to achieve military goals. One of the more important features of doctrine is "time-urgency," whether

the arsenal must be ready for immediate use early in a conflict or whether the arsenal can be maintained at a relatively low state of readiness. The more hostile the strategic environment the more likely the new proliferator will feel compelled to adopt a time-urgent nuclear doctrine.[36] Such a move, however, can feed back and exacerbate the strategic environment. First, adopting a time-urgent posture puts pressure on your opponents to do the same; if your opponent fails to counter this move, he may be vulnerable to a knockout first strike. Second, a time-urgent posture often involves a delegative command and control system. But a delegative command system is itself more prone to accidents and unauthorized use in a crisis thereby making any emergency that much more dangerous.

Strategic Culture

The third domain, strategic culture, is embedded in the domestic political level of analysis and thus has been slighted by rational deterrence theorists. When a state crosses the nuclear threshold, its new capability is necessarily grafted onto an existing military and political culture. Even if the country invents new agencies or governmental organs to manage the new weapons these new actors must operate within the old social/political/military environment. And each country's distinctive environment, which I call strategic culture, shapes nuclear behavior in meaningful ways.

Strategic culture is an ambiguous term in the literature but here refers collectively to a wide variety of domestic factors including three crucial elements:[37] (1) the pattern of civil-military relations; (2) the character of and relations among other governmental institutions; and (3) the long shadow of military and political history which influences attitudes about the usefulness of military force (including nuclear weapons) as an instrument of state policy.

The way a new proliferator wields its nuclear power will depend, in part, on the way civilian and military leaders interact. Traditional civil-military relations theory, from Clausewitz to Huntington, posits a grand social contract wherein the military promise to submit to civilian rule in exchange for a civilian promise to respect military autonomy on operational matters.[38] The problem, of course, is that few countries match this ideal arrangement. Some polities face severe challenges from would-be military dictators; others have secure civilian control over the military in political terms, but face a conflict over the appropriate degree of military autonomy on expressly military concerns. Operations like the functioning of command and control are central to nuclear behavior and are precisely the issues over which civilian and military leaders are most likely to disagree. Thus, different patterns of civil-military relations will suggest different day-to-day management styles and, as a consequence, different nuclear behaviors.

Patterns of civil-military relations vary according to the assertive-delegative continuum I outlined above in the discussion on command and control.[39] Assertive civil-military relations are those in which the civilians exercise close and direct control over military affairs. Delegative civil-military relations, in contrast, are characterized by a high degree of civilian trust and military autonomy. The preferences of the actors follow the traditional pattern of central control in large bureaucracies. Insiders naturally resist outsiders' interference in cherished operations, jealously guarding their autonomy of activity. The military tend to prefer the operational autonomy afforded by delegative control. In contrast, central decisionmakers in a large organization seek mechanisms to enhance their control over the behavior of critical elements of an organization. Thus, civilians tend to prefer assertive control over nuclear operations.[40]

In the United States, this distribution of preferences has motivated a rich history of civil-military struggle over the control of nuclear operations.[41] Although they favor assertive control, however, American civilian leaders have actually tolerated a relatively high degree of delegation in the nuclear command and control system, thus making the system more survivable and the deterrent more credible. This phenomenon is explained partly by the evolution of the strategic environment. But the nature of civil-military relations also seems relevant. The United States tolerated more delegative control than the Soviet Union did, even though the Soviet Union's strategic environment dictated that *its* arsenal should be the one more delegatively controlled because Soviet forces were more vulnerable to a first strike.[42] Since the United States has a long tradition of military professionalism and voluntary military subordination to civilian control, American policymakers have not confronted stark challenges to civilian rule. Military disobedience, though a concern, has not dominated all other worries about the reliability of the nuclear arsenal.

It is reasonable to expect a nation with a different experience in civil-military relations to respond to the inherent conflict over operational policy in a different fashion. Totalitarian and single-party states where political leaders have used extraordinary control measures are more likely to have assertive patterns of civil-military relations. States in this camp are more likely to be ruled by leaders who value direct and even personal control; thus, they will employ extraordinary measures such as para-military organizations and separate chains of command – as the Soviet Union did with the KGB,[43] and Iraq does with the secret police.[44]

Such assertive control is likely to extend to the nuclear realm as well, because the mechanisms for assertion already exist and because the leaders will naturally expect this kind of control.[45] A checkered history of civil-military conflict – for instance a history of coups – would have a similar effect.

In such cases, the national leader may be a former military officer who exploited his position to achieve political power, or the leader may be a civilian who faces some political competition from the military. In this volatile situation, nuclear weapons could be considered important symbols of political power and so could themselves become stakes in a domestic power struggle. Nuclear weapons have played such a role in attempted coups, especially during the revolt of the French generals in Algeria in 1961.[46] The best way to prevent a domestic rival from exploiting the political power of nuclear weapons is to retain as severe an assertive grip on the arsenal as possible. Hence, the greater the fear of coups, the more likely the weapons are under assertive control.

Brazil provides an interesting outlying case. Brazil has an unhappy tradition of coups and other military interference in domestic politics. Some reports indicate, however, that the military controlled Brazil's nuclear program and did so secretly even during periods of nominal civilian control of the government.[47] Brazil's case may indicate yet another variant: in countries where the military is a more stable institution than the civilian government, a determined military may be tempted to direct the program itself, start to finish. It is unclear, however, what effect this would have on the command and control system, and so, by extension, on nuclear behavior generally. Possibly, whoever was leader of the military program would recognize that his position was precarious and so seek guarantees that the arsenal could not be exploited by his political competitors.

In sum, the command and control system is likely to reflect the underlying pattern of civil-military relations and so nuclear operations in a proliferating country cannot be reliably explained without reference to the very domestic political factors systemic theories ignore. Nuclear weapons are grafted on to an existing power structure and must be wielded by the existing actors in the political spectrum. Accordingly, the prevailing pattern of civil-military relations, which sets the broad parameters for the brokering of power in the state, will influence the command and control system.[48]

The foregoing merits an important caveat. We would expect that, given a volatile pattern of civil-military relations, the top leadership will want assertive control over nuclear weapons. If civil-military relations are too volatile, however, the top leadership may be incapable of asserting control. Countries with pathological civil-military relations are characterized by persistent and pervasive military insubordination. In such cases, the de facto command and control system might be highly delegative, in spite of the strong incentives for tough assertive control. Because of such deductive uncertainty, this caveat must be applied on a case by case basis to countries with extremely volatile civil-military traditions.

The character of and relations among other governmental institutions will

also affect nuclear behavior. In the U.S. case, the evolution of nuclear operations was steered not only by civil-military relations but by patterns of relations within successive presidential administrations and between the executive and legislative branches. For instance, different presidents held different expectations for the nuclear command and control system. President Eisenhower accepted a delegative pattern of operations while President Kennedy, facing roughly the same systemic environment, demanded more assertive control.[49] Moreover, the powerful Joint Committee on Atomic Energy (JCAE) played a dominant role in shaping the development of American nuclear weapons during the first two decades of the cold war. Crucial turning points like the decision simultaneously to develop both high-yield and low-yield weapons, or the decision to deploy Permissive Action Links on NATO nuclear forces, cannot be explained without reference to the unique role of the JCAE and its often adversarial relationship with successive administrations.[50]

The argument extends even further to capture the effects of bureaucratic politics at lower levels. For instance, the development of safety and security devices on U.S. weapons partly grew out of the competition between the various weapons laboratories for claims on budget resources.[51] Similarly, it is virtually impossible to explain the dramatic growth in the size and complexity of the U.S. nuclear arsenal without showing how inter-service rivalry resulted in separate Army, Navy, and Air Force strategic nuclear programs. Even the character of command and control systems varies across the services, influenced heavily by individual service cultures and traditions; during the cold war, civilians continued to tolerate delegative control over naval nuclear weapons even while asserting control over army and air force weapons.[52]

These twists and turns in the American nuclear program are more than mere historical detail. As I argued earlier, command and control is an important determinant of nuclear behavior; similarly, the capabilities of the arsenal, driven as they are by the vicissitudes of bureaucratic politics, are themselves important drivers of state behavior in the international system. A complete theory of nuclear behavior should offer explanations for why nuclear programs take different paths. Civil-military relations and other bureaucratic factors contribute to that explanation.

It is possible, however, that these factors will be less important for proliferating countries, especially if the proliferating countries are small. Domestic political factors may be more consequential in large states like the United States than they are in small ones.[53] It is at least plausible that while bureaucratic politics did have an important effect on nuclear behavior in the United States, the impact would be sufficiently slight in smaller countries to be safely ignored in a theory about proliferation. This remains an important

question to be resolved as more data about proliferating countries become available.

The resolution of this question is made more vexing by the difficulty of formulating the role bureaucratic factors play in terms of testable hypotheses.[54] Whereas the civil-military factor suggested relatively straightforward preferences for assertive or delegative nuclear operations, these secondary bureaucratic factors are more indeterminate in their effects on nuclear behavior. We know that bureaucratic conflict changes nuclear behavior, but the precise causal relationship is ambiguous. Does interservice rivalry always breed nuclear overexpansion? Does inter-agency competition always result in assertive command and control? It is not very satisfying to say that the factor is important if we cannot specify what its influence will be. But it is also not very convincing to explain the nuclear behavior of the superpowers while ignoring entirely how these factors influenced the course of events at crucial junctures. Perhaps better information about the role of bureaucratic politics in nuclear countries will suggest more testable hypotheses. In the meantime, the hypotheses do serve a useful purpose by directing the attention of researchers to this question.

One last component of strategic culture deserves mention: the long shadow of military and political history which generates attitudes about the usefulness of military force (and particularly nuclear weapons) as an instrument of state policy.[55] Bernard Brodie was the first American to write that nuclear weapons could not be used for traditional military ends.[56] Forty years later, President Reagan seemingly echoed this sentiment with his famous claim that "a nuclear war could not be won and must never be fought."[57] In the intervening years, of course, hundreds of billions of dollars and the considered energies of generations of military leaders, policymakers, and analysts were expended in pursuit of strategies for fighting just such a nuclear war. Nevertheless, the conventional wisdom fastened on the non-usability of nuclear weapons; or rather, on the idea that nuclear weapons were only good for making deterrent threats which themselves increasingly resembled bluffs.[58]

This nuclear maxim necessarily affected the evolution of nuclear doctrine and nuclear behavior. Nuclear weapons which had a primary war-fighting role, for example, battlefield nuclear weapons, were held in disrepute and their longevity owed more to bureaucratic factors than to any conviction that they were vital components of the national security posture.[59] Nuclear brinkmanship enjoyed only the briefest of runs during the 1950s and it was used very sparingly after the shock of the Cuban missile crisis.[60] The point is not that nuclear weapons were inconsequential; rather, the point is that the American strategic culture generally embraced the idea that nuclear weapons were not very usable for narrow military goals.[61] This directly affected the

way the United States wielded its nuclear sword, especially once the Soviets achieved some sort of parity in the late 1960s.

It is an open question whether the Soviet Union's strategic culture cultivated a similar understanding of the limited useability of nuclear weapons. Colin Gray, in his critique of the American style, argues implicitly that the Soviet Union was much more willing in the 1970s to envision military uses for nuclear weapons and, consequently, adopted very different nuclear doctrines.[62] The different Soviet strategic culture potentially augured very different behavior if a crisis ever escalated to the level of armed hostilities.[63] Thankfully, Gray's argument was never proven in combat. But it is suggestive of how different strategic cultures can approach nuclear weapons in different ways.

Stephen Rosen similarly argues that appreciating the role of strategic culture is an essential step in understanding the development of nuclear weapons on the Asian sub-continent. Rosen traces Indian strategic canon back hundreds of years and shows how it differs in marked ways from both the American and the Soviet doctrines.[64] Obviously, pending a test no one wants to see, the question of whether Indian nuclear behavior in a crisis will conform to the expectations of deterrence theorists or to the expectations derived from strategic culture must remain open.[65]

Again, it is difficult to identify causal propositions based on the long shadow of military and political history. Waltz already has rejected sharply the more simplistic and ethnocentric version of this argument, that is, that new nuclear states in the Third World are by nature more irresponsible because of cultural backwardness.[66] But Waltz rebuts a straw-person, ignoring a more reasonable and potentially more testable formulation: proliferating states with strategic cultures that accept nuclear weapons as useful will adopt deterrent postures based on war-fighting doctrines. This hypothesis may place an almost intolerable burden on subjective assessment. Absent independent evidence – such as speeches, leaked confidential memos, or interviews with senior policymakers – how do we know that the proliferator has a particular attitude about the usefulness of nuclear weapons without reference to their nuclear behavior or their nuclear doctrine?

The ambiguity of the strategic culture factor is ample reason for being cautious about making dogmatic claims for its precise influence in proliferating countries. But a nagging fact prevents us from dismissing it altogether. The U.S. and the Soviet Union did develop different strategic doctrines and different ways of managing their nuclear arsenals. These differences cannot be explained solely with reference to system-level factors. Some of the differences, however, can be traced to the influence of civil-military relations, relations among other governmental institutions, and cultural attitudes about the usefulness of nuclear weapons. We should expect, therefore, that these factors have leverage in explaining the behavior of proliferating states as well.

The Special Case of Opaque Nuclear Proliferation

The argument advanced above applies with greatest force to countries that openly cross the nuclear threshold. This type of proliferation remains relevant – witness the possible spread of nuclear weapons in the former Soviet Union. Open proliferation, however, is not the only important model for future proliferation theories. Recently, scholars have argued that the current wave of nuclear proliferation is likely to be opaque; proliferating countries will deliberately obscure whether or not they have in fact developed nuclear weapons.[67] The effect of opacity on nuclear operations merits its own study and I can only briefly sketch out some suggestive hypotheses here.

Opaque nuclear proliferation refers to the gray area between no nuclear development program and an openly declared arsenal. The classic opaque proliferator is Israel.[68] The existence of Israel's nuclear weapons program is widely recognized yet Israel has never officially admitted it owns or is seeking to own a nuclear arsenal. Seven basic features characterize opaque proliferation: (1) the proliferator does not conduct a nuclear test; (2) the proliferator denies that it possesses nuclear weapons; (3) the proliferator does not face a direct nuclear threat; (4) the proliferator does not declare a military doctrine involving nuclear weapon; (5) the proliferator does not openly deploy nuclear weapons in a military mode (although it might do so covertly); (6) elites within the proliferating country do not openly debate the role of nuclear weapons; and (7) the nuclear program is rigidly "insulated" from routine security policy activities.[69]

Opacity may be a desirable feature for many would-be proliferators. An opaque proliferator can continue to develop nuclear weapons without incurring world opprobrium as a de jure violator of the nuclear nonproliferation regime. Moreover, if the opacity lifts enough to persuade potential enemies the weapons' program is real, then the opaque proliferator can enjoy the deterrent benefits of possession at minimal cost. From the perspective of nuclear operations, however, opacity introduces important conditions, some of which may ameliorate operational dilemmas and some of which may exacerbate them. The decisive characteristic in this respect is weaponization, the degree to which an opaque proliferator turns a nuclear development program into a deployed military weapon integrated with that country's armed forces.

Since operational behavior changes with different degrees of weaponization, it makes sense to distinguish between four levels of opaque proliferation. The first level of opacity is characterized by virtually no weaponization of the arsenal. Here proliferation is little more than a research program, the development of knowledge which the country someday could exploit for military purposes. Such a condition approximates the deterrent

posture Jonathan Schell recommends in *The Abolition*: countries deter each other with the knowledge that if threatened a victim could choose to develop nuclear weapons.[70] Mutual deterrence inhibits both sides and so neither weaponizes, ever. By definition there are no nuclear operations without nuclear weapons so most of the discussion of operational behavior is moot. Under Schell-esque opacity there is no always-never dilemma and command and control reduces to controlling the decision to weaponize. This latter task is not inconsiderable, as France and perhaps Brazil discovered,[71] but it is qualitatively different from the challenge of nuclear operations as defined here.

The second level of opacity is characterized by minimal weaponization, an arsenal barely more embodied than technical knowledge and far less robust than a nuclear military posture. Nuclear operations at this level reduce to Bundy's existential deterrence: the proliferator need not concern itself with the always-never dilemma since any minute degree of uncertainty suffices to deter an adversary.[72] In this case, opacity reinforces deterrence; because the contours of the nuclear program are so shrouded, the enemy of a proliferator is even less confident about any preemptive strike. Opacity breeds uncertainty, and uncertainty breeds existential deterrence. Provided that the proliferator wholly buys Bundy's argument, operational dilemmas are again moot. Command and control means, in this case, controlling the commitment to existential deterrence and eschewing further weaponization.

Arguably, this form of opacity is widespread. India and Pakistan have so far refrained from fully weaponizing their nuclear arsenal. Even Israel might be thought of as an existential opaque proliferator, if the awkwardness of the Yom Kippur War is disregarded (on which more below). I am skeptical, however, of the longevity of these countries' respective commitments to existential deterrence. As noted above, neither the United States nor the Soviet Union ran their nuclear arsenals as if existential deterrence mattered. On the contrary, each side devoted hundreds of billions of dollars (or rubles) in pursuit of marginal returns from a carefully calculated deterrence. Proponents of existential deterrence focus on the enemy, asking whether the enemy will ever truly trust its preemption option. But the question can be turned on its head: will a proliferator ever truly believe that its arsenal is invulnerable? Neither the United States nor the Soviet Union acted like they did, and they each possessed the most survivable weapons of all, submarine-launched ballistic missiles. Even if new proliferators begin with a higher degree of trust in the absolute weapon, any country's overall commitment to existential opaque proliferation probably depends on the likelihood of that country being involved in a major military conflict.[73] When war is unlikely, existential deterrence is cheap. As war becomes more likely, the pressures to assure retaliation will mount. The faith of some members of the policy-

making elite (probably the military) will waver as conventional war looms. In a shooting conflict, particularly one that is going badly, the pressures to weaponize further may be irresistible. If I am right, level two opacity is at best a temporary condition, decaying sooner or later into level three.

The third level of opacity is delayed weaponization. During peacetime, the opaque proliferator avoids weaponizing the nuclear program. The military do not develop a use doctrine, nor do they practice with the weapons which are themselves segregated from the rest of the force structure. The elites do not debate the merits of this or that strategic program, and public consideration of strategic dilemmas is virtually nil. Because of the extremely compartmentalized nature of the nuclear program, these strategic issues are scarcely attended to even within government. The always/never dilemma and the other features of nuclear operations are non-issues – until the country faces a crisis that forces a rapid weaponization. This form of opacity is the most dangerous of all; the factors which shape nuclear operations (discussed in section two above) will all come into play in a moment of extreme national emergency. The risks of aberrant behavior are greatest precisely because the opacity has inhibited preparing the national leadership for weighing the trade-offs wisely. Accounts of the 1973 Yom Kippur War suggest that Israel confronted this problem of opacity after the failure of the Israeli armored counter-offensive in the Sinai on 8 October day of the war.[74] Seymour Hersh describes a panicky group of advisors meeting at the last possible moment to discuss nuclear options – the implication being for the first time.[75] If these accounts are credible, Israel confronted serious nuclear operational dilemmas and had very little time to resolve them. The reversal of fortunes in the Golan and the Sinai saved Israel from a potential disaster, but the incident is instructive of the risks inherent in this kind of opacity. And it suggests that the crucial element of control of nuclear operations is controlling the timing and circumstances of weaponization.

The fourth level of opacity is covert weaponization. Here the arsenal has many of the features of an open nuclear capability: the nuclear program is weaponized and senior leadership have confronted the operational dilemmas inherent in a nuclear posture. But this kind of opaque proliferation differs in one crucial respect: the refusal to acknowledge the nuclear capability openly constrains strategic discourse on and even awareness of operational issues. The need to maintain the artificial status of a non-nuclear country chokes off public discussion and prevents a thorough vetting of operational tradeoffs within the governmental elite. This is a difference in degree not kind, for all countries restrict information, and hence discussion, about nuclear operations. Yet the opaque proliferator is that much more restrictive; hence debate in an opaque country is that much less informed, making the management of operational tradeoffs that much more difficult. Since the public is rarely

involved in operational policymaking anyway, the effect of opacity is significant chiefly to the extent that it hampers management within the politico-military elite. In particular, nuclear operations are hampered by the inability of the appropriate military forces to practice their nuclear mission regularly and openly; as any military officer knows, operational problems can only be overcome through thorough field tests and regular training.[76]

With this caveat, nuclear operations in this kind of opaque proliferator are likely to follow the pattern described in section two above: the relevant leaders (a smaller and possibly less well-informed group this time) will confront the same set of factors from strategic systems, strategic environment, and strategic culture and will balance the same operational dilemmas. The Israeli arsenal may be moving to this level of opacity. The scanty information available on Israeli nuclear operations suggests a fairly advanced degree of weaponization; at the very least, Israel appears to have some forces dedicated to the nuclear mission (the missiles at Hirbat Zachariah) and so at least some units must have trained for the nuclear mission.[77]

Opacity, therefore, may require some modifications to a theory of nuclear operations. The more weaponized the opaque arsenal becomes, the more its operations will face the constraints derived from the three domains; the less weaponized, the less relevant are operational considerations. Delayed weaponization and covert weaponization may actually exacerbate operational challenges because opacity could hinder strategic discourse and effective management of nuclear operations. While the nuclear behavior of proliferators under the first two forms of opacity may conform to the expectations of proliferation optimists, behavior is likely to vary in the second two forms. This brief discussion, then, underscores the need for a more reliable theory of nuclear behavior – one that can account for variation across different kinds of nuclear proliferation.

Toward a Richer Theory of Nuclear Behavior

Rational deterrence theory has an undeniable advantage over other candidate theories of nuclear behavior. It is parsimonious and embedded in a sophisticated and generalizable understanding of international relations. But its very parsimony limits its application, at least in the realm of nuclear policy. Because it only considers systemic factors, it cannot explain adequately problems couched at a different level of analysis: for example, variations in U.S. nuclear operations over time. Its usefulness as a reliable predictor of nuclear behavior in proliferating states is limited precisely because it concludes that variances in such behavior are inconsequential. Yet its own sanguine conclusions about proliferation depend, in part, on the proliferators adopting the appropriate nuclear operations.

A more useful theory should incorporate systemic and sub-systemic factors. While such a theory is less parsimonious, it offers the prospects of more nuanced explanation and, perhaps, more useful prediction. Where parsimony yields uncertain bias, there are powerful reasons for including more relevant factors, regardless of their origin.

This analysis is an early cut at this project. I identified the three domains which mediate the causal relationship between nuclear weapons and political behavior, and I specified how key features from each domain influence nuclear behavior. The strategic systems domain affects the manageability of the arsenal because not all nuclear weapons are equal. A small nuclear arsenal consisting of unwieldy devices more resembling engineering experiments than weapons of war grants a proliferator a very different capability than does one based on a modern arsenal consisting of prompt, survivable, and accurate missiles. The former offers at best an existential deterrent option; the latter could provide more flexible, and potentially more useable, options. Similarly, a delegative command and control system augurs very different nuclear behavior from an assertive one; in a crisis, a country with delegative control faces sharper risks of an accidental or unauthorized use while a country with assertive control may be unable to execute a nuclear strike at all.

These factors help determine whether proliferation is likely to constitute a major threat to regional or global stability. The same small vulnerable arsenal that leads to crisis instability in a hostile strategic environment can be a minimal threat in a pacific strategic environment. A hard-pressed new proliferator may feel compelled to adopt a time-urgent doctrine which itself will constrain its options in a crisis. A more secure proliferator may feel free to tolerate a nuclear posture that, though vulnerable, makes for moderate political behavior (for example, developing the capability to build nuclear weapons but not actually crossing the threshold into doing so).

The third domain, strategic culture, is at once the most ambiguous and the most intriguing in its effects. If strategic systems and the strategic environment set broad parameters for choice, strategic culture influences the way the nuclear proliferator will frame those choices. A long history of military obedience will make a state more disposed to respond to environmental incentives for delegating control over nuclear operations. Domestic political pathologies may inhibit the way a proliferator manages vulnerabilities in its arsenal. It is at least plausible that new nuclear nations will see their arsenals as more militarily useful than did the superpowers near the end of the cold war, particularly if the strategic systems and the strategic environment domains are similarly conducive to a war-fighting strategy. If their strategic culture supports such a posture, nuclear proliferation may not be nearly as stabilizing as deterrence optimists expect.

Opaque proliferation can either eliminate or complicate nuclear opera-

tions. If opaque proliferation means never weaponizing an arsenal then operational considerations never materialize. But if it means weaponizing in a crisis or covertly, then the basic operational dilemmas obtain. A comprehensive theory of nuclear operations, therefore, can incorporate the opacity factor; doing so, however, dilutes prediction due to the difficulty of determining levels of opacity. Almost by definition, opaque proliferation defies robust analysis. A theory which depends upon knowing explicit levels of weaponization is doomed to imprecise forecasts so long as the crucial information is unavailable because the countries involved never lift the shroud of secrecy. Perhaps theories of opaque proliferation will necessarily be somewhat opaque themselves, at least until the database expands.

This analysis illuminates how different nuclear proliferators may behave in very different ways even while undergoing the same nuclear revolution. Examining the factors from the three domains and determining the degree of weaponization will enable experts to make more plausible predictions about the strategic consequences of open and opaque nuclear proliferation in their region of interest.

At least at this stage, however, two hurdles remain before the hypotheses presented here can be considered a complete theory of nuclear behavior. First, the theory should be able to specify outcomes when the factors make for contrary predictions. For instance, how will a new proliferator behave if it has a large arsenal (which is therefore somewhat difficult to manage), is surrounded by capable enemies (and so faces pressures to adopt delegative operations), but has a volatile pattern of civil-military relations (and so feels compelled to adopt assertive operations)? Deterrence theory shares this problem of indeterminacy. Because it dismisses nuclear behavior as inconsequential, it cannot predict how a state will respond to strategic vulnerability: that is, whether to seek survivable strategic systems or delegative command and control measures.

A second hurdle is the need to specify the relative weights for the influence of each domain. Is the strategic culture factor of volatile civil-military relations more important than the strategic environment factor of vulnerability? Here, deterrence theory has an edge (at least in explicitness), by stating categorically that the first two domains dominate the third. I argue that this gravely understates the importance of strategic culture, but I cannot identify unequivocally what its appropriate weight should be.

The best way to resolve these problems is by testing these various hypotheses against the historical record. A comparison of the expectations with the behavior of a large sample of nuclear countries should produce one of three possible outcomes. First, if vastly different nuclear proliferators do behave in roughly similar ways the usefulness of rational deterrence theory is confirmed. Second, if differences in strategic cultures do correlate with

different nuclear behaviors then the desire for parsimony is weakened. Third, even if the results are not decisive, the exercise will suggest refinements to specific propositions advanced above. In particular, a more detailed picture of nuclear operations in proliferating states is certain to improve our understanding of the general link (if any) between bureaucratic politics and nuclear operations.

Unfortunately, such a theory test is not possible at this time for the simple reason that the data on nuclear proliferators do not exist. We have a fairly sophisticated understanding of U.S. nuclear programs and our knowledge of the Soviet program, at least as it was during the cold war, is rapidly improving. But we know comparatively little about even mature arsenals like the British, French and Chinese. Despite ample attention over the years, our understanding of third generation proliferators like Israel and India is very unreliable on crucial details about nuclear operations. And for those countries yet to cross the threshold, the information is scarce to nonexistent.

But it is not merely a problem of data. Even if the information were available, a robust theory test would be difficult because the competitor theory to rational deterrence theory presented above needs to be fleshed out and refined so that the propositions are more direct and less equivocal. I believe I have demonstrated the need to open the black box of nuclear behavior theory; I do not claim to have specified or organized all its contents.

The foregoing suggests a research agenda for nuclear proliferation studies. More scholars need to mine the growing mound of declassified information on cold war era nuclear programs and behavior in the U.S. and the former Soviet Union. Even if the results are primarily descriptive, the potential contributions to theory are significant. As information accumulates, scholars should be able to model U.S. and Soviet behavior more accurately, possibly identifying causal relationships that went unnoticed in our earlier superficial accounts. A rich description of our nuclear history should, through process-tracing, help identify crucial interactions at the domestic level that can become hypotheses about nuclear cause and political effect.

This emphasis on the United States and the Soviet Union makes a virtue out of necessity. Theory about nuclear proliferation is bound to be informed by the U.S. and Soviet cases simply because we know those two best. Therefore, it makes sense to fashion as theoretically sophisticated *and* descriptively accurate an understanding as possible. The agenda does not end there, however. New insights about the influence of domestic institutions derived inductively from the U.S. and Soviet cases should be refashioned into generalizable deductive propositions that can guide research directly on nuclear proliferation. This paper identifies important factors that should cue research on individual countries: for example, patterns of civil-military relations, strategic rationales about the useability of nuclear weapons, and the

institutional frameworks governing the production of nuclear weapons. Other studies will add to this list. Ultimately, the circle will close when insights derived from studies of proliferating countries can be turned to refine our understanding of the U.S. and Soviet cases as well.

This last point suggests yet another fruitful line of inquiry for proliferation studies. A research project that focuses on the influence of domestic factors on system behavior can profitably be turned to explain better the influence of system factors on domestic behavior. This is the question outlined by Peter Gourevitch in "The Second Image Reversed" and recently addressed in some fashion by a variety of studies.[78] It makes sense to study the domestic institutions in proliferating countries not only to predict how those institutions will affect nuclear behavior, but also to understand how undergoing the nuclear revolution changes the domestic institutions themselves.

With the close of the cold war, the focus of strategic studies has shifted inevitably to post-cold war problems. Nuclear proliferation has emerged at the top of policymaking agendas and so the renaissance of proliferation studies is predictable. The timing is fortuitous in one respect. This time our study of other nuclear countries benefits from recent studies of cold war nuclear operations. And that understanding tells us that domestic factors are too important to be left out of the equation. A generalizable theory of nuclear behavior ought to incorporate all the significant relationships between nuclear cause and political effect, including those operating in all three domains: strategic systems, strategic environment, and strategic culture.

Notes

For their careful reading of earlier drafts and useful suggestions, I thank Stephen Biddle, Paul Chrzanowski, Michael Desch, Lynn Eden, Benjamin Frankel, Joseph Grieco, Ole Holsti, Peter Lavoy, Steven Miller, Emerson Niou, Scott Sagan, David Welch, and the participants in the Stanford Conference on Social Science Theory and Nuclear Weapons Proliferation, 5–6 February 1993. I also thank Roger Cooper for his diligent and energetic research assistance.

1. Thomas Graham has criticized the management approach as a needless distraction from the traditional, and for him, achievable goal of stopping proliferation. See Thomas W. Graham, "Winning the Nonproliferation Battle," *Arms Control Today* (September 1991): 8–13.
2. The topic is not entirely new. One of the first systematic treatments was Joel Larus, *Nuclear Weapons Safety and the Common Defense* (Columbus: The Ohio State University Press, 1967). Another early expression is W. B. Wentz, *Nuclear Proliferation* (Washington, D.C.: Public Affairs Press, 1968). Lewis Dunn has also long championed a balance between prevention and management; see, for example, Lewis A. Dunn and Hermann Kahn, *Trends in Nuclear Proliferation, 1975–1995: Projections, Problems and Policy Options* (Croton-on-Hudson, N.Y.: Hudson Institute, 1976). The question of managing nuclear proliferation has

enjoyed something of a renaissance, however, beginning in the early 1980s and then accelerating with the collapse of the Soviet Union. Michael D. Intriligator and Dagobert L. Brito, "Nuclear Proliferation and the Probability of Nuclear War," *Public Choice* 37, no. 2 (1981): 247–59; John J. Weltman, "Managing Nuclear Multipolarity," *International Security* 6, no. 3 (Winter 1981/82); Bruce Bueno de Mesquita and William Riker, "An Assessment of the Merits of Selective Nuclear Proliferation," *Journal of Conflict Resolution* 26, no. 2 (June 1982): 283–306; Dagobert L. Brito, Michael D. Intriligator, and Adele E. Wick, eds. *Strategies for Managing Nuclear Proliferation* (Lexington, Mass.: Lexington Books, 1983); Shai Feldman, "Managing Nuclear Proliferation," in Jed C. Snyder and Samuel F. Wells, eds., *Limiting Nuclear Proliferation* (Cambridge, Mass.: Ballinger, 1985); Daniel Caldwell, "Permissive Action Links: A Description and Proposal," *Survival* 29, no. 3 (May/June 1987): 224–38; Lewis A. Dunn, *Containing Nuclear Proliferation*, Adelphi Paper no. 263 (London: IISS, 1991); Lewis A. Dunn and Gregory F. Giles, *Nuclear Proliferation Contingency Planning: Defining the Issues* (McLean: Center for National Security Negotiations, 1991); Mark D. Mandeles, "Between a Rock and a Hard Place: Implications for the U.S. of Third World Nuclear Weapon and Ballistic Missile Proliferation," *Security Studies* 1, no. 2 (Winter 1991): 235–69; Gregory Giles, "Safeguarding Undeclared Nuclear Arsenals," *Washington Quarterly* 16, no. 2 (Spring 1993): 173–86; and Robert D. Blackwill and Albert Carnesale, eds., *Coping with New Nuclear Nations* (forthcoming).

3. Waltz's formulation of proliferation optimism and Mearsheimer's recapitulation have garnered the most notoriety, although neither originated the idea that nuclear proliferation was good. The French strategic thinkers, especially Pierre Gallois, were probably the first to draw the conclusion which itself derives from Brodie's analysis in *The Absolute Weapon*. See Pierre Gallois, *The Balance of Terror* (Boston: Houghton Mifflin, 1961); Bernard Brodie, ed., *The Absolute Weapon: Atomic Power and World Order* (New York: Harcourt Brace, 1946); and see citations in n. 2. I treat Waltz and Mearsheimer as my foils precisely because their elegant treatments are now standard and because of their obvious links to neorealist theory. Waltz and Mearsheimer take different paths to their common conclusion about nuclear proliferation. Peter Lavoy notes that Waltz is optimistic about the potential of nuclear deterrence, while Mearsheimer is pessimistic about the inevitability of proliferation (and so seeks to make a virtue out of necessity, at least where Germany is concerned). Waltz's formulation poses a higher hurdle for developing a theory of nuclear behavior and so I consider it more closely in the text. Peter Lavoy, "Learning to Live with the Bomb: The Politics of Nuclear Proliferation in South Asia" (Ph.D. diss., University of California–Berkeley, forthcoming). Kenneth N. Waltz, *The Spread of Nuclear Weapons: More May be Better*, Adelphi Paper no. 171 (London: IISS, 1981), passim; Kenneth N. Waltz, "Nuclear Myths and Political Realities," *American Political Science Review* 84, no. 3 (September 1990): 731–45; and 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 challenges much of Mearsheimer's argument but nevertheless concurs that a German nuclear arsenal would be acceptable. Stephen Van Evera, "Primed for Peace: Europe after the Cold War," *International Security* 15, no. 3 (Winter 1990/91): 54.
4. Thomas Schelling, *Strategy of Conflict* (New York: Oxford University Press, 1963), passim. Also, Bruce Bueno de Mesquita, *The War Trap* (New Haven: Yale University Press, 1981), passim. For an admirably concise summary, see Christopher Achen and Duncan Snidal, "Rational Deterrence Theory and Comparative Case Studies," *World Politics* 46, no. 2 (January 1989): 150–53.
5. Achen and Snidal, "Rational Deterrence Theory," 159.

6. Richard Ned Lebow and Janice Gross Stein are concise and unambiguous: "Proponents of 'rational deterrence theory' contend that it is conceptually sound, a good predictor of strategic behavior, and a successful strategy of conflict management. All three assumptions are unwarranted." Richard Ned Lebow and Janice Gross Stein, "Rational Deterrence Theory: I Think Therefore I Deter," *World Politics* 46, no. 2 (January 1989): 208.
7. For a good introduction, see the special issue of *World Politics* 46, no. 2, (January 1989) containing the following articles: Achen and Snidal, "Rational Deterrence Theory"; Alexander L. George and Richard Smoke, "Deterrence and Foreign Policy"; Robert Jervis, "Rational Deterrence: Theory and Evidence"; Lebow and Stein, "Rational Deterrence Theory"; and George W. Downs, "The Rational Deterrence Debate."
8. Lebow and Stein, "Rational Deterrence Theory," 208–12. Also Robert Jervis, *Perception and Misperception in International Politics* (Princeton: Princeton University Press, 1976).
9. Waltz, *The Spread of Nuclear Weapons*, 3–10, esp. 5–6. The deterrence failure school claim that their insights do in fact apply to nuclear as well as conventional deterrence. But they face the same counterfactual problem noted in the text. See, for example, Richard Ned Lebow, *Nuclear Crisis Management: A Dangerous Illusion* (Ithaca: Cornell University Press, 1987).
10. McGeorge Bundy, "Existential Deterrence and Its Consequences," in Douglas MacLean, ed., *The Security Gamble: Deterrence Dilemmas in the Nuclear Age* (Totowa, N.J.: Rowman & Allanheld, 1984), 3–13.
11. Of course, we may worry about nuclear proliferation because it threatens other goals besides war-avoidance. Even if rational deterrence theory is correct about the implications of the spread of nuclear weapons, or rather especially if it is correct, proliferation poses grave policy problems for the great powers. RDT posits that nuclear proliferation will multiply situations of mutual deterrence wherein each side can threaten the other into inaction. This condition is agreeable if the only objective is to avoid war. But war-avoidance is only one goal for great powers like the United States; in fact, at times great powers want the freedom to go to war in order to prevail over other transgressor countries. RDT suggests that nuclear proliferation would make it far easier for smaller powers to resist great powers. For instance, a nuclear-capable Iraq perhaps could have deterred the United States from launching Desert Storm. A nuclear-armed Iraq might have exercised regional hegemony secure in the knowledge that its arsenal deterred other countries from getting involved. Nuclear war is avoided, but at what cost? One reason RDT fails to convert everyone to optimism, therefore, is that nuclear proliferation vastly complicates regional power management problems. Great powers prefer that membership in the nuclear club be kept limited in order to maximize their latitude in international affairs. This is a reason to worry about nuclear proliferation, but it does not address the deeper point about whether nuclear behavior is an interesting theoretical puzzle.
12. I skip over two responses that lead away from the focus of my argument. First is the flippant answer most obvious to optimists and least persuasive to pessimists: people who worry about proliferation are benighted. A second answer is more serious, but it involves questions that go well beyond the scope of this paper: perhaps people reject proliferation optimism because they are unwilling to trust counter-intuitively rosy predictions from a social science theory. After all, as John Lewis Gaddis has been at such pains to remind us, political science (and especially the international relations subfield) is scarcely renowned for the reliability of its predictions. If intuition suggests that nuclear proliferation is bad, but a "robust and parsimonious" theory of international relations says it is good, Gaddis counsels that we disregard theory; especially when that theory has shed little or

no light on other questions of great import–say, how and why the Cold War ended. Gaddis' diagnosis is far more convincing than his confusing prescription: at points he seems to imply that we abandon forecasting entirely, but he concludes by recommending that political scientists merely augment their theories with the tools of fiction writers–"narrative, analogy, paradox, irony, intuition, imagination, and–not least in importance–style." If I understand him, I find his caution nonetheless useful, and hereby invoke all the caveats and contingencies Gaddis recommends. See John Lewis Gaddis, "International Relations Theory and the End of the Cold War," *International Security* 17, no. 3 (Winter 1992/93): 5–58.

13. Achen and Snidal, "Rational Deterrence Theory," 161.
14. The forty-five years are even less reassuring if one considers that the weapons programs of both superpowers belied any reliance on Bundy-esque existential deterrence. At the very least, neither American nor Soviet leaders acted like they thought existential deterrence sufficed. Waltz dismisses this behavior as an atavistic hangover from the 1930s. He may be right but current changes allow for a more robust test. Waltz, "Nuclear Myths," 734–35.
15. Mearsheimer, "Back to the Future," 9–10. See also the articles by John Lewis Gaddis, Robert Jervis, Carl Kaysen, John Mueller, Jack Snyder, and Steven Van Evera, compiled in Sean M. Lynn-Jones, ed., *The Cold War and After: Prospects for Peace* (Cambridge: MIT Press, 1991).
16. Achen and Snidal, "Rational Deterrence Theory," 153.
17. Waltz, *The Spread of Nuclear Weapons*, 28 and 16, respectively. While Waltz's view of the importance of this requirement is relatively consistent, his thinking on the difficulty of meeting it has undergone a curious evolution. In *Theory of International Politics*, Waltz dismisses the French nuclear deterrent as hopelessly vulnerable: "French officials continue to proclaim the invulnerability of their forces, as I would do if I were they. But I would not find my words credible." In *The Spread of Nuclear Weapons*, he is more optimistic about securing a sufficient second-strike capability: "Will such countries be able to construct and protect a deliverable force? We have found that they can readily do so." By the 1990 *APSR* article, he becomes positively sanguine: " ... the invulnerability of a sufficient number of warheads is easy to achieve and the delivery of fairly large numbers of warheads impossible to thwart, both now and as far into the future as anyone can see." To my knowledge, Waltz has not explained why he deems the third-ranked nuclear arsenal irredeemably vulnerable and yet any crude Third World arsenal securely invulnerable. See Waltz, *Theory of International Politics*, 181; Waltz, *The Spread of Nuclear Weapons*, 17; and Waltz, "Nuclear Myths," 732. I am grateful to Scott Sagan for suggesting this point to me.
18. Mearsheimer, "Back to the Future," 37–8.
19. "[A systemic theory like balance-of-power] ... explains why a certain similarity of behavior is expected from similarly situated states. The expected behavior is similar, not identical. To explain the expected differences in national responses, a theory would have to show how the different internal structures of states affect their external policies and actions." Kenneth Waltz, *Theory of International Politics* (Reading, Mass.: Addison-Wesley, 1979), 122.
20. Waltz notes, for instance: "Relations between the United States, the Soviet Union, and later among the United States, the Soviet Union, and China, were at their bitterest just when their nuclear forces were in early stages of development, were unbalanced, were crude and presumably hard to control." Waltz, *The Spread of Nuclear Weapons*, 16.
21. Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton: Princeton University Press, 1993).
22. Even those who criticize Waltz for his conclusions about the desirability of

nuclear proliferation often invoke similarly gaunt theory, slighting the domestic factors which shape nuclear behavior. For example, Dagobert Brito and Michael Intriligator's formal model of proliferation is a useful corrective to Waltz because it considers the problem of accidental war, perhaps arising out of an unauthorized nuclear use. Consequently, it gives a more nuanced analysis of the conditions under which nuclear proliferation is desirable. But the model does not examine the operational factors which make accidental nuclear war more likely and so does not constitute a theory of nuclear operations. Brito and Intiligator, "An Assessment of the Merits." Moreover, while operational issues were raised in an exchange between Waltz and a series of critics, none advanced a comprehensive theory of how operations would vary across the field of proliferators. See exchange including Kenneth Waltz, Dagobert Brito, Michael Intriligator, George Quester, Bruce Russett, Thomas Schelling, and Dina Zinnes in *Strategies for Managing Nuclear Proliferation*, 99–162. Waltz criticizes unnamed analysts who fear proliferation on the basis of negative assessments about the domestic character of would-be proliferators. In fact, however, traditional treatments generally downplay domestic factors even while incorporating, often unconsciously, one of the few variables that structural realism deems significant, that is, the distribution of power in the system. See Bruce D. Berkowitz, "Proliferation, Deterrence, and the Likelihood of Nuclear War," *Journal of Conflict Resolution* 29, no. 1 (March 1985); Daniel S. Geller, "Nuclear Weapons, Deterrence, and Crisis Escalation," *Journal of Conflict Resolution* 34, no. 2 (June 1990); Rodney Jones, ed., *Small Nuclear Forces and US Security Policy: Threats and Potential Conflicts in the Middle East and South Asia* (Lexington, Mass.: Lexington Books, 1984); Geoffrey Kemp, *Nuclear Forces for Medium Powers: Strategic Requirements and Options*, Adelphi Papers no. 107 (London: IISS, 1974); John J. Weltman, "Managing Nuclear Multipolarity," *International Security* 6, no. 3 (Winter 1981/82); Albert Wohlstetter, et al., *Moving Toward Life in a Nuclear Armed Crowd?* (Los Angeles: Pan Hueristics, 1976). Lewis Dunn and Leonard Spector are important exceptions in that they self-consciously treat domestic factors, albeit in an inductive fashion. Lewis A. Dunn, *Containing Nuclear Proliferation*, Adelphi Paper no. 263 (London: IISS, Winter 1991); and Leonard Spector, *Nuclear Proliferation Today* (New York: Vintage, 1984); Leonard Spector, *New Nuclear Nations* (New York: Vintage, 1985); Leonard Spector, *Going Nuclear: The Spread of Nuclear Weapons 1986–1987* (Cambridge, Mass.: Ballinger, 1987); Leonard Spector, *The Undeclared Bomb* (Cambridge, Mass.: Ballinger, 1988); and Leonard Spector, *Nuclear Ambitions: The Spread of Nuclear Weapons, 1989–90* (Boulder: Westview, 1990).

23. Achen and Snidal rightly point out that lists of variables are not substitutes for theory. But they admit that the identification of important variables does constitute a significant step in theory-building. Achen and Snidal, "Rational Deterrence Theory," 155.
24. This definition of operations is modified from Stephen Biddle, "The Determinants of Offensiveness and Defensiveness in Conventional Land Warfare" (Ph.D. diss., Kennedy School of Government, 1991), 11.
25. Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket, eds., *Managing Nuclear Operations* (Washington: Brookings, 1987): 1–13.
26. Elsewhere, I have sketched out a framework for estimating command and control in emerging nuclear nations. My argument here builds upon that earlier work. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security* 17, no. 3 (Winter 1992/93): 160–87. Also Gregory Giles has recently assembled command and control information for certain proliferating countries, Giles, "Safeguarding Undeclared Nuclear Arsenals," 173–86.
27. Note that this discussion applies to a variety of proliferation scenarios. Motiva-

tions do not matter; operations are important regardless of why a country chooses to proliferate. The path to proliferation is also not necessarily relevant; operations are important whether a country resolutely develops a weapon, underhandly steals a weapon, or blindly stumbles from a civilian nuclear energy program into building an arsenal. Opaque and covert proliferation *does* affect operations, however, and I discuss this more fully later in the text.

28. See, for example, the analysis by Leonard Spector cited in n. 22.
29. Witness, for example, the evolution of Army battlefield nuclear doctrines. John J. Midgley, Jr., *Deadly Illusions: Army Policy for the Nuclear Battlefield* (Boulder, Colo.: Westview, 1986).
30. Thomas Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966), 244–48.
31. Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," 162–68. See also, Donald Cotter, "Peacetime Operations: Safety and Security," in Carter, Steinbruner, and Zraket, *Managing Nuclear Operations*, 17–74; House Committee on Armed Services, Panel on Nuclear Weapons Safety, *Nuclear Weapons Safety*, Report, 101st Cong., 2nd Sess., December 1990; and Peter Stein and Peter Feaver, *Assuring Control of Nuclear Weapons: The Evolution of Permissive Action Links* (Lanham, Md.: University Press of America, 1987).
32. For example, a country might decide to keep the warheads separate and distant from the delivery vehicles, thus making unauthorized use virtually impossible. But this severely complicates the ability to use the weapons quickly, especially if under attack.
33. For an interesting argument about how states are motivated to war by competing claims of justice see David Welch, *Justice and the Genesis of War* (New York: Cambridge University Press, 1993, forthcoming). With centuries-old rivalries and grievances reigniting throughout the world, Welch's analysis of justice claims is particularly timely.
34. Of course, a regional nuclear hegemon could be comparatively free to engage in nuclear blackmail with its hapless neighbors and so behave in an even more careless fashion. This is a possibility, but it is interesting to note that Richard Betts finds only equivocal evidence for arguing the U.S. behaved in this way during its period of nuclear "superiority." See Richard K. Betts, *Nuclear Blackmail and Nuclear Balance* (Washington, D.C.: Brookings, 1987), passim.
35. Of course, a potential attacker might fear that the intended victim would switch to a delegative command system (for example, delegate the authority to use nuclear weapons) just as a preemptive strike is underway and so be able to retaliate anyway. If this calculation discourages the potential attacker, deterrence may hold. This is one of the ways existential deterrence could work, the mere shadow of a doubt preventing an attack. As discussed before, if both sides believe in existential deterrence (and act on that belief), then the problem of nuclear behavior is moot. Several factors militate against this calculation, however: first, countries may find a last minute delegation difficult to achieve, especially if they have a rigidly assertive command structure in place; second, last minute transitions increase the chance for accidents and unauthorized activities at precisely the most dangerous time, when the nation is already in a crisis.
36. Deductively, this relationship holds if a proliferator is unable to improve the strategic environment in other ways, for example by resolving regional tensions through arms control and peace settlements or by building up its own forces to the point where it is invulnerable to an enemy first strike.
37. I use this admittedly loose understanding of strategic culture in order to capture as wide a range of factors as possible. Strategic culture here is an umbrella concept that draws from, but is not limited to, more precise formulations. See, for example, Gabriel A. Almond and Sidney Verba, eds., *The Civic Culture Revisited*

(Boston: Little, Brown, 1980); Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: Johns Hopkins University Press, 1989); Kenneth Booth, *Strategy and Ethnocentrism* (New York: Holmes and Meier, 1979); Colin Gray, "National Style in Strategy," *International Security* 6, no. 2 (Fall 1981); Colin Gray, *National Strategy and National Style* (Boston: Hamilton Press, 1986); Joseph Lepgold, "Cultural Arguments as Explanations of Foreign-Policy Behavior: The American Case" (Paper presented at the 1992 Annual Meeting of the American Political Science Association, Chicago, September 1992); Glenda M. Patrick, "Political Culture," in Giovanni Sartori, ed., *Social Science Concepts* (Beverly Hills, Calif.: SAGE, 1984).

38. Carl Von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976); and Samuel Huntington, *Soldier and State* (Cambridge, Mass.: Belknap Press, 1957).
39 This section is adapted from Feaver "Command and Control," 170–78.
40. Not all civilians demand the same level of assertive control, but civilians in general prefer more assertive control than the military would want to give if left to its own devices. This would hold, but with lesser force, even in those cases where the civilian leader adopts a relatively delegative administrative style overall, as did Presidents Eisenhower and Reagan. This assumption holds with the United States and the Soviet Union and so has prima facie plausibility as a working assumption for proliferation studies. However, testing and if necessary modifying this hypothesis should be a priority for future research on nuclear proliferation.
41. The story of this struggle over nuclear custody is detailed at length in Feaver, *Guarding the Guardians*. It is not limited to nuclear operations, however, as the dispute over President Johnson's "micro-management" of the Vietnam War indicates.
42. Bruce Blair, *The Logic of Accidental War* (Washington: Brookings, 1993).
43. The recent dramatic changes in the Soviet Union raise interesting questions about the future of command and control in the second nuclear superpower. Most of the discussion in the West so far has focused on the problem of transition stability, i.e., whether the old and presumably reliable Soviet command system will fail during the tumultuous transition from the Soviet empire to a federation of independent republics. A secondary question, also of interest, is how evolving civil-military relations will cause the command and control system to change over time.
44. Stephen Biddle and Robert Zirkle, "Technology, Civil-Military Relations, and Warfare in the Developing World" (Paper presented at the Mershon Center Conference on Civil-Military Relations, 4–5 December 1992).
45. The link between leadership style and nuclear command and control was evident in the evolution of custody policy in the United States. Presidents with a delegative administrative style (for example, Eisenhower) tended to tolerate more delegation in nuclear command and control, whereas assertive presidents (such as Kennedy) carried this style into the control of nuclear weapons as well. See Feaver, *Guarding the Guardians*, chaps. 3, 7, and 8.
46. See Spector, *Going Nuclear*, 28–32.
47. See James Brooke, "Brazil Uncovers Plan by Military To Build Atom Bomb and Stops It," *New York Times*, 9 October 1990, pp. 1, 4.
48. The overall process is probably interactive: nuclear weapons affect civil-military relations just as civil-military relations affect the way states manage nuclear weapons. The effect of nuclear weapons on civil-military relations is discussed in Peter Feaver, "Guarding the Guardians: Civil-Military Relations and the Control of Nuclear Weapons" (Ph.D. diss., Harvard University, 1990), 46–94. See also Scott D. Sagan, "The Nuclear Sword and Scepter: Civil-Military

Relations and Nuclear War" (Paper delivered at the Mershon Center Conference on Civil-Military Relations, 4–5 December 1992).

49. See Feaver, *Guarding the Guardians*, 149–98.
50. The story of the sometimes stormy relationship is told in the official histories of the Atomic Energy Commission. Richard G. Hewlett and Oscar E. Anderson, Jr., *The New World, 1939–1946*, vol. 1 of *A History of the United States Atomic Energy Commission* (University Park, Pa.: Pennsylvania State University Press, 1962); Richard G. Hewlett and Francis Duncan, *Atomic Shield, 1947/52*, vol. 2 of *A History of the United States Atomic Energy Commission* (University Park, Pa.: Pennsylvania State University Press, 1969); Richard G. Hewlett and Jack M. Holl, *Atoms for Peace and War, 1953–61*, vol. 3 of *A History of the United States Atomic Energy Commission* (University Park, Pa.: Pennsylvania State University Press, 1989). See also Feaver, *Guarding the Guardians*, 175–91.
51. Interview with author.
52. Vice Admiral G. E. Miller (Ret.), "Who Needs PALS?" *Naval Institute Proceedings* (July 1988): 50–56.
53. Peter Katzenstein has shown how large states have more freedom to maneuver around systemic constraints on political economy issues than do small states. Peter Katzenstein, *Small States in World Markets* (Ithaca: Cornell University Press, 1985); and Katzenstein, ed., *Between Power and Plenty* (Madison: University of Wisconsin Press, 1978). Jack Snyder has argued that this phenomenon obtains in security matters as well. Snyder, *Myths of Empire*, 62.
54. See David Welch, "The Organizational Process and Bureaucratic Politics Paradigms: Retrospect and Prospect," *International Security* 17, no. 2 (Fall 1992): 120–21.
55. Joseph Nye has called the evolution of these attitudes "nuclear learning." Joseph S. Nye, Jr. "Nuclear learning and U.S.–Soviet security regimes," *International Organizations* 41, no. 3 (Summer 1987).
56. Brodie, *The Absolute Weapon*.
57. Ronald Reagan, "Address Before a Joint Session of the Congress on the State of the Union," 25 January 1984.
58. Gray, "National Style in Strategy," 37–38. Former senior policymakers aided the establishment of this consensus with their claims, many years after leaving government, that their on- and off-the-record efforts to advance war-fighting strategies were conscious efforts in futility since they knew no president would ever authorize the first strategic use of nuclear weapons. See, for example, McGeorge Bundy, *Danger and Survival: Choices About the Bomb in the First Fifty Years* (New York: Random House, 1988).
59. Catherine Kelleher and Ernest May "History of the Development and Deployment of BNW," in Stephen Biddle and Peter Feaver, *Battlefield Nuclear Weapons: Issues and Options* (Lanham, Md.: University Press of America, 1989), 13–32.
60. Betts, *Nuclear Balance and Nuclear Blackmail*. See also, Gordon H. Chang, "To the Brink: Eisenhower, Dulles and the Quemoy-Matsu Crisis," *International Security* 12, no. 4 (Spring 1988); Roger Dingman, "Atomic Diplomacy During the Korean War," *International Security* 13, no. 3 (Winter 1988/89); Michael Howard, "Nuclear Danger and Nuclear History," *International Security* 14, no.1, (Summer 1989).
61. This statement is not necessarily incompatible with Steven Kull's apparently somewhat contrary assessment. Kull traces the evolution of elite attitudes towards nuclear weapons and finds ample evidence of an embrace of a war-fighting role of nuclear weapons (what he calls the "traditional stream" of strategic thought) throughout the cold war extending into the Reagan administration. Moreover, he finds many instances of the same individual holding contradictory views on the usability of nuclear weapons. Kull's explanation,

springing from the language of psychotherapy, is that these individuals are manifesting an inner struggle between conflicting goals; national security being only one and not always the dominant ambition. Kull notes, as I do above, that procurement policies tended to reflect the view that nuclear weapons were usable, but crisis behavior was much more circumspect. Significantly, however, Kull views the inner conflict as important. Although he believes the "reality" is that nuclear deterrence makes war futile (thereby embracing one tenet of the proliferation optimists), he nevertheless worries about any inner conflict within American strategic culture (implying that strategic culture can overwhelm deterrence logic). If Kull is correct, and if his analysis is extended to proliferation studies, there is ample reason to be concerned with elite attitudes on the useability of nuclear weapons in emerging nuclear nations. Steven Kull, *Minds at War* (New York: Basic Books, 1982), passim.

62. Gray, "National Style in Strategy," 21. Gray cites as evidence Jack Snyder, *The Soviet Strategic Culture: Implications for Limited Nuclear Operations*, R-2154-AF (Santa Monica, Calif.: RAND, September 1977).
63. Although strict deterrence theorists, as noted before, claim that culture would not, in the end, matter much.
64. Stephen Peter Rosen, *Hindu Strategic Behavior*, unpublished ms.
65. An anecdote from the 1991 Gulf War makes the point sharply. A senior Indian military officer, asked to speak to the lessons of Desert Storm, remarked that he believed the most important lesson was the necessity of using nuclear weapons early in any conflict with the United States. This is clearly not conclusive evidence that the Indians would handle a large nuclear arsenal different from the way the U.S. or the Soviets did; indeed, the narrative of the cold war is replete with similarly colorful quotes from bellicose American and Soviet military officers. But it is suggestive of how strategic culture could condition the way a state would treat nuclear weapons.
66. Waltz, *The Spread of Nuclear Weapons*, 11–13.
67. The term "opaque proliferation" was coined by Benjamin Frankel in "Notes on the Nuclear Underground," *The National Interest*, no. 9 (Fall 1987). It was further developed in Avner Cohen and Benjamin Frankel, "Opaque Nuclear Proliferation," *Journal of Strategic Studies* 13, no. 3 (September 1990).
68. Yair Evron, "Opaque Proliferation: The Israeli Case," *Journal of Strategic Studies* 13, no. 3 (September 1990); and Shlomo Aronson, *The Politics and Strategy of Nuclear Weapons in the Middle East: Opacity, Theory, and Reality, 1960–1991. An Israeli Perspective* (Albany: SUNY Press, 1992).
69. Cohen and Frankel, "Opaque Nuclear Proliferation," 21–22.
70. Jonathan Schell, *The Abolition* (New York: Knopf, 1984), 114–21, esp. 118.
71. Lawrence Scheinman argues that French technocrats pushed the nuclear weapons program along with a minimum of political leadership during the Fourth Republic. Sylvia Crosbie further speculates that a small group of French military officers may have fueled the drive for an accelerated nuclear program, absent political direction, because of their disatisfaction with allied support at Dienbienphu, Suez, and the North African campaigns. Lawrence Scheinman, *Atomic Energy Policy in France Under the Fourth Republic* (Princeton: Princeton University Press, 1965), 213; Sylvia K. Crosbie, *A Tacit Alliance* (Princeton: Princeton University Press, 1974), 119–20. Political control over Brazil's nuclear program was similarly ambiguous, see Brooke, "Brazil Uncovers Plan," 1, 4.
72. Bundy, "Existential Deterrence," 9–10.
73. There are other reasons for being skeptical. For instance, the decision *not* to weaponize a bilateral opaque nuclear relationship is like a prisoner's dilemma. While it may be in both parties interests not to weaponize (not to defect), coordination problems may compel both sides to do so. Moreover, as Steven

Flank argues in his article in this volume, the process of developing nuclear proliferation is itself a political and social process. Contingent factors may push for weaponization even if the top leadership prefer the existential or Schell-esque deterrence afforded by *not* weaponizing.

74. Shlomo Aronson, *The Politics and Strategy of Nuclear Weapons*, 139–49, esp. 147; Seymour Hersh, *The Samson Option: Israel's Nuclear Arsenal and American Foreign Policy* (New York: Random House, 1991), 225–40; and "How Israel Got the Bomb," *Time*, 12 April 1976, p. 39.
75. Hersh, *The Samson Option*, 225–27.
76. Giles also suggests that this kind of opacity complicates nuclear operations, possibly making for unsafe nuclear behavior. Giles, "Safeguarding Undeclared Nuclear Arsenals," 178.
77. Hersh, *The Samson Option*, 225–29. For further speculation on Israeli nuclear operations see Peter Pry, *Israel's Nuclear Arsenal* (Boulder, Colo.: Westview, 1984), 80; and Giles, "Safeguarding Undeclared Nuclear Arsenals," 175–78.
78. Peter Gourevitch, "Second Image Reversed: The International Sources of Domestic Politics," *International Organization* 32, no. 4 (Autumn 1978): 881–911. See also, Biddle and Zirkle, "Technology, Civil-Military Relations, and Warfare in the Developing World"; Michael Desch, "Systemic Determinants of Civil-Military Relations: The Military Technical Revolution and Changing Soviet Civil-Military Relations," unpublished paper; Peter Feaver, "Civil-Military Relations and the Use of Force," a research proposal available from the author; Sagan, "The Nuclear Sword and Scepter"; Jack Snyder "International Leverage on Soviet Domestic Change," *World Politics* 42, no. 1 (October 1989); and Snyder, *Myths of Empire*, 318.