

Current thinking about nonproliferation issues tends to deal with nuclear weapons and other weapons of mass destruction in a political vacuum, choosing to see these issues in a security-oriented context. This perspective reduces the complex rhythms and multiple voices of the process of proliferation to a single element--security. Just as a string quintet requires a viola, sometimes even two, so security

clearly is an important element of understanding and dealing with proliferation. Yet the full score for proliferation extends beyond any single voice or any single set of issues. I argue in this essay that the policy instruments available for dealing with proliferation need to expand beyond security-centered measures and need to work in better harmony with their domestic political foundations, and that theoretical and policy understandings of proliferation need to become more explicitly political.

Too often, U.S. government policy and the recommendations of nonproliferation analysts focus on a narrow set of proliferation causes and nonproliferation options. Countries are usually assumed to acquire weapons of mass destructions or ballistic missiles because they see them as necessary for their security. The most important factors in determining the course of proliferation therefore tend to be identified as external security threats and foreign technical assistance. Other causes or processes are addressed only cursorily or lumped into the residual category of status and prestige, while basic questions about the "security" issue--what is defined as security, what is defined as necessary for security, and how those definitions come to be accepted--frequently escape focused attention.¹

Similarly, policy recommendations tend to rehearse the same tunes: export controls, arms control, and redressing security concerns. These old favorites play well in various capitals around the world, perhaps be-

cause they are both sensible and comfortably familiar. But they are also insufficient. The point here is not only that the nonproliferation community--both theorists

and practitioners--can reach farther afield in devising policy options. We also need to recognize that nuclear weapons and other weapons of mass destruction do not spring into being in isolation from the rest of society. Our analyses and recommendations need

to recognize instead how the process of proliferation is intimately connected to broader political and international issues.

This essay first examines the surprising diversity of causes and motivations that underlies the processes of development, acquisition, deployment, and retention of weapons of mass destruction, as well as ballistic missiles. It then turns to the expanded set of nonproliferation policy options and political processes that, from the U.S. perspective, becomes available when the spotlight is turned away from traditional security-based arms control and export control policies. This essay also tries to draw new implications and policy recommendations from the reality that nonproliferation policy formation in the United States is just as diverse and politi-

VIEWPOINT:
**NONPROLIFERATION
POLICY: A QUINTET
FOR TWO VIOLAS?**

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cal as proliferation processes elsewhere. It concludes by addressing the need for new theoretical perspectives that can help construct a broader and more political view of proliferation.

ARE NUCLEAR WEAPONS SPECIAL?

Nuclear weapons are special. Anything that can destroy entire cities in a microsecond merits distinctive consideration. Ballistic missiles and chemical and biological weapons share in a limited way the impression of awesome destructive power. But the process of proliferation is not special. It is the same as any other social or political process. Decisionmaking about developing a technological infrastructure, about acquiring specific numbers and configurations of weapons, or about deploying or retaining those weapons, all occurs with the same constraints, the same historical contingencies, and the same diversity of considerations as decisionmaking about any other political issue. What we, as analysts, know about the political processes surrounding elections, welfare reform, or industrial policy also applies to proliferation and to nonproliferation policy. This simple truism has surprisingly deep implications for our understanding of proliferation and our choices about how to deal with it.

One might be tempted to think that nuclear weapons or other proliferation concerns are exempt from the usual political processes or that their patterns of internal decisionmaking are distinct from other political issues. Perhaps in the 1940s and 1950s, the purveyors of nuclear weapons and ballistic missiles could successfully cling to an aura of absolute--even demonic--power and thus brush off any interference from political groups outside the appointed priesthoods (such as technologists or the military).² The bureaucratic weapons of national security, military prerogatives, or a technological smokescreen could also be useful in fending off political incursions. Even during that period, the priesthoods were hardly apolitical, fighting among themselves over agendas ranging from manned bombers or particle accelerators to personal ambition.³

By the 1960s, and certainly today, the post-Hiroshima aura surrounding nuclear weapons has long since faded. The many-decades-old technology for nuclear weapons, ballistic missiles, and chemical weapons is widespread, almost commonplace--passé though clearly not obsolete.⁴ The claims that arguments of national security could once make on authority, resources, and secrecy can now

often be made with equal force by other issues, such as economic growth in China, technological development and self-reliance in India, or trade policy in Brazil. Assumptions left over from the national security state of 1950's America do not apply universally.⁵

Nor does the military imprimatur insulate proliferation programs politically. Uniformed services are frequently out of the loop in nuclear weapons decisionmaking. The United States explicitly set up the civilian Atomic Energy Commission in order to lessen military influence on nuclear decisionmaking; Stalin kept the early Soviet programs under tight personal control and the warheads under even tighter KGB control. Similarly today, in Ukraine, India, or perhaps even Iraq, uniforms are a rare sight at bureaucratic nuclear weapons meetings. It is difficult to find a case where that special aura of authority that comes with a military uniform had a significant impact on the original development of nuclear weapons.

In sum, neither new technology nor totemic implications, neither national security nor military authority, can provide a basis for thinking that nuclear weapons and other proliferation concerns are subject to a unique set of political processes. Yes, because technological development is frequently an important aspect of proliferation, scientists and engineers may play a more prominent role than they do in welfare reform. Yes, because of the international implications, the foreign policy elite may be more involved than it is for campaign financing laws. But these groups, along with all the others involved in activities of proliferation concern, are still subject to the competition, the ideological shifts, the quest for allies, the publicity consciousness, and all the diverse political processes that characterize any other social activity in the modern world.

THE CAUSES OF PROLIFERATION: LOOKING FOR POLITICAL ALLIANCES

One fruitful approach for seeing the diversity and the politics inherent in proliferation processes is to view the development of nuclear weapons or other weapons of mass destruction as the process of building an alliance. Nuclear and missile system-builders, especially in developing countries, face limits on all sorts of resources-- money, political authority and consensus, laboratory quality reagents, access to imports, and so on. To gain access to such resources, nuclear weapons advocates need to recruit an array of allies: the security

elite, the military R&D establishment, commercial sub-contractors, or the press. Constructing the relatively simple artifacts of nuclear weapons or ballistic missiles thus requires using these allies to recruit and fix these scarce resources in a stable technological system.⁶

These allies not only add specific capabilities needed to manufacture end-products such as nuclear weapons and ballistic missiles, they also sustain and support the growth of the whole system. The system must collect momentum and resources into a big coalition, or such weapons will never be produced. The diverse communities and interests involved in developing weapons of mass destruction (or any other large technological system) will never monolithically decide to construct them, with the technical processes then obediently following in the wake of the political decision.⁷ Instead, complex systems start small and build painstakingly on existing resources. If successful, a growing technological system recruits both "social" and "technical" allies along the way.⁸

Traditionally, proliferation analysts have focused on just two allies that have moved technological systems along the development path--external security threats and foreign technical assistance. We can see clearly that country A is building chemical weapons, for example, because it feels threatened by country B. We can also identify when country X finds it easier to develop a given capability because of the availability of key components internationally. But other allies also play vital roles, often in highly context-dependent ways.

In many older programs of proliferation concern, the civilian nuclear power industry was a crucial ally in building up the technological, industrial, and political infrastructure that would be needed for a nuclear weapons program. The premise of the entire International Atomic Energy Agency safeguards program is that civilian programs are an ally worth paying attention to (although the worldwide decline of nuclear power may mean that the relationship between weapons and power programs seen in India, Argentina, South Korea, and elsewhere will not be repeated in the future). Similarly, space programs have given an important or imputed boost to ballistic missile programs in a number of cases.⁹

We can also examine more carefully how the usual suspects from the bureaucratic politics literature, such as budget battles or personal ambition, operate in the proliferation context. Some argue that budgetary outcomes change with an influx of money, especially hard

currency, so that oil revenues, for example, can sometimes be the most important ally in the progression of an arms race.¹⁰ More generally, scientific and engineering communities are usually key actors in the development of the large technological systems that produce nuclear weapons or ballistic missiles. In understanding how these communities form alliances with weapons programs, an analyst could look for how they value original research and individual accomplishment, how they construct the boundary between the technical and the political, and how they do and do not identify as part of an international community of science.¹¹

"Rollback" (where countries choose to abandon already existing and significant capabilities) provides striking illustrations of the need to look beyond security threats and technical assistance to the same sorts of factors that would explain dropping a protectionist trade policy or ending human rights abuses. In the Brazilian case, the decisions to reverse the ballistic missile and nuclear weapons programs were intimately connected with the opening to international trade and investment. In South Africa, an existing nuclear stockpile was physically dismantled in parallel with the dismantling of apartheid. Faced with an impending regime change and seeing opportunities to end international sanctions and reclaim civilian nuclear export markets, South Africans increasingly viewed their nuclear weapons as an impediment rather than an aid to their objectives, which now included political and economic reintegration into the international community.¹² For Kazakhstan, security assurances were an issue that needed to be resolved in the process of disposing of nuclear weapons, but they were not the driving force in the arguments of those supporting or opposing retaining the republic's nuclear arsenal. Instead, cost and technical questions, the nuclear legacy of Semipalatinsk, nationhood, legitimacy, and acceptance into the international political and economic mainstream all figured prominently.¹³

Odd historical contingencies also help account for support for nuclear programs. In India, the manufacture of fertilizer and a drive for increased agricultural production led nuclear technology into a strong, though short-lived, alliance with self-styled "agro-industrial complexes."¹⁴ In Brazil, the distance from the largest rivers to the largest cities was an ally for the nuclear program. With transmission losses so high from hydroelectric power, some Brazilians found it tempting to transfer the power by other means: using an electricity-intensive method of uranium enrichment near

the dams, and building indigenously-fueled enriched uranium reactors near the cities.¹⁵ Political alliances can be similarly contingent, as in the late 1950s when a narrow majority for the ruling coalition in the Swedish parliament (at times as small as a single vote) made it imperative to satisfy all wings of the major coalition partner, the Social Democratic Party. It is possible that this dynamic encouraged continued nuclear weapons development to a quite advanced state, until it finally shifted with the elections of 1958.¹⁶

More pressingly, the economic distress and potential social collapse of the former Soviet republics have become the leading proliferation concerns in the world. Yet because these problems do not fall under the rubric of security or technology, all of our traditional conceptions about proliferation provide only ad hoc and intuitive ideas of how to analyze and deal with them.

Even when access to technology or security threats are present, those allies are rarely sufficient to explain the choices observed. For example, one recent analysis of chemical weapons and ballistic missile proliferation advocates an emphasis on the "demand side" of proliferation, with international conflict as the underlying cause. Yet the same analysis notes that chemical weapons are "morally dubious and of infamous reputation," and that missiles are "symbols of high technological achievement."¹⁷ I would argue that these factors are indeed important. The high-tech aura is an important ally for missile advocates in developing countries, and moral squeamishness can inhibit potential allies from joining the cause of chemical weapons. But a narrow focus on security issues and technological capabilities excludes their explicit consideration.

Similarly, security considerations may indeed motivate the pursuit of nuclear weapons because they are seen as the ultimate purveyor of international power or as the token of great power status. But this formulation begs the question of how nuclear weapons come to be seen in this way. Preliminary investigation shows that the highly political processes of international diffusion and learning of ideas, norms, and cause-and-effect stories can account for shared--and crucial--understandings about the need, function, or desirability of nuclear weapons. Though international in origin, these shared understandings about nuclear weapons and security are then translated into the domestic political arena.¹⁸

For example, in the United States during the Cold War and in Pakistan more recently, support for nuclear weapons programs became a litmus test for national

politicians. Candidates and government officials had to protect themselves by aggressively supporting such programs and vigorously attacking anyone who did not support them.¹⁹ Nuclear weapons or ballistic missile system-builders trying to win more allies for their systems know how to exploit this dynamic and all the others that lead to taken-for-granted assumptions about nuclear weapons. Nonproliferation analysts trying to follow those system-builders could learn about the precisely the same dynamics by examining the international diffusion of everything from science boards and air forces to flags and social security systems.²⁰

Finally, and perhaps most importantly, both the causes of proliferation and the international politics of nonproliferation are thoroughly wrapped up in the tangle of political issues surrounding North-South trade, international equity, and economic and technological development, a tangle which I arbitrarily group under the rubric of "North-South issues." The global debates over nonproliferation regimes such as the Non-Proliferation Treaty (NPT), the Missile Technology Control Regime (MTCR), or the Nuclear Suppliers Group (NSG) are manifestly about accusations of discrimination, supplier cartels, maintaining underdevelopment through technology denial, and so on.

The same arguments find their reflection in proliferants' domestic debates over saving money on high-tech imports, using nuclear, missile, and other defense technologies as "leading sectors" to develop upstream and downstream industries, and breaking into supplier cartels as second-tier suppliers of space launch services, ballistic missiles, and nuclear technology.²¹ More broadly, the drive for some form of technological autonomy supported the growth of many countries' nuclear systems. Wide-ranging political, economic, and industrial interests support programs (such as promoting self-reliance or fighting "brain drain") that enhance indigenous capabilities for innovating and adapting technologies. Nuclear technology has been a prime conduit for such policies.²²

In sum, even when nuclear weapons or other weapons programs benefit from the support of security- and technology-centered allies, they do not avoid interacting with a multitude of broadly political issues. What remains is for us to integrate these factors into our understanding of proliferation and, more importantly, into nonproliferation policy.

POLICY OPTIONS: BEYOND EXPORT CONTROLS, ARMS CONTROL, SECURITY

Traditional nonproliferation measures cover a relatively narrow band of policy options: export controls, arms control, and redressing security concerns. Export controls range from broad international regimes to barely formal supplier cartels (including the Chemical Weapons Convention (CWC), the NPT's prohibition on transferring nuclear weapons, the NSG, and the MTCR). They share the assumption that access to foreign technology is a key ally for potential proliferants' programs, usually ignoring North-South issues in the process. Export controls are an important (if sometimes counterproductive) policy tool, but as argued above they cover only a portion of the broader picture.

Arms control measures directly target weapons, weapons components (such as fissile materials), and weapons testing and operations (e.g., the NPT, the Comprehensive Test Ban (CTB), a fissile material production cut-off, the CWC, a global treaty on Intermediate-range Nuclear Forces (INF), and so on). If implemented successfully, such measures can clearly have an important nonproliferation impact. But the State Department or Foreign Ministry is usually left to figure out how and why countries would be willing to sign on. For the most part, such measures are the end game of nonproliferation, marking the success of other policies or an a priori conjunction of objectives among parties to an agreement. If North Korea or France chooses full NPT compliance, that choice follows many actions by many countries. The NPT itself does not somehow inspire the compliance.

Finally, the last 20 years have seen an increasing (and laudable) emphasis on addressing underlying security concerns as part of the battle against proliferation. Transparency, confidence- and security-building measures, conventional arms control, and positive and negative security assurances have all been proposed and sometimes implemented in a nonproliferation context. Yet, as discussed above, such security concerns are not the only reason countries develop or acquire weapons of mass destruction or ballistic missiles.

Unfortunately, these three sets of nonproliferation policies span the usual repertoire.²³ In addition, carrots and sticks unrelated to proliferation are sought to pressure a given country into undertaking specific nonproliferation actions.²⁴ Recently, Clinton administration officials have made encouraging statements that they

"intend to weave it [nonproliferation] more deeply into the fabric of all of our relationships with the world's nations and institutions," and will seek a "new consensus...to promote effective non-proliferation efforts and integrate our non-proliferation and economic goals."²⁵ The administration is also seeking to "expand and strengthen the world's communities of market-based democracies" and to "remove outdated controls that unfairly burden legitimate commerce and unduly restrain growth and opportunity all over the world." However, other than relaxing specific export control regulations, such sentiments have not been developed into a recognizable policy. As Spurgeon Keeny notes, the few new initiatives "are too vague."²⁶

In practice, U.S. policy does already include numerous elements that go beyond the traditional categories. An agreement to purchase highly enriched uranium (HEU) from dismantled Soviet weapons for blending into U.S. civilian reactor fuel has been reached and may soon be implemented.²⁷ U.S. nuclear diplomacy with Ukraine has not been limited to traditional nonproliferation policies, centering on issues of national sovereignty and identity, economic aid, and fuel supplies.²⁸ Also, in order to implement a cut-off of the production of weapons-usable fissile material, the Russian Ministry of Atomic Energy would have to shut down all plutonium production reactors, some of whose heat and steam are used for residential and industrial applications. Nonproliferation specialists in the U.S. Department of Energy now find themselves worrying about developing "combined heat and power stations based on aeroderivative gas turbines fueled by natural gas" to replace existing heat streams in Tomsk and to meet their nonproliferation objectives.²⁹

Similarly, dealing with the Indian missile program may require directing U.S. policies away from traditional security concerns. Technology development is a strong Indian motivation, so the United States could try to provide missing pieces needed to apply missile technology to civilian applications. The Indian missile program recently constructed a separate research facility to develop carbon-carbon composite materials in cooperation with Indian industry. Targeted assistance could conceivably incorporate those new materials into important Indian industries, such as transportation or consumer goods, so that the technology's promoters would not have to rely on the missile programs in order to expand. Such assistance might dislodge that research establishment from the missile program's orbit.³⁰

Does this mean we are doomed to devoting massive intelligence and research bureaus to devising custom proliferation policy packages for each country? Given enough resources, it would probably help. But more importantly, the nonproliferation community needs to integrate policy into the existing framework of broad economic and international relations, just as proliferation itself exists within such broader frameworks. For example, dual-use export controls are part of overall trade and technology issues, which are closer to the hearts of leaders in developing countries than nonproliferation issues. It is not that free trade, technology transfer, and economic development cannot be in conflict with nonproliferation goals. But if export controls and the nonproliferation regime as a whole are to be viable over the long term, then they must be dealt with as part of these larger issues. From NPT talks to the General Agreement on Tariffs and Trade (GATT), from most-favored nation (MFN) status for China to ensuring economic stability in Russia, the future of proliferation fundamentally depends on whether the international economic order moves toward interdependence or conflict and autarky. Efforts such as the NSG, while helpful, are holding actions that operate at the margins in comparison to the broader course of the politics of international economics.³¹

On a smaller scale, the South Korean case illustrates the effectiveness of a nonproliferation policy that is integrated into broader political issues. Besides wanting U.S. troops and nuclear weapons to remain on their soil, the South Koreans placed a high value on continued technology transfer and close, cooperative trade relations with the United States, to such an extent that they were unwilling to put those relations at risk by continuing their nuclear program in the 1970s.³² Today, U.S. officials are probably more worried about the Koreans dumping D-RAM chips than they are about the South Korea weapons programs, despite the extreme security-related provocations from the North. I suspect that this successful melding of economics, trade, politics, and proliferation is a replicable outcome.³³

The economic politics of proliferation may be an important, generalizable phenomenon. Using theories from international political economy (IPE), Etel Solingen argues persuasively that key domestic constituencies become engaged in the nuclear debate when a society moves toward economic liberalization. With state-driven economic development, state-run firms and politicians who profit from state enterprises may dominate the do-

mestic political landscape, while finding no compelling reasons to involve themselves in debates over weapons programs. With moves toward economic liberalization (which do not automatically imply political liberalization), a new coalition takes on greater domestic importance, including export-oriented firms, large banks, and industrial complexes, as well as internationally socialized professional groups.³⁴ These groups' extensive reliance on the global economy and on international exchange makes them vehemently opposed both to autarkic models of economic development and to proliferation policies that would sunder them from the international community. A restrained proliferation posture has the potential to secure for these constituencies economic, financial, and political benefits such as debt-relief, export markets, technology transfer, aid, and investment. In other words, cooperative regimes in the economic and security realms are mutually reinforcing, in both the international and the domestic realms.³⁵

The course of the proliferation of nuclear weapons in particular also merges with the fate of the global nuclear network. In the past, nuclear power stations, superpower arsenals, and vast research establishments in the advanced industrialized countries testified to the possibility and importance of nuclear technology. When Indian scientists argue in the domestic political debate that electrical utilities should use nuclear power stations, that Indian universities should have departments of nuclear engineering and physics, or that nuclear weapons will deter Pakistani and Chinese attacks, they rely on the global nuclear network as the anchor for their still unstable systems. Conversely, if the U.S. nuclear power industry collapses, if leading universities brand nuclear research as passé, and if Soviet successor states give up their weapons, then would-be nuclear system-builders may feel themselves pulled down along with the rest of the global network.³⁶

Is it possible to deal effectively with proliferation policy if it is intertwined in so many issues? One potential model is the Madrid process for the Middle East peace talks. These talks obviously would be doomed if they were only nonproliferation talks, consisting entirely of discussions about demilitarized zones, nuclear weapons, and perhaps new borders. Instead, a whole gamut of dauntingly intertwined issues has been incorporated into the multilateral component of these talks, from borders to CSBMs, from water rights to trade, from passports and refugees to regional security, and ultimately perhaps to nuclear weapons, chemical weapons,

and ballistic missiles.³⁷ If Middle Eastern representatives find it conceptually and politically feasible to address a full spectrum of issues in face-to-face negotiations, then U.S. and other policymakers could also strive to consider the whole range of proliferation issues in a more unified, integrated fashion.

POLICY FORMATION: INTEGRATING NONPROLIFERATION WITH DOMESTIC POLITICS IN THE UNITED STATES

Of course a unified, integrated nonproliferation policy is not a realistic possibility. Domestic politics, and that peculiar blend of the international and the domestic known as alliance politics, preclude any textbook approaches to an issue as complex and diverse as nonproliferation. Numerous analysts recognize this constraint, but we do not generally go beyond deploring it.³⁸ In some cases, the quest for jobs and export markets conflicts with a desire to limit dual-use exports, both domestically and alliance-wide. At other times, a military searching desperately for missions may latch on to an inflated proliferation threat, distorting policy priorities. Other foreign policy objectives may usurp center stage, such as human rights or lowering trade barriers.

Yet, the impediments of domestic politics sometimes result from the segregated, apolitical perspective on proliferation that I have been criticizing in this essay. Instead of decrying how domestic politics are "threatening to paralyze effective policy-making," we could instead recognize both the necessity and the opportunities for integrating nonproliferation strategies back into the rest of foreign and domestic politics.

Better integration with domestic politics essentially means not having to fight against them so hard. For example, if the United States cares about high-tech and manufacturing jobs, then it should aim its nonproliferation policy at expanding those export markets. It should encourage technology transfer and development abroad (with exceptions for pariahs) in order to: reward reluctant regimes and domestic constituencies within those regimes; demonstrate the value of full membership in the international community; and wean potentially civilian technologies away from their dependence on allies like nuclear or military programs.³⁹

Similarly, if the military seizes the counterproliferation mission as justification for conventional forces and technological development, then let them run with it (though perhaps without much funding). A counterproliferation

program implies (accurately or not) that the United States cannot be deterred by a few nuclear or chemical weapons or ballistic missiles in the hands of a proliferant.⁴⁰ If actual military programs broadcast the message that proliferation cannot deter the U.S. "conventional deterrent" (what used to be known as the threat of intervention), they may thereby reduce the desirability of nuclear weapons and lower the incentives for their acquisition.⁴¹

Finally, integrating nonproliferation policy with domestic politics means admitting that nuclear weapons, and certainly other weapons of mass destruction, are sometimes not the highest priority on the international and security agendas.⁴² In the process of admitting that heresy, we also move away from security as the best or only lens for seeing proliferation issues. We might then find opportunities to demonstrate that nuclear weapons are not the magic elixir of international power and that cooperation and participation as a full member of the international community are a potential proliferator's best long-term security bet.

THEORIES OF PROLIFERATION: BEYOND SECURITY, BEYOND REALISM

A lack of richer theories of proliferation is one primary reason why our search for the causes of proliferation has been narrow, why the menu of policy options has been unnecessarily sparse, and why policy formation remains, in principle at least, isolated from domestic politics. The need for new and broader conceptions of security, of proliferation, and of international relations is beginning to be addressed. Many authors, such as Tad Homer-Dixon, Jessica Tuchman Mathews, and Joe Romm, alert us to security threats beyond military force, including environmental disasters, the demand for energy sources, drug trafficking, and the increasing competition over natural resources.⁴³

Yet, amidst the broader revolution in international relations theory, proliferation and security studies remain an oasis of realism, though the surrounding theoretical landscape is not a desert, but quite verdant.⁴⁴ If, as I have argued in this brief essay, the process of proliferation is not special, then we can learn from an array of other theories of international and domestic politics. As discussed above, the nonproliferation community can learn what international political economy theories tells us about the evolution of economic and trade relations, about global alignments and North-South politics, and about how nonproliferation and other re-

gimes form.⁴⁵ Sociological theories inform us about how ideas, norms, and organizations (such as the NPT or the "unconventional" nature of chemical weapons) become institutionalized, offering lessons about how domestic politics and the international environment interact.⁴⁶

Similarly, our understanding of proliferation could extend to the interaction of domestic and international politics during negotiations or the role of internationalized professional communities in affecting policy outcomes.⁴⁷ Even more synthetic and integrative approaches have already been applied to nuclear proliferation in particular, such as those focusing on myth-making and on the social construction of technology.⁴⁸

These theories, as with the earlier policy discussions, alert us to how much the process of proliferation intersects with other features of our political life, and how heterogeneous that process can be. An obvious implication is that we, as proliferation analysts, need to be not only theoretically limber, but as heterogeneous as our subject. In order to unravel the strands of the seamless web of large technological systems, such as nuclear or missile development programs, an analyst may need to pull together detailed knowledge of fertilizer plants and uranium enrichment processes, of development theory and nation-building, and of economics and ethnic conflict. How can the social fabric of the Russian Federation be held together, and how much can that fabric fray before Russia's nuclear weapons custodianship is threatened? Would smothering North Korea in trade incentives and aid wean it off its nuclear appetite? And do we know how to answer the sorts of questions that the post-Cold War world puts to us?

The current nonproliferation quintet drones on repetitiously. Other themes never appear in the score, while the central motif--security--is not well developed. Meanwhile, in international relations theory as a whole and in the real world of nuclear weapons, chemical weapons, and ballistic missiles, an entire symphony resounds.

Those of us studying or trying to affect the course of nuclear proliferation need to take ourselves out of the social vacuum of security assurances and treaty obligations, out of the theoretical oasis of balancing behavior and self-help systems. We need instead to connect with the mundane reality of nuclear weapons: trade policy and economic growth; personal ambitions and manufacturing plants; ethnic politics and the politics of getting published in scientific journals. The result may sound more like a cacophony than a harmonious whole.

But if we are not sequestered within narrow analytic limits, we improve our chances of dealing effectively with the challenges of nonproliferation policy.

¹ Some specific examples are mentioned below, although this essay focuses on constructive proposals rather than on dissecting specific analyses or policies. While I believe that the assumptions and limitations ascribed here to the nonproliferation community are discouragingly common, they do not apply to all analysts, nor do they apply to any analyst all of the time.

² Spencer Weart, Nuclear Fear: A History of Images (Cambridge: Harvard University Press, 1988); Sheldon Ungar, The Rise and Fall of Nuclearism: Fear and Faith as Determinants of the Arms Race (University Park: Pennsylvania State University Press, 1992).

³ Desmond Ball, Politics and Force Levels: The Strategic Missile Program of the Kennedy Administration (Berkeley: University of California Press, 1980); Daniel Kevles, "Cold War and Hot Physics: Science, Security, and the American State, 1945-1956," Historical Studies in the Physical and Biological Sciences 20 (1990).

⁴ Biological weapons are something of a wildcard. They have a relatively low profile, lacking many of the layers of meaning and significance that have accumulated around nuclear weapons, ballistic missiles, and chemical weapons. Yet, they may turn out to be the most destructive and least controllable weapon of all. This analysis does not deal with biological weapons explicitly.

⁵ Daniel Yergin, Shattered Peace: The Origins of the Cold War and the National Security State (Boston: Houghton Mifflin, 1977).

⁶ Chemical weapons require fewer resources and thus fewer allies, but still share in some of the same dynamics. Kathleen Bailey, Doomsday Weapons in the Hands of Many: The Arms Control Challenge of the '90s (Urbana: University of Illinois Press, 1991), pp. 50-81.

⁷ In rare cases, tightly organized authoritarian societies may lessen the requirement for as broad a coalition as would be needed in more fractured or more pluralistic societies. But even in North Korea, Peter Hayes, for example, argues that the nuclear weapons program is not a straightforward top-down process resulting from the orders of an absolute dictator, but is rather the outcome of intense bureaucratic maneuvering over trade, foreign policy, and succession. Peter Hayes, "North Korea's Challenge to the Nuclear Non-Proliferation Treaty," unpublished paper, 1993, pp. 7-11. Similarly, while the existence of a Soviet atomic bomb program in the later 1940s can be attributed largely to Stalin's unquestioningly obeyed orders, the subsequent development of the weapons program repeatedly demonstrates that there is no one best way to reach a given technological goal. Matthew Evangelista, Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies (Ithaca, N.Y.: Cornell University Press, 1988). The evolution of a large technological system is not "a naturally unfolding process of technological development; at all points it should be seen rather as the product of contingency. The result is that it twists and turns as social and technical circumstances change." Wiebe Bijker and John Law, "Do Technologies Have Trajectories? Introduction," in Bijker and Law, eds., Shaping Technology/Building Society: Studies in Sociotechnical Change (Cambridge: MIT Press, 1992), 17-19, 17.

⁸ The classic exposition of this perspective is Thomas P. Hughes, Networks of Power: Electrification in Western Society, 1880-1930 (Baltimore: Johns Hopkins University Press, 1983), or more succinctly, Thomas P. Hughes, "The Evolution of Large Technological Systems," in Wiebe Bijker, Thomas P. Hughes, and Trevor Pinch, eds., The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology (Cambridge: MIT Press, 1987), pp. 51-82.

⁹ Pericles Gasparini Alves, Access to Outer Space Technologies: Implications for International Security, Research Paper no. 15, United Nations Institute for Disarmament Research (UNIDIR) (New York: United Nations,

1992).

¹⁰ Yahya Sadowski argues that "Oil revenue is the real foundation of the arms race in the Middle East" in Scuds or Butter? The Political Economy of Arms Control in the Middle East (Washington, D.C.: Brookings Institution, 1993), p. ix.

¹¹ Itty Abraham, "Security, Technology and Ideology: Strategic Enclaves in Brazil and India," Ph.D. diss., University of Illinois at Urbana-Champaign, 1993; Abraham, "Science and Power in the Postcolonial State," presented at the Organization Theory and National Security Workshop, Stanford University, April 14, 1994; Steven Flank, "Reconstructing Rockets: The Politics of Developing Military Technologies in Brazil, India, and Israel," Ph.D. diss., MIT, 1993; and Flank, "Status, Prestige, Legitimacy and Indian Nuclear Weapons Development: International Sources of Domestic Politics," presented at the International Studies Association annual meeting, Washington, D.C., March 29 - April 1, 1994, esp. pp. 9-15.

¹² Lawrence Shelton Garth, "Nuclear Weapons, Deterrence and Non-Proliferation: The Case of South Africa," Ph.D. diss., University of Witwatersrand, 1991; Steven Flank, "Exploding the Black Box: The Historical Sociology of Nuclear Proliferation," Security Studies 3 (Winter 1993/94), pp. 259-94.

¹³ Murat Laumulin, "Nuclear Politics and the Future Security of Kazakhstan," Catherine Boyle, trans., The Nonproliferation Review 1 (Winter 1994), pp. 61-65.

¹⁴ Flank, op. cit. (1993/94), p. 271.

¹⁵ George Quester puts forward this tentative hypothesis in "Brazil and Latin-American Nuclear Proliferation: An Optimistic View," ACIS Working Paper, no. 17 (University of California, Los Angeles: Center for International and Strategic Affairs, December 1979).

¹⁶ Wilhelm Agrell, "The Bomb That Never Was: The Rise and Fall of the Swedish Nuclear Weapons Programme," in Nils Petter Gleditsch and Olva Njolstad, eds., Arms Race: Technological and Political Dynamics (Newbury Park, Calif.: Sage Publications, 1990), pp. 154-74, esp. pp. 162-65.

¹⁷ Trevor Findlay and Andrew Mack, "Multiple Responses to an Evolving Problem," in Trevor Findlay, ed., Chemical Weapons & Missile Proliferation: With Implications for the Asia/Pacific Region (Boulder, Colo.: Lynne Rienner, 1991), pp. 135-38, pp. 135-36.

¹⁸ See the papers from the panel, "Status, Prestige, Legitimacy, and Nuclear Weapons: Weaving Some Real Clothes for the Emperor," Steven Flank, chair, International Studies Association Annual Meeting, Washington, D.C., March 29 - April 1, 1994.

¹⁹ On the Pakistani case, see Peter Lavoy, "Symbolic Weaponry: The Role of Prestige and Political Imagery in Pakistan's Nuclear Bomb Program," paper presented at the International Studies Association Annual Meeting, Washington, D.C., March 29 - April 1, 1994.

²⁰ For a review of such studies see Walter Powell and Paul DiMaggio, eds., The New Institutionalism in Organizational Analysis (Chicago: Chicago University Press, 1991); or, for a more recent review and a study of science boards in particular, Martha Finnemore, "International Organizations as Teachers of Norms: The United Nations Educational, Scientific, and Cultural Organization and Science Policy," International Organization 47 (Autumn 1993), pp. 565-97.

²¹ These dynamics, for military industries as a whole, are covered in James Everett Katz, ed., Arms Production in Developing Countries: An Analysis of Decision Making (Lexington, Mass.: Lexington Books, 1984); and James Everett Katz, ed., The Implications of Third World Military Industrialization: Sowing the Serpent's Teeth (Lexington, Mass.: Lexington Books, 1986). The role of second-tier supplier was an important one for Brazil in the past, as it is for China and North Korea now. On exports from Brazil, see Scott Tollefson, "Brazilian Arms Transfers, Ballistic Missiles, and Foreign Policy: The Search for Autonomy," Ph.D. diss., Johns Hopkins University, 1991; for China, see John Lewis, Hua Di, and Xue Litai, "Beijing's Defense Establishment: Solving the Arms-Export Enigma," International Security 15 (Spring 1991), pp. 87-109; on export markets for space, see Brian Chow, Emerging National Space Launch Programs: Economics and Safeguards (Santa Monica, Calif: RAND National Defense Research Institute, 1993), RAND Report #R-4179-USDP.

²² Emanuel Adler, The Power of Ideology: The Quest for Technological

Autonomy in Argentina and Brazil (Berkeley: University of California Press, 1987); Flank, op. cit. (1993/94), esp. pp. 277-78. How nuclear or missile technologies achieve technological autonomy is no longer self-evident. They no longer seem compulsory components of a technologically advanced society. Many development programs now include state and non-state actors, with greater weight given to the private sector in furthering development and growth. As a result, nuclear and missile system-builders have more difficulty recruiting government agencies or downstream or upstream industries into their alliances.

²³ For current examples, see the National Security Council's definition of nonproliferation, in "Agreed Definitions," Memorandum from Daniel Poneman, Special Assistant to the President, to Robert Gallucci, Assistant Secretary for Political-Military Affairs, and to Ashton Carter, Assistant Secretary of Defense for Nuclear Security and Counterproliferation, The White House, February 18, 1994; White House text of President Clinton's address to the UN General Assembly in New York on September 27, 1993, reprinted as "Clinton Calls for Honest Look at U.N.'s Global Challenges," Congressional Quarterly, October 2, 1993, pp. 2679-82; and the summary of existing nonproliferation policies in Zachary Davis and Warren Donnelly, "Nuclear Nonproliferation Policy Issues in the 103rd Congress," CRS Issue Brief (Washington, D.C.: Congressional Research Service, Library of Congress, February 21, 1994), pp. 2-4. Even critics far outside the government adhere to these narrow policy constraints. Consider the description by the head of a new Physicians for Social Responsibility nonproliferation project, in Daniel Ellsberg, "Manhattan Project II: Caging the Beast Unleashed Half a Century Ago," The Progressive 57 (August 1993), pp. 28-31.

²⁴ Consider the debate over whether China's most favored nation trading status should be held hostage to Chinese human rights, missile export, and nuclear weapons testing policies. Lally Weymouth, "Thinking Out a China Policy," Washington Post, April 12, 1993, p. A19; John Glenn, "China's Dangerous Arms Exports," Washington Post, December 3, 1993, p. A29.

²⁵ Clinton, op. cit., p. 2681; and "Fact Sheet: Non-Proliferation and Export Control Policy," White House, Office of the Press Secretary, Washington, D.C., September 27, 1993, reprinted in U.S. Department of State Dispatch 4 (October 4, 1993), pp. 676-77.

²⁶ Clinton's U.N. address and responses, quoted in John Morrocco, "U.S. Sets Guidelines for Arms Control," Aviation Week and Space Technology 139 (October 4, 1993), pp. 56-57. Similarly, Thomas Graham's statement to the second NPT Preparatory Committee notes that extension of the NPT would be valuable "both in the security sphere and in the area of social and economic development," and then proceeds to discuss only the traditional nonproliferation measures listed above. Statement by Thomas Graham, Acting Deputy Director, U.S. Arms Control and Disarmament Agency, to the Second Meeting of the Preparatory Committee for the 1995 Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, United States Mission to the United Nations, Press Release USUN 5-(94), January 21, 1994, quotation at p. 1.

²⁷ The idea was first proposed by someone outside the realm of traditional nonproliferation policy, as is the idea itself. Thomas Neff, "A Grand Uranium Bargain," The New York Times, October 24, 1991, p. A15.

²⁸ Contrast the joint U.S.-Russian-Ukrainian statement with the joint U.S.-Russian statement following the summit meeting of the three presidents in January 1994. The former deals with "respect for [Ukraine's] independence, sovereignty and territorial integrity," and economic assurances "to refrain from economic coercion designed to subordinate...the rights inherent in [Ukraine's] sovereignty and thus to secure advantages of any kind," while the latter addresses measures that fall entirely within the three traditional policy categories described above. "Statement by the Presidents of the United States, Russia, and Ukraine, January 14, 1994," in Weekly Compilation of Presidential Documents 30 (January 24, 1994), pp. 79-80; and "Joint Statement on Non-Proliferation of Weapons of Mass Destruction and the Means of Their Delivery, January 14, 1994," in Weekly Compilation of Presidential Documents 30 (January 24, 1994), pp. 80-83.

²⁹ "Protocol of Meeting between the United States and the Russian Federation on the Replacement of Russian Plutonium Production Reactors," Washington, D.C., March 16, 1994, p. 2; "US, Russia Agree to Studies, Inspections to Further Nonproliferation Goals," DOE News, Office of the Press

Secretary, U.S. Department of Energy, Washington, D.C., March 16, 1994.

³⁰ For a description of the research program, see Anand Parthasarathy, "A Firm Purpose," *Frontline*, June 10-23, 1989, pp. 9-14. Applications might include high-temperature industrial processes in refining, or perhaps ceramics for high-efficiency internal combustion engines. Such materials are already being used for aircraft brake linings, and may soon find their most profitable application in tennis rackets and golf clubs. Dr. V. S. Arunachalam, interview with author, Cambridge, Mass., March 10, 1993.

³¹ These arguments are not new. Consider what Robert Keohane and Joseph Nye wrote 17 years ago in *Power and Interdependence: World Politics in Transition* (Boston: Little, Brown, 1977).

³² Mitchell Reiss, *Without the Bomb: The Politics of Nuclear Nonproliferation* (New York: Columbia University Press, 1988), pp. 78-108.

³³ Contrast the South Korean outcome with counterproductive attempts by the United States to force India and Brazil into compliance with the MTCR, a technology denial regime for dual use technologies in the space and missile sector. The larger political and economic implications of the trade and technology transfer issues were ignored. The U.S. attempts only reinforced the drive for technology autonomy that fueled both the Indian and the Brazilian space and missile programs in the first place. See Scott Tollefson, "Brazil, the United States, and the Missile Technology Control Regime," ch. 11 in Tollefson, *op. cit.*, pp. 382-518; and Flank, *op. cit.* (1993), pp. 331-35.

³⁴ While these particular constituencies may not be involved in societies without economic liberalization, the processes of debate, alliance-building, and dynamic construction and reconstruction of shared understandings all take place among whatever groups are involved. Thus bankers may not have influenced nuclear decisionmaking in Stalin's time, but scientists, military officers, party politicians, and industrial managers surely did.

³⁵ Etel Solingen, "Economic Liberalization, International Institutions, and the Fate of Regional Nuclear Regimes," presented at the Conference on Social Science Theory and Nonproliferation, Stanford University, February 5-6, 1993, and at the International Studies Association Annual Meeting, Acapulco, Mexico, April 6-9, 1993. For a nonproliferation analysis that uses a concept of security somewhat integrated with IPE, see Janne Nolan, ed., *Global Engagement: Cooperation and Security in the 21st Century* (Washington, D.C.: Brookings Institution, 1994).

³⁶ See Ungar, *op. cit.*; and John Campbell, *Collapse of an Industry: Nuclear Power and the Contradictions of U.S. Policy* (Ithaca, N.Y.: Cornell University Press, 1988).

³⁷ John Cooley, "Middle East Water: Power for Peace," *Middle East Policy* 1 (1992), pp. 1-15; and Johan Kaufmann, "The Middle East Peace Process: A New Case of Conference Diplomacy," *Peace & Change* 18 (July 1993), pp. 290-306.

³⁸ For example, in pointing out the difficulties of combating proliferation threats by establishing strong, unified export controls, Robert Rudney writes that, "Confronting these challenges is a Western world in the process of a security mutation and in the throes of an economic downturn and increasingly acrimonious commercial competition....Increasingly, complex security and defense issues are becoming intermeshed with equally intricate political and economic interests, thereby threatening to paralyze effective policy-making." Rudney, "Introduction," in Kathleen Bailey and Rudney, eds., *Proliferation and Export Controls* (Lanham, Md.: University Press of America, 1993), pp. xv-xx, xvi-xvii.

³⁹ As the Iraqi case demonstrates, there can be serious risks with such policies. On the other hand, the current system makes it difficult to integrate proliferation into normal politics. For example, the authority to regulate exports now comes from an executive order which requires the president to find "that the proliferation of nuclear, biological and chemical weapons, and of the means of delivering such weapons, constitutes an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States, and hereby declare a national emergency to deal with that threat." "Executive Order 12868--Measures to Restrict the Participation by United States Persons in Weapons Proliferation Activities, September 30, 1993," in *Weekly Compilation of Presidential Documents* 29 (October 4, 1993), pp. 1935-36.

⁴⁰ Then-Secretary of Defense Les Aspin disclosed in a December 1993

speech some details of President Clinton's directive ordering regional commanders to develop detailed plans for thwarting proliferation threats. John Lancaster, "Aspin Vows Military Efforts to Counter Arms Proliferation," *Washington Post*, December 8, 1993, p. A7.

⁴¹ We would be battling "the conviction of some states that non-conventional weapons are the sole guarantee of national security, turning national territory into an invulnerable 'sanctuary.'" Peter van Ham, *Managing Non-Proliferation Regimes in the 1990s: Power, Politics, and Policies* (New York: Council on Foreign Relations Press, 1994), p. 51.

⁴² As Rudney complains, "The absence of a clear and present military threat makes Western security policy formulation more susceptible to short-term political advantages and commercial payoffs." Rudney, *op. cit.*, xvii. Or as Keohane and Nye put it, an "absence of hierarchy among issues means, among other things, that military security does not consistently dominate the agenda...[and that] politics does not stop at the waters' edge." Robert Keohane and Joseph Nye, "Complex Interdependence and the Role of Force," in Robert Art and Robert Jervis, eds., *International Politics: Enduring Concepts and Contemporary Issues* (New York: Harper Collins, 1992), p. 176. Other issues certainly took priority over proliferation in the past--consider U.S. policy toward France or Israel. In Pakistan, the United States cared more about intervening in the Afghan war than about nuclear weapons; in South Africa, both trade and, to a lesser extent, anti-apartheid policies took precedence.

⁴³ Thomas Homer-Dixon, Jeffrey Boutwell, and George Rathjens, "Environmental Change and Violent Conflict," *Scientific American* (February 1993), pp. 38-45; Jessica Tuchman Mathews, "Redefining Security," *Foreign Affairs* 68 (Spring 1989), pp. 162-77; and Joseph Romm, *Defining National Security: The Nonmilitary Aspects* (New York: Council on Foreign Relations Press, 1993). Similarly, the secretary-general of the United Nations has spoken of an expanded approach to nonproliferation, recognizing that it is "integral to development and progress" globally, as well as "central to international peace." Secretary-General Boutros Boutros-Ghali's message to the General Conference of the IAEA, September 1993, quoted in "Non-proliferation Integral to Development, IAEA Told," *UN Chronicle* 30 (December 1993), p. 65.

⁴⁴ Recent policy-oriented analyses rely heavily though implicitly on a realist or neorealist framework, such as those already cited in this essay, including Bailey and Rudney, *op. cit.*; Findlay, *op. cit.*; and van Ham, *op. cit.* Academics working in the field are also mostly limited to this narrow perspective. For an attempt to break out of these restrictions, which succeeds only spottily, see Zachary Davis and Benjamin Frankel, eds., *The Proliferation Puzzle: Why Nuclear Weapons Spread (and What Results)*, special issue of *Security Studies* 2 (Spring/Summer 1993).

⁴⁵ Ethan Nadelmann, "Global Prohibition Regimes: The Evolution of Norms in International Society," *International Organization* 44 (Autumn 1990), pp. 479-526, esp. p. 523; Etel Solingen, "The Domestic Sources of Regional Regimes: The Evolution of Nuclear Ambiguity in the Middle East," *International Studies Quarterly* 38 (June 1994, forthcoming); more generally, see Joseph Grieco, ed., *International System and the International Political Economy* (Brookfield, Vt.: Ashgate Publishing, 1993); and Robert Gilpin, *The Political Economy of International Relations* (Princeton: Princeton University Press, 1987).

⁴⁶ This "new institutionalism" is discussed in Powell and DiMaggio, *op. cit.*; and Finnemore, *op. cit.* The theory addresses "the increasingly well-documented feedback effects of social structures such as norms, shared expectations, and even international organizations on actors such as states. Neorealist theory takes preferences as given and understands them to drive international interaction....The fact that states adopt policies not as an outgrowth of their individual characteristics or conditions but in response to socially constructed norms and understandings held by the wider international community demonstrates an embeddedness of states in an international social system that conventional approaches ignore." Finnemore, *op. cit.*, pp. 593-95.

⁴⁷ For an excellent empirical collection of analyses of "two-level games," including four security-related articles, see Peter Evans, Harold Jacobson, and Robert Putnam, eds., *Double-Edged Diplomacy: International Bargaining and Domestic Politics* (Berkeley: University of California Press, 1993).

On the role of knowledge- or profession-based ("epistemic") communities, see Peter Haas, ed., Knowledge, Power and International Policy Coordination, special issue of International Organization 46 (Winter 1992).

⁴⁸ Peter Lavoy, "Nuclear Myths and the Causes of Nuclear Proliferation," in Davis and Frankel, op. cit., pp. 192-212; and Flank, op. cit. (1993/94).