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# Nuclear Proliferation Over the Next Decade: Causes, Warning Signs, and Policy Responses

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# NUCLEAR PROLIFERATION OVER THE NEXT DECADE

## Causes, Warning Signs, and Policy Responses

**Peter R. Lavoy**

*The intensification of the Iranian and North Korean nuclear crises causes concern that deteriorating security conditions in the Middle East and Northeast Asia will lead additional countries to seek nuclear weapons. This special issue, which is based on a conference organized by the Center for Contemporary Conflict at the U.S. Naval Postgraduate School, examines the factors that are likely to shape nuclear proliferation in the next ten years. This introduction analyzes the conditions and events that might drive new countries to pursue nuclear weapons; the indicators and cautionary signs that can provide early warning that a country is trying to build nuclear bombs; and the policy measures that can be adopted to prevent or at least dissuade new proliferators. A novel analytical approach is developed, focusing on the role of nuclear myths and mythmakers to help analysts better understand and policymakers better manage nuclear proliferation over the next decade.*

**KEYWORDS:** Nuclear weapons; Nuclear proliferation; U.S. nonproliferation policy; Intelligence; Dissuasion

Combating the international spread of nuclear weapons has been a top security concern for the United States since 1944, when Washington partnered with London in a secret effort to monopolize the world's uranium and thorium supplies so that none would fall into German or Soviet hands.<sup>1</sup> Ever since then, abundant governmental resources have been levied in the struggle to block or discourage new countries from acquiring nuclear forces and to encourage countries that have initiated bomb development programs to reverse those efforts. But the track record of the United States and other concerned countries in countering nuclear proliferation is mixed. There have been many cases when the U.S. intelligence community managed to identify nuclear aspirants early enough in the bomb acquisition process to enable policymakers to take timely action to impede these efforts, or to persuade these countries to pursue alternate security strategies. But in several other situations there was either a lack of timely intelligence or policymakers were unable (or unwilling) to take effective measures to prevent proliferation.

The chief result of this uneven nonproliferation record is that nuclear capabilities have spread to additional countries, although in a gradual and relatively stable manner. In each of the six decades of the nuclear era, only one or two countries have obtained nuclear weapons capabilities (the United States and the Soviet Union in the 1940s, the United Kingdom and France in the 1950s, China and Israel in the 1960s, India and South

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Africa in the 1970s, Pakistan in the 1980s, and North Korea in the 1990s). However, in today's rapidly evolving international security environment, it is not altogether certain that the global system will be able to integrate another nuclear weapon state as smoothly as in the past. The very same forces that make proliferation so problematic create the conditions for more countries (and possibly non-state actors) to consider nuclear arms acquisition. As a result, the pressures on the intelligence and policy communities to correctly anticipate, obstruct, and dissuade the next nuclear aspirants are extremely high.

This special issue of the *Nonproliferation Review* brings together leading analysts of nuclear proliferation to examine the issues that are likely to shape the nuclear proliferation environment in the next decade. An international conference was organized by the Center for Contemporary Conflict at the Naval Postgraduate School in Monterey, California, in July 2006 to focus critical attention on this subject, and the papers presented at that event, in expanded and revised form, constitute this special issue. All 17 authors, with varying degrees of specificity and emphasis, examine three overarching questions: (1) What conditions and events drive and enable a country to pursue nuclear weapons? (2) What indicators and cautionary signs can be identified to provide early warning that a country is trying to obtain nuclear weapons—and projecting ahead 10 years, what are the conditions and events that analysts should pay particularly close attention to in order to gain a deeper and more timely understanding of new proliferation dynamics and trends? and (3) What policy measures can be adopted to prevent or at least slow the proliferation process—in general and in specific circumstances—over the next decade in order to keep the international nuclear order as stable as it has been in past decades? These three questions are also taken up in the remainder of this introduction.

### **Causes of Nuclear Proliferation**

Two theoretical perspectives compete to explain the causes of nuclear proliferation. The realist (or neo-realist) perspective contends that states pursue nuclear weapons to offset international security threats.<sup>2</sup> At a fundamental level, all nuclear bomb development programs constitute a response to insecurity and a form of balancing against foreign threats—be they political or military in nature. But the theoretical framework of realism is too abstract to allow precise predictions about the conditions under which states will build nuclear bombs instead of pursuing other time-honored defense policies, such as strengthening their conventional military capabilities, acquiring different weapons of mass destruction, or forging alliances with foreign powers. Moreover, it cannot explain the timing of proliferation decisions or key policy shifts because it operates at a systemic level of analysis and thus does not take into account specific political, technical, or psychological factors that affect the day-to-day dynamics of any nuclear weapons program. In order to understand why some countries seek nuclear deterrence instead of more conventional defense strategies, or why some countries race to get the bomb while others take more leisurely or circuitous routes, the problem must be considered from an alternate theoretical perspective.

Smith College Professor Jacques Hymans contends that the idealist paradigm does a better job of explaining nuclear proliferation. Focusing on ideas produced by national,

cultural, or individual attributes, idealist approaches can explain much about the worldviews, motives, and decisionmaking styles of specific state leaders.<sup>3</sup> However, most idealist arguments, such as those that posit strategic culture as a driving force behind nuclear bomb programs, suffer the same limitation as realism.<sup>4</sup> Both approaches highlight boundaries on the freedom of choice of national leaders—realists point to the constraints caused by international competition, and cultural idealists show how the values and beliefs of a population or national organizations bind policy options—but neither perspective has an adequate explanation for when and why policymakers choose to ignore these constraints, as they so often do.<sup>5</sup>

Similarly, idealist approaches focusing on the psychology of national leaders emphasize the constraints of cognition or affect and have trouble with “out-of-character” behavior triggered by domestic or international shocks. This is the classic levels of analysis problem.<sup>6</sup> No theory of nuclear proliferation will be valuable to policymakers seeking to understand and influence the proliferation environment of 2016 unless it can account for both the changes and the continuities of new nuclear weapons programs.

A possible solution lies with an approach I call “nuclear mythmaking.” According to this perspective, a state is likely to make the pursuit of nuclear weapons part of its national security strategy when national elites (nuclear mythmakers), who want their government to adopt this strategy, (1) emphasize their country’s insecurity or its poor international standing; (2) portray this strategy as the best corrective for these problems; (3) articulate the political, economic, and technical feasibility of acquiring nuclear weapons; (4) successfully associate these beliefs and arguments (nuclear myths) with existing cultural norms and political priorities; and finally (5) convince senior decisionmakers to accept and act on these views.

Of course, competing myths also may exist and would be spread in the same fashion. Thus, if enterprising and well-connected strategic elites manage to cultivate a national—or at least a governmental—consensus around the notion that developing nuclear weapons would make the country *less* secure or *less* influential, then the government is not likely to initiate or continue to invest in a weapons development program. At any given time and in any given country, multiple strategic myths may coexist and compete with one another.

The success of one nuclear myth over another generally depends on three factors: (1) the substantive content of the myth and its compatibility with prevailing cultural norms and political priorities, (2) the ability of the mythmaker to legitimize and popularize his or her beliefs among fellow elites and then to persuade national leaders to act on these beliefs, and finally (3) the process whereby institutional actors reorient mission priorities and budgets and integrate the popularized myths into their own organizational identities, rules, and objectives.<sup>7</sup> This emphasis on nuclear mythmaking is not intended to downplay the significance of actual security threats as powerful pressures for countries to seek nuclear weapons. In fact, it is difficult to think of any governmental official calling for the manufacture of nuclear arms without an overriding interest in solving some pressing security problem. Nearly all of the authors of this issue accept the realist credo: The real world does matter. Nuclear myths and the existence of genuine security threats are closely correlated. The chief distinction between the mythmaker approach and realism lies at the

level of analysis. Whereas security-oriented (and even most idealist) accounts focus on the prior events or conditions that are said to trigger a certain strategic response, the mythmaking approach emphasizes the strategic beliefs and political maneuvering that link these same triggering conditions to the subsequent policy debate and decision and then to the actual process of implementing this policy.<sup>8</sup> National leaders are known to accept some policy constraints and yet ignore or overcome others. Studying the role of myths and mythmakers provides important insights into the process by which this selection of priorities occurs. Heads of state as well as nuclear mythmakers (sometimes they are the same people) operate within the confines of the international environment as well as their own nation's political culture (and even their own psychology). But they generally have some degree of freedom to reorient and expand the internal and external boundaries of their behavior. Significant policy changes are risky, however. The more a leader or mythmaker tries to extend the boundaries of traditional behavior, the greater the risk he or she runs domestically and internationally. The unorthodox actions of Pakistani Prime Minister Zulfikar Ali Bhutto during the early to mid-1970s illustrate this point. Although Bhutto had the vision and courage to put Pakistan on the path to nuclear weapons ownership when the country had limited financial resources and only rudimentary industrial and scientific capabilities, his many other innovative and non-traditional policies created enormous domestic turmoil and ultimately led to a military coup and his imprisonment and execution in 1979.<sup>9</sup>

Drawing on the mythmaking model, many of the case study authors in this issue (most more implicitly than explicitly) point to three elements as critical to national nuclear decisions. The first is the composition, scope, and logical consistency of various nuclear myths about nuclear weapons and deterrence—for example, Zulfikar Ali Bhutto's conviction that Pakistan could deter a nuclear-armed India only if it had nuclear weapons, Colonel Gamal Abd al-Nasser's belief that Egypt needed the bomb to match nuclear-capable Israel, and Prime Minister John Vorster's interest in nuclear weapons to counter the hostile "encirclement" of South Africa.

Second is the identity, background, and skills of successive nuclear mythmakers, or carriers of these beliefs, that is, Bhutto, Nasser, and Vorster together with the heads of their national nuclear establishments, A. Q. Khan, Salah Hedayat, and Waldo Stumpf.

The third element is the process of nuclear mythmaking—of legitimizing, popularizing, and institutionalizing strategic arguments about nuclear arms acquisition in a state's national security policy and institutions. Iranian leaders associate nuclear technology with sovereignty, economic security, and respect for Islam among domestic and international audiences; defiantly defend Iran's right to enrich uranium as a member of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT); and cultivate political support for its nuclear policies in capitals as far flung as Caracas and Jakarta.

All of our authors agree (though again many more implicitly than explicitly) that a given country's security policies, including its pursuit of nuclear weapons, have been influenced by the beliefs that a wide range of officials have held about national security threats and responses. Two kinds of beliefs have played especially important roles in the development of nuclear weapons programs. The first set of beliefs includes the myths of nuclear security and nuclear influence. These are beliefs about the desirability of acquiring

nuclear weapons. The other significant set of beliefs concerns the technical, economic, and political feasibility of manufacturing nuclear arsenals as well as the utility of using these weapons for strategic purposes.<sup>10</sup> (Table 1 lists these beliefs and summarizes their main characteristics.)

To cite one example, U.S. Air War College professor Stephen Burgess relates in this issue that in the case of South Africa, the myths of nuclear security and technical feasibility were closely linked: “South African scientists demonstrated the feasibility of nuclear uranium enrichment at the same time the county began to experience increased threats from enemies in the region and throughout the world.”<sup>11</sup> This linkage between desirability and feasibility of weapons production is just as evident in the countries that initiated research and development programs for nuclear bombs only later to reverse course. Libya is the classic example.

As national security analyst Torrey Froscher recounts elsewhere in this issue, Colonel Muammar Qaddafi tried and failed to purchase nuclear weapons outright from China in the 1970s. He later failed in various efforts to buy bomb production materials and technologies from India, Pakistan, the Soviet Union, Argentina, Brazil, and Belgium during the 1970s and 1980s. Then in the 1990s and 2000s, when U.S. intelligence blocked his attempts to acquire a “full-service” nuclear fuel cycle from the A. Q. Khan proliferation network, Qadhafi finally lost interest in nuclear weapons, choosing instead to reintegrate Libya into the world political and economic order.<sup>12</sup>

And in Venezuela today, as Naval Postgraduate School professor Harold Trinkunas observes elsewhere in this issue, although President Hugo Chavez often promotes the myths of nuclear security and nuclear influence, these myths have not spread very far or

**TABLE 1**  
Beliefs about Nuclear Weapons

Belief Type	Subject of Belief
<i>Nuclear Myths</i>	
Nuclear security	Relationship between nuclear weapons acquisition and the political and military dimensions of national security
Nuclear influence	Relationship between nuclear weapons acquisition and the status and political influence of the state in international affairs
<i>Auxiliary Assertions</i>	
Technical feasibility	Capacity to overcome technical difficulties associated with developing nuclear weapons; possibility for industrial spin-offs
Economic feasibility	Capacity to meet financial costs associated with developing nuclear weapons; possibility for lucrative industrial spin-offs
Political feasibility	Capacity to manage political problems associated with developing nuclear weapons; impact on relations with important states
Strategic utility	Capacity to develop operational nuclear weapons and to devise options for their effective use in deterrence policies and military operations

deep because of the skepticism of his political, economic, and military advisers, all of whom doubt the political, economic, and technical feasibility of going nuclear, not to mention the military utility of fielding nuclear weapons so close to the United States.

### Warning Signs of Nuclear Proliferation

Academic theories can be of use to national security practitioners if they impart relevant knowledge about the outside world. They are particularly valuable to the nonproliferation policymaking process when they generate specific indicators or cautionary signs of a country's intent to proceed on a particular pathway of nuclear weapons development. The authors of this special issue have done just that, identifying valuable indicators of proliferation intent in three general categories. The first category follows from the nuclear mythmaking model and contains cautionary signs in the realm of nuclear myths, mythmakers, and the mythmaking process. The second, "realist" category focuses on changes in the objective security circumstances in which states find themselves. And the third category consists of observable indicators of shifts in the technical status of a country's nuclear program.

#### *Indicators of Nuclear Myths and Mythmakers*

Proliferation analysts can identify many kinds of indicators to show the presence, evolution, and popularity of nuclear myths and also of the entrepreneurial activities of the proponents of these myths. Here, three sets of indicators are identified to illustrate the general utility of this approach: public statements, policy debates, and the movements, meetings, and statements of nuclear mythmakers.

*Public Statements.* The first set of indicators is the most obvious: public statements by governmental leaders, official spokespersons, and other political, military, and scientific officials concerning nuclear energy and nuclear weapons. In 1965, when Zulfikar Ali Bhutto was foreign minister in President Ayub Khan's cabinet, he became the first Pakistani official openly to call for nuclear weapons, proclaiming: "If India developed an atomic bomb, we too will develop one even if we have to eat grass or leaves or to remain hungry, because there is no conventional alternative to the atomic bomb."<sup>13</sup> Although Khan rejected Bhutto's demand for nuclear weapons to counter India, choosing instead to beef up Pakistan's conventional defenses and strengthen its security ties to the United States, Bhutto's public statements in the 1960s provided a clear indication of the kind of policies he would pursue in early 1972 upon becoming head of the Pakistani state.

As University of Tampa Professor Maria Rost Rublee observes in this issue, Egyptian President Gamal Abd al-Nasser publicly proclaimed his interest in obtaining nuclear arms at the very time he was instructing the Egyptian Atomic Energy Establishment to initiate preparations for a bomb program. Much more recently, Gamal Mubarak, son of Egyptian President Hosni Mubarak, proposed in an important political speech that Egypt should pursue a nuclear energy program.<sup>14</sup> Although he referred to the use of nuclear technology to produce electricity not nuclear weapons, such a statement could be a signal

that Egyptian policymakers are contemplating the initiation of a nuclear program that might—at some time—provide a weapons option. Or it could be an indication that, like Bhutto, Gamal Mubarak might become a proponent of nuclear weapons if he were to succeed his father as president.

Of course, it is not always clear what precise message certain public statements are intended to convey and to what audiences. Consider the audacious announcement the North Korean foreign ministry released on October 3, 2006 that Pyongyang “will in the future conduct a nuclear test.”<sup>15</sup> At the time, it was not known if this was an advisory that North Korea would soon test a nuclear device or a sign that the Pyongyang regime was prepared to resume negotiations with the United States and its four Asian negotiating partners in an effort to remove U.S.-initiated sanctions over counterfeiting and money laundering, or some completely different kind of alert. Although North Korea was and is believed already to possess a few nuclear weapons, a warning sign like this could have indicated some significant shift in its nuclear policy or posture. As it turns out, North Korea was the first country to provide its own early warning message that it would soon conduct its first nuclear explosive detonation, which it did six days after issuing the warning statement. Despite the advance warning, concerned policymakers in Asia and the United States were powerless to prevent the North Korean nuclear test.

*Policy Debates.* Another set of indicators of changes in proliferation intent or capability can be drawn from governmental policy debates, especially about the political, economic, and technical feasibility of developing nuclear weapons, and the military utility of fielding these forces. India’s liveliest nuclear debate was sparked by China’s first nuclear explosive test in October 1964. Even before that event, the Indian nuclear program chief, Homi Bhabha, had established the technical and economic feasibility of building nuclear bombs in India and then lobbied to convince key political elites to approve the development of a limited nuclear deterrent capability. Prime Minister Lal Bahadur Shastri, the humble and reticent politician who had assumed power after Jawaharlal Nehru’s death, initially rejected the bomb option, preferring a diplomatic solution to deal with China. But Bhabha was so effective in swaying the internal feasibility arguments and creating a wellspring of political support for the bomb program, that by early 1965 Shastri had no alternative but to allow Bhabha to design and develop nuclear devices. Although this effort slowed when Shastri and Bhabha each died less than a year later, this episode illustrates how domestic policy debates, some of which take place in the media and other public fora, can offer valuable insights into the forces for and against nuclear arms acquisition. Even when these debates take place in the secret chambers of government, the intelligence agencies of the United States and some of its nonproliferation allies often have the means to follow them.

Three of Bhabha’s claims proved especially consequential in India’s 1964 bomb debate. Two weeks *before* China’s test, Bhabha reiterated an assertion he had made in several public and private gatherings since 1959: India had the technical means to build and explode a nuclear device within 18 months of a policy directive to do so.<sup>16</sup> Then, a week after the Chinese explosion, Bhabha targeted the government’s economic rationale against building bombs. Citing data obtained from an international atomic energy conference,



Bhabha claimed that production of a 10-kiloton nuclear device would cost only \$368,000 and a 2-megaton bomb would cost \$630,000—an order of magnitude cheaper than the (more realistic) figures calculated by Shastri's other aides and by U.S. experts.<sup>17</sup>

It is of little significance that these claims were not accurate: Bhabha's well-timed statements persuaded key Indian politicians and bureaucrats of the feasibility of making nuclear weapons. The nuclear chief also was one of the first Indian officials to embrace nuclear deterrence and disparage India's traditional support for disarmament, things he dared not do under Nehru's watchful eye. Although U.S. officials tracked these mythmaking activities closely, they failed to realize just how influential Bhabha's entrepreneurial activities were. And after Bhabha's death, they failed to grasp how his nuclear myths had survived—and in fact proliferated throughout the Indian bureaucracy—which largely explains why India tested nuclear weapons in 1998 and why the U.S. government was so surprised by that event.<sup>18</sup>

*Mythmaker Movements.* Apart from the content and context of the nuclear myths that are debated within policymaking circles of potential nuclear proliferators, another indicator of possible proliferation activity is the coming and going of potential nuclear mythmakers, particularly the scientists, engineers, and bureaucrats that run nuclear energy programs. In some cases, such as during the Brazilian nuclear weapons campaign in the 1980s, key scientists involved in civilian nuclear energy applications may be recruited to work on a parallel weapons development program. If the movement of these individuals is monitored, their absence from civilian work might indicate that more nefarious activities could be taking place. Also, when nuclear program managers and scientists travel overseas, warning bells should go off. Even though most countries engaged in nuclear research and development have peaceful international partnerships, sometimes the foreign travels of key program officials can indicate that sensitive nuclear technologies are being bought, sold, or bartered. As Torrey Froscher explains later in this issue, U.S. and UK intelligence and policy officials finally managed to unravel the A. Q. Khan proliferation network because of their vigilant monitoring of the movements of Khan and his international associates.<sup>19</sup>

Finally, another sign that could indicate a significant change in a country's nuclear status is the promotion of a key nuclear mythmaker to a position of greater influence within the government. For example, Raja Ramanna, who was director of the Bhabha Atomic Research Center for over a decade, including during the time when India carried out its first nuclear explosive test in 1974, and later science adviser to the defense minister, was appointed defense minister in 1990 in the V. P. Singh government. This promotion could have been taken as a sign that India was ramping up its weapons production work, which in fact it was. Obviously, it is much harder to monitor the comings and goings of key scientists and other nuclear mythmakers in closed and highly secretive societies, such as in North Korea today. But an effort to understand the inner workings of even a difficult intelligence collection target such as North Korea ought to be made.<sup>20</sup>

### *Indicators of Changed Security Circumstances*

At some basic level, all nuclear aspirant states seek the bomb to offset a real security predicament. However, because not all threatened countries covet nuclear forces, the emergence of a security threat, even a very intense threat, is not a surefire indicator that proliferation is likely to follow. The rise of an acute security threat is a necessary—though not a sufficient—condition for a country to start a nuclear weapons program. It might be hard to detect, too. As the mythmaker framework highlights, not every civilian or military member of a threatened country's leadership will agree on the character or intensity of the threat, or on the need to acquire nuclear forces to counter it.

Consider again the case of Pakistan in 1965. As noted above, Foreign Minister Zulfiqar Ali Bhutto believed that the threat of Indian aggression, as enabled by India's military buying spree following its 1962 border war with China, coupled with India's acceleration of its nuclear research and development program following China's 1964 nuclear test, meant that Pakistan too should initiate a nuclear bomb effort out of its then peacefully oriented nuclear energy research program.<sup>21</sup> President Ayub Khan agreed on the seriousness of the Indian military menace but downplayed the prospect of an Indian nuclear arsenal and quickly decided that shoring up the military alliance with the United States and modernizing Pakistan's conventional forces would more reliably ameliorate the country's security problems.

Even though Pakistan did not try to go nuclear in 1965, India's conventional military buildup and apparent interest in nuclear weapons created the conditions for a serious security debate in Pakistan, a debate in which competing myths and mythmakers battled over the desirability, feasibility, and utility of nuclear arms acquisition. After Pakistan came out on the losing side of the 1971 Bangladesh war, another, even more pained defense debate ensued, and this time Bhutto—Pakistan's most ardent nuclear mythmaker—steered his country's scientists and bureaucrats in the direction of nuclear arms production and then redoubled this effort after India's first nuclear test in May 1974—developments that the U.S. government immediately grasped but was powerless to prevent.<sup>22</sup>

From an "indications and warnings" perspective, therefore, a major shift in a country's security situation—particularly the initiation or acceleration of a nuclear bomb program by a neighbor—should highlight the need to scrutinize the interplay of that country's strategic myths and mythmakers in order to provide policymakers with early warning about the creation or acceleration of a new national nuclear weapons program. But it is vitally important to examine threat perceptions and debates on defense policy options from the perspective of the country in question—not from an American, or British, or French point of view. This is easier said than done.

Retired Pakistani army officer Feroz Hassan Khan contends in this journal that U.S. nonproliferation policymakers failed to dissuade Pakistan from building nuclear bombs because they never understood the intensity of Pakistani feelings of insecurity vis-à-vis India, especially after the 1971 Bangladesh war. For Islamabad, the establishment of a robust nuclear deterrent has for decades been the *conditio sine qua non* of its national survival. If Washington officials had come to grips with this fact, they would have known that the wide array of nonproliferation measures enacted to dissuade Pakistan—from the

“carrots” of conventional military assistance and diplomatic pressures on India to the “sticks” of technology export controls and tough economic sanctions—could never have worked. Pakistan was never like Libya, or even South Korea or Taiwan. The lesson to be drawn from this experience is that nonproliferation analysts have to go to great lengths to comprehend national feelings of vulnerability and the myths of nuclear security and influence from the perspective of different strategic elites in the threatened countries—even if they are friends of the United States who Washington believes ought not to be so worried about their arguably exaggerated security concerns.

An even more challenging task is to understand threat perceptions from the subjective perspective of adversary states. Empirically, it can be difficult to get reliable information on how adversary leaders really see the world. But that is not the only problem. Psychologically, it can be demanding to see how cruel the world looks from the point of view of security officials in Tehran or Pyongyang, for example. Policymakers also tend to downplay, or altogether dismiss, feelings of insecurity that their own actions might cause among adversaries. Politically even, it can be risky for Western proliferation analysts to empathize with the worldviews of adversaries, lest they be labeled as “soft” on Iran or North Korea. This is one reason the U.S. government was so mistaken about Iraq’s weapons of mass destruction (WMD) prior to the March 2003 war. Nobody could believe that Saddam Hussein would unilaterally destroy his WMD stockpiles and abandon his WMD production programs, both of which he worked so hard to create and conceal. But that is exactly what he did—although he hid these facts from UN inspectors.<sup>23</sup> Western analysts might have grasped Iraq’s counterintuitive strategy if they had tried to look at its defense dilemma from Saddam’s perspective, for they would have better understood his competing security compulsions vis-à-vis his Arab neighbors, Iran, the United States, and even his own armed forces and population.<sup>24</sup>

While it is important for analysts to do what they can to understand the security compulsions of threatened adversaries, they must be careful not to overshoot the mark. Just as most politics is local, so too are most security threats. As U.S. Naval Postgraduate School Professor Abbas Kadhim describes later in this issue, officials in Tehran often try to justify their own strategic actions as reasonable responses to “aggressive” American moves in the region; but even if this were true, it does not necessarily mean that the Iranians would abandon their WMD programs if only the United States were to withdraw from the region or offer credible security assurances that respect their political sovereignty and territorial integrity.

Further on this point, in a recent *Foreign Affairs* article, Stanford University Professor Scott D. Sagan offers some evidence that Iran is seeking nuclear weapons at least in part to counter what it sees as hostile U.S. policies in the region, including the threat to launch preventive military strikes against Iran’s nuclear facilities. But Sagan’s recommendation that Washington should offer Tehran limited security guarantees will not necessarily reduce Iranian interest in nuclear weapons.<sup>25</sup> It could be the case that Iranian elites want a nuclear arsenal just as much—or even more—to counter Israel or its Arab neighbors, or to promote Shia interests throughout the Persian Gulf region. The best way to find out is to track and analyze Iran’s security perceptions and debates along with the content of its nuclear myths and the movements of its mythmakers.

Similarly, the best way to assess the impact that Iranian and North Korean nuclear activities are having on their neighbors is to study the current interplay of public statements, nuclear myths, and mythmakers in those surrounding countries. For example, Kadhim observes that if Iran's nuclear program continues to advance, Saudi Arabia and Egypt are likely to consider more seriously their own nuclear weapons options. French defense analyst Bruno Tertrais indicates in this issue that acceleration of Iran's nuclear effort is one of two factors that could drive Turkey to reconsider its opposition to nuclear weapons (the other factor is a growing sense of alienation from the rest of Europe).

The same dynamic is at work in Asia, where the underground nuclear explosive test that North Korea conducted on October 9, 2006 is certain to have a significant impact on the security calculations of Japan and South Korea. As James Clay Moltz discusses in this issue, the North Korean test could tilt the defense debate in each of these countries in favor of the myth of nuclear security. World analysts and policymakers no doubt have their attention focused on the reactions of Tokyo and Seoul. The statement of Japan's new Prime Minister Shinzo Abe that as a result of Pyongyang's "unpardonable" action, the region was "entering a new, dangerous nuclear age,"<sup>26</sup> is a clear sign that Tokyo is considering all possible policy responses, including the creation of its own nuclear force. This in turn will lead outside analysts to examine changes in the orientation of Japan's nuclear energy program.

### *Indicators of Nuclear Program Dynamics*

The most reliable way to detect whether a country is building nuclear weapons is to observe it in the act. However, there are two problems with this approach. The first is that states such as Iran and North Korea go to great lengths to conceal their weapons-related research and development activities. Western intelligence agencies might not be able to penetrate the elaborate "denial and deception" efforts of these countries to gain a complete picture of the status of their bomb programs. The second problem is that technical "observables" will only be observable well after a country has sorted out the domestic political and international security ramifications and feasibility calculations of going nuclear. Thus, while it is absolutely essential to monitor a country's technical progress on nuclear weapons production, this approach cannot provide concerned policymakers with *early* warning of an impending nuclear program. Because it can be much easier to block or dissuade a nuclear aspirant very early in the arms development process, measures to provide early warning are critical. Fortunately, there are many technical warning signs that can be tracked by governmental as well as non-governmental analysts to gain awareness of the early steps of a nuclear program before it really gets up and running.

*Scientific Training and Education.* Unless a country has a very well-developed nuclear energy program, such as Japan has today, one of the first steps a nuclear weapons aspirant must take is to send its scientists and engineers abroad for training and education in weapons-related fields. Although President Ayub Khan decided against a Pakistani

bomb program in the mid-1960s, Zulfikar Ali Bhutto, first when he was minister of fuel, power, and natural resources and later as foreign minister, took it upon himself to send dozens of Pakistani scientists and engineers to the United States and Europe for scientific training and education, a move that paid off later when he decided to initiate a bomb program. In the case of Iraq, numerous students were sent abroad for scientific education, and many of them did not even know about the Iraqi nuclear weapons program until they finished their degrees and returned to Iraq. Other Iraqi students were aware of the bomb program, and were used by the Iraq Atomic Energy Commission to collect technical studies or locate equipment needed by the clandestine effort.<sup>27</sup> Knowledge of the subjects students are sent abroad to study, and awareness of any suspicious activities in which they might be engaged, can provide important clues to the intentions of potential nuclear weapons aspirants.

*Procurement Efforts.* To initiate a nuclear weapons production program, a country must devise a procurement strategy and infrastructure to import sensitive materials and technologies most of which fall under the export control laws of supplier countries. Several indicators of proliferation intent may be revealed by these activities. The first set of indicators has to do with the nature of the technology and materials a country is trying to acquire. For example, Rublee writes in this issue that in the early 1960s, when Egypt suddenly mounted a frantic campaign to acquire a large heavy water reactor ostensibly for nuclear power (after turning down generous offers of smaller or more proliferation-resistant reactors), this was a clear sign that Egypt had become interested in an indigenous source of weapons-grade plutonium. Mark Fitzpatrick, a senior fellow at the International Institute for Strategic Studies, also writes in this issue that Western governments initially became concerned about Iran's nuclear intentions when it too attempted to purchase heavy water-moderated power reactors and research reactors, both of which are well suited for producing plutonium.

The target of a country's acquisition efforts also can be an indicator of a new orientation in that country's nuclear policy. Again according to Rublee, throughout the 1960s the Egyptians approached the Soviet Union and China, both established nuclear weapon states, for technical assistance, and also allegedly for the transfer or purchase of a nuclear device. To cite a more recent case, Naval Postgraduate School professor Michael S. Malley writes elsewhere in this volume that media reports of secret meetings between the Burmese and North Korean militaries have raised the possibility that Burma may be trying to obtain North Korean technical assistance to start a nuclear bomb program.

Finally, the manner in which a procurement program is organized may reveal important clues about the objectives of a country's nuclear program. During the 1990s, for example, Saddam Hussein created a large network of Iraqi front companies using several illicit revenue streams to procure illicit goods, services, and technologies for Iraq's WMD-related programs. Iraqi intelligence agents operating out of Iraq's embassies facilitated these efforts, as did officials in various Iraqi ministries, including the Ministry of Trade, Ministry of Oil, and the Ministry of Higher Education and Scientific Research. In addition, numerous Iraqi and foreign trade intermediaries disguised illicit items, hid the identity of the end user, and changed the final destination of the commodity to get it to Iraq.<sup>28</sup> This complex pattern of illicit procurement provided many clues to concerned government

observers about the status and scope of Iraq's WMD programs. However, the Iraq case also demonstrates that reliance on any one set of indicators can create a false image of a country's weapons program, for Iraqi procurement efforts apparently continued even after Saddam decided to destroy his WMD stockpile and halt WMD production.<sup>29</sup>

*The Role of Military and Intelligence Organizations in Nuclear Efforts.* Another indicator of nuclear weapons-related activity is the involvement of military or intelligence officials and organizations in ostensibly civilian nuclear research and development programs. In the case of Iraq, Saddam used the Iraq Intelligence Service (also known as Mukhabarat) to undertake the most sensitive procurement missions, and the Ministry of Defense also played a major role in clandestine procurement for Iraq's WMD programs.<sup>30</sup> Iraq is not alone in this regard. Fitzpatrick writes that there are at least 10 indicators of Iranian military involvement in Iran's nuclear program, starting from the front end of the fuel cycle all the way through to various aspects of weaponization. Citing numerous findings of the International Atomic Energy Agency (IAEA), Fitzpatrick points out that the Iranian armed forces have been involved in the nation's uranium mining, milling, and centrifuge enrichment efforts—a situation that would be difficult to imagine if Iran's nuclear program were strictly peaceful. In addition, he notes that the Islamic Revolutionary Guard Corps has been linked to an undeclared Iranian activity known as the Green Salt Project, concerning a key step in the conversion of uranium ore into uranium hexafluoride, a product that then can be enriched into weapons-grade material.

### *What Do Indicators Indicate?*

Understanding the conditions and events that cause nuclear proliferation and monitoring the wide array of indicators that show the proliferation process is occurring or may soon occur are critical for the communication of early warning to policymakers. However, the "outcome" that analysts must try to discern is not the same for all nuclear weapons aspirants. In other words, the "dependent variable" of proliferation can vary considerably. Robert Einhorn, a former U.S. nonproliferation official now with the Center for Strategic and International Studies in Washington DC, writes in this issue that the future path for any nation (or non-state actor) to nuclear arms acquisition will be different than the first nine or ten nuclear-armed states mainly because the international community is now much more aware of and concerned about the threat of proliferation. Because every nation that might seek nuclear forces in the future is currently a non-nuclear weapon NPT member, and therefore subject to strict IAEA safeguards, Einhorn reasons that future nuclear weapon states must either operate a clandestine program without being detected or develop overt fuel-cycle capabilities with the intention of withdrawing from the NPT at some future point—or both.

Apart from this basic pathway choice potential proliferators must make, the goals, means, urgency, and secrecy associated with their nuclear programs also may vary substantially. Rather than trying to obtain declared, tested, and weaponized capabilities in the shortest time possible, Einhorn writes, new nuclear aspirants might pursue more cautious, incremental, and ambiguous policies. The goal of a nuclear program might be to

acquire workable weapons rapidly, or it might be to create a bomb option through a hedging, or “standby,” strategy, whereby the essential technical and personnel requirements are established but a bomb decision is deferred.<sup>31</sup> New proliferators might attempt to obtain fissile material clandestinely through dedicated weapons-related facilities or instead through overt, dual-use nuclear facilities. The leadership might be content with assembling its nuclear capabilities in a slow, measured manner (as Argentina and Egypt seemed to do, and Pakistan did from 1972 to 1974), or it might embark upon a crash weapons-development program (as Pakistan did after India’s 1974 nuclear test).

Finally, the secrecy and compartmentalization associated with a nuclear bomb program can vary, with some countries being able to conceal their program from the outside world for many years through elaborate denial and deception techniques. As defense analyst and former U.S. nonproliferation official Lewis A. Dunn observes in his article in this issue, proliferators innovate just as quickly as do the backers of the nonproliferation regime: future proliferators will seek new ways to beat the system, possibly from moving nuclear bomb programs offshore, to forming proliferation joint ventures.

These variations also apply to countries that had initiated nuclear bomb programs in the past only later to suspend or terminate their weapons-related activities. U.S. National Defense University analysts Rebecca Hersman and Robert Peters explain later in this issue that although Taiwan and South Korea both “rolled back” their weapons development programs, they did so in different ways and to different capabilities. After pursuing nuclear weapons from the late 1960s through the mid 1970s, Taiwan undertook a substantial reduction in its nuclear program over the next decade, eventually going so far as to eliminate its ability to produce fissile material. South Korea’s rollback process also took a long time, but its fissile material production capability was more modest to begin with, and the rollback did little to reduce it. In fact, evidence has emerged that South Korea has conducted uranium enrichment experiments as recently as 2000.<sup>32</sup> The key lesson here is that causal dynamics, warning signs, and even policy responses will vary according to the choices that nuclear proliferators make.

### **Policy Measures to Prevent Further Proliferation**

Obtaining early warning of an impending decision or activity related to the production of nuclear weapons is critical because it allows policymakers to act quickly to block or dissuade the proliferation process before the would-be nuclear weapon state has too much to lose by reversing course. But policymakers have to know which tools to use to achieve the desired effects. Once again, valuable insights are provided by the nuclear mythmaker framework and by the authors of this special issue. Two sets of policy measures appear to be particularly important: policies designed to influence the main myths about nuclear security, nuclear influence, and strategic utility and policies aimed at altering calculations about the political, technical, and economic feasibility of producing nuclear weapons.

*Policies to Influence Nuclear Myths*

According to the mythmaker model, the most important determinant of proliferation is the victory of the myth of nuclear security in the halls of national power. On the surface, this observation may seem obvious, but it can also point policymakers in a useful direction for halting the forward progress of a country toward nuclear arms production. When a nation faces a deteriorating threat environment, and national elites argue that fielding a nuclear deterrent is the best corrective for stabilizing their security situation, then the international community must offer credible alternatives to shore up that country's security—in terms that will succeed in the domestic defense debate. As Dunn observes, U.S. security alliances with other states have been the most effective nonproliferation measures ever taken. But he goes on to remark that the security alliance in Europe, which dissuaded at least Germany, Italy, and Sweden from going nuclear, and the security alliance in Northeast Asia, which dissuaded Japan, South Korea, and Taiwan from building bombs, were essentially “free goods” for nonproliferation.<sup>33</sup> The impetus for these alliances was the fear of the Soviet Union, not the fear of proliferation. Tertrais writes that the same holds true for the European Union today, where non-nuclear weapon status is a requirement for membership (except for Britain and France). Both authors argue that future success in containing the spread of nuclear weapons almost certainly will require a greater willingness on the part of the United States, Europe, and others to invest more directly and heavily in nonproliferation.

Of course, there are many circumstances in which the United States, on its own, will not be able to influence the security calculations of a would-be proliferator. Hersman and Peters explain that U.S. security guarantees were sufficient to convince the Taiwanese and South Koreans that they need not possess their own nuclear forces. But the same cannot be said about Turkey over the next decade. As Tertrais writes, Turkish defense planners may have some doubts about the credibility of Washington's commitment to Turkey's security, but they have far graver concerns about the attitude of the European members of the North Atlantic Treaty Organization (NATO) on this score. Assuring Ankara that its security interests are best met through NATO collective defense mechanisms will require a renewed trans-Atlantic consensus. Similarly, building and strengthening security partnerships in Asia will be essential to mitigating the strain placed on South Korea and Japan by North Korea's mounting nuclear weapons capability.

Outside of its formal security pacts, Washington should reenergize defense dialogues with all of the countries threatened by the Iranian or North Korean nuclear weapons programs. For example, although Saudi Arabia and Egypt are not covered by any formal U.S. security guarantee, the United States could beef up the “Cooperative Defense Initiative” (CDI) it launched in 1998 to enhance the ability of the Gulf Cooperation Council (GCC) states, along with Jordan and Egypt, to prepare their forces to operate effectively in nuclear, biological, and chemical environments, to improve the interoperability of these forces with U.S. troops, and to increase the capability of these countries' domestic agencies to deal with a WMD event on their territory.<sup>34</sup> U.S. officials should also make it a priority to conduct candid dialogues in annual bilateral defense talks with the threatened countries in Southwest and Northeast Asia.



Because the myth of nuclear security can be influenced by less tangible forces as well, concerned countries ought to do what they can to enhance the nonproliferation norm that now prevails in the “security communities” of Latin America and Southeast Asia, to cite two prime examples. As Trinkunas relates later in this issue, states in Latin America are rarely subject to the security dilemmas, existential threats, or arms races more common in other world regions. If Latin American countries continue to value democracy, economic liberalism, and low defense budgets, and generally seek nonconfrontational means to manage their regional disputes, then it will remain difficult for any nuclear mythmaker to mobilize elite or mass interest in this region for developing nuclear deterrent forces. Similarly, Malley writes that no country in Southeast Asia faces an immediate strategic threat comparable to that found in Northeast Asia or the Middle East. Moreover, because all countries in the region (except the newly formed East Timor) belong to the Association of Southeast Asian Nations, the guiding principle of which has been noninterference in each other’s affairs and nonmilitarization of bilateral and regional disputes, there is little thought given to developing nuclear weapons.<sup>35</sup> This trend ought to be supported as a matter of U.S. nonproliferation policy.

By the same token, Washington should consider how it could shape “nuclear influence” calculations in key regions of the world. Although some authors in this special issue indicate that this could be accomplished best if the United States deemphasized nuclear weapons in its defense strategy, such an approach might have unintended harmful effects on the myths of nuclear security, especially within the countries that are threatened by their neighbors’ nuclear weapons and are reassured by strong U.S. security commitments that rely on the possible use of nuclear weapons. Dunn provides a more practical suggestion when he writes that the United States should do its best to anticipate and leverage future proliferation shocks, such as a nuclear weapons accident in India or Pakistan, a confirmed theft of nuclear materials or a weapon, or a successful or aborted use of nuclear weapons by a state or a non-state actor.

Finally, counterproliferation policymakers would do well to consider how best to influence the calculations possible proliferators make about the strategic utility of possessing and deploying nuclear weapons. As Dunn reminds us, effective U.S. defense capabilities to counter new powers armed with WMD can shape the calculus of any given state about the likely political and military benefits it would achieve by owning and using nuclear weapons.<sup>36</sup> However, there is little clarity on exactly how this process works or could work better.

### *Policies to Influence Feasibility Calculations*

As observed above, the mythmaker model challenges the conventional distinction between proliferation motivations and capabilities as the target on nonproliferation efforts. Arguments about the political and strategic benefits of nuclear weapons ownership are tightly connected to calculations about the technical, economic, and political feasibility of acquiring nuclear arms. For that matter, beliefs about the different kinds of feasibility associated with a weapons program are interconnected. Influence one set of nuclear myths and you might just influence the other.

*Political Feasibility.* Anything that can be done to raise the political costs to proliferators for going nuclear should be given high priority. Clearly, the world's reaction to North Korea's nuclear test will influence how other countries assess the costs of building and testing nuclear weapons. This episode will be watched closely in the capitals of all potential proliferators—as will the Iranian case. If Tehran is not forced to pay a heavy political price for violating its commitments to the NPT and the IAEA and defying the will of the United Nations (UN) Council, then how much hope is there that even wealthier and stronger countries, such as Japan and South Korea, or Egypt and Turkey, would cringe at the thought of the political opprobrium that would follow their moves down the path toward nuclear arms acquisition? This issue lies at the center of the nuclear nonproliferation regime, but as Dunn observes, the United States and its international partners have been far more effective at establishing nonproliferation institutions than sustaining them.

Unfortunately, as Einhorn relates, any further erosion of the nonproliferation regime—including additional NPT withdrawals, new discoveries of covert programs, or additional failures of the international community to make treaty violators pay a high price for non-compliance—also affects the popularity of the myth of nuclear security. If more states become less confident that the regime will be able to constrain the nuclear ambitions of their neighbors and adversaries, then their own security dilemma would be exacerbated. As a result, the incentives for them to pursue their own nuclear bomb programs would increase, just as the barriers to these actions would likely decline.

*Technical Feasibility.* Einhorn also writes that despite the international diffusion of scientific knowledge and engineering expertise, the technical barriers that new proliferators would encounter will remain formidable. For less industrially developed countries, such as Burma, Venezuela, or Saudi Arabia, the ability to produce fissile material, not to mention the complex task of weaponization, is not possible for the foreseeable future. Even more industrially and scientifically advanced countries, such as Turkey, Egypt, and Taiwan, would encounter significant technical hurdles that probably would cause lengthy delays in possible weapons development campaigns. Recent policy initiatives, such as stricter domestic and international export controls, the Proliferation Security Initiative, UN Security Council Resolution 1540, and measures to combat illicit nuclear financing have helped to fill key technical gaps in the nonproliferation regime.

Despite these positive developments, it is often argued that the growing international demand for energy coupled with increasingly problematic oil and natural gas supplies will make the world more dependent on nuclear energy, and that the projected expansion of the commercial nuclear energy system will create new opportunities for a new generation of nuclear proliferators to obtain the means to make their own fissile material. Stanford University nuclear analyst Chaim Braun examines this problem in this issue and concludes that the general nuclear energy system of 2016 will not be much different than the system of 2006, and that the nonproliferation regime, especially if it continues to experience incremental improvement, ought to contain the likely proliferation risks stemming from sustained nuclear energy growth. However, Braun goes on to write that in the decade *after* 2016 the rate of new reactor construction might accelerate, and new technologies such as fast breeder reactors and their associated fuel

cycles might also begin coming on line. It is anyone's guess at this point in time how these possible developments would affect the future proliferation environment.

There is one other new development, or wild card, that could create real complications for the United States and its nonproliferation partners: the rise of non-state actors on the supply side as well as the demand side of the nuclear proliferation equation. Elsewhere in this issue, U.S. Naval Postgraduate School Professor James A. Russell analyzes how by 2016 non-state actors are likely to penetrate deeper into the proliferation business, which heretofore has largely been dominated by states (with the notable exception of A. Q. Khan's non-state nuclear proliferation network). There are four dimensions to what Russell calls the non-state proliferation market substructure: (1) diversion of the legitimate trade in dual-use items for nuclear programs run by states and non-state actors; (2) front companies and subsidiaries of quasi-governmental organizations in states such as Iran and Pakistan circumventing export controls on their indigenous nuclear programs; (3) illicit smuggling networks in nuclear and radioactive materials administered by states, transnational criminal organizations, and terrorist organizations; and (4) servicing of demand by these illicit networks from violent non-state actors that seek unconventional and conventional weapons that can be used for tactical, operational, and strategic effects. How the international community will deal with these emerging actors and forces in the marketplace for nuclear weapons remains to be seen.

*Economic Feasibility.* The creation and completion of a nuclear weapons program are still expensive propositions—but just how expensive building bombs would be for a new proliferant state is difficult to predict. Elsewhere, I estimated the construction, logistical, and operational costs of the Indian and Pakistani nuclear deterrent forces just after their May 1998 nuclear tests to be somewhere in the range of several billion dollars each.<sup>37</sup> By way of comparison, one analyst estimated that the United States spent more than \$400 billion to manufacture its arsenal of nuclear weapons from 1940 to 1996.<sup>38</sup> For new proliferators, actual prices may vary. The scale of the weapons program matters, as do the degree to which the bomb effort is embedded in an existing nuclear energy program, the technological choices the country makes, the balance of imports to indigenous production, and the local labor and industrial market costs. If the actual costs are significantly higher than the estimates the mythmakers portray to senior decisionmakers, as was the case with Homi Bhabha in India's big bomb debate in the mid-1960s, then the United States and its nonproliferation partners should be prepared to insert more realistic calculations into national nuclear debates—but only in an honest and credible manner.

Financial and industrial opportunity costs also should be considered when calculating the economic feasibility of producing nuclear weapons. Again take the case of South Asia. India and Pakistan are afflicted with some of the world's worst poverty. Widespread unemployment, outdated infrastructure, rising food prices, and low living standards have plagued each society (although these factors are changing, especially in India). At the time of its 1998 nuclear tests, India's per capita gross domestic product of \$390 ranked in the bottom fifth worldwide; Pakistan's was only slightly better. Each country ranked in the bottom quarter of the world in the UN Development Program

(UNDP) Human Development Index.<sup>39</sup> According to one Indian estimate, a single Agni missile costs as much as the annual operation of 13,000 health care centers. More than 3,000 public housing units could be built for the price of one nuclear warhead. The expenditures required to develop India's "minimum" deterrent could meet 25 percent of the yearly costs of sending every Indian child to school.<sup>40</sup> Nearly every Pakistani child could be educated and fed for the cost of the nuclear and missile arsenal that is being created for their "protection."

To be sure, every government is willing to allow its population to suffer in some measure to attend to its supreme national security interests. For the past 30 years, the "human needs" or "anti-nuclear" mythmakers in India and Pakistan have consistently lost out to those countries' pro-nuclear mythmakers. That trend shows no sign of change. But in countries such as Japan, Turkey, and Egypt, where the nuclear myth debates are presumably in very early stages, it is not clear how the leadership will come down on the economic feasibility question. Anything the United States can do to influence that domestic dialogue could pay rich dividends. And even in cases where it appears that the pro-nuclear mythmakers have won out, such as in Iran and North Korea, nonproliferation policymakers would do well to recall the main lesson of the rollback of nuclear bomb programs in Argentina, Brazil, and South Africa: With the passage of time and changed economic, political, or security circumstances, certain feasibility calculations become less credible while alternate views become more appealing. As a result, the costs of maintaining nuclear weapons programs may come to be seen as excessive, especially relative to the benefits of reengagement with the world economy and polity. Thus as Dunn reminds us, buying time is worth doing so as a means of waiting for "something good to turn up."

### DISCLAIMER

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### NOTES

1. U.S. and UK efforts to deny the Soviet Union access to world uranium supplies increased after the end of World War II because prewar geological studies convinced Allied officials that Moscow had limited access to high-grade uranium. This estimate was mistaken, for the Soviets immediately exploited rich uranium deposits in the Ural Mountains that U.S. analysts did not know existed and also imported large quantities of uranium ore from Czechoslovakia. As a result, the Soviet bomb program advanced much more quickly than U.S. intelligence estimated. See Donald P. Steury, "How the CIA Missed Stalin's Bomb," *Studies in Intelligence* 49 (2005), <[www.cia.gov/csi/studies/vol49no1/html\\_files/stalins\\_bomb\\_3.html](http://www.cia.gov/csi/studies/vol49no1/html_files/stalins_bomb_3.html)>; and Charles A. Ziegler, "Intelligence Assessments of Soviet

- Atomic Capability, 1945–1949: Myths, Monopolies, and *Maskirovka*,” *Intelligence and National Security* 12 (Dec. 1997).
2. The main expectations of realism—or, more accurately, neo-realism—are: (1) the recurrence of balances of power in the world political system; (2) the tendency of states to balance, that is, to strengthen, themselves in the face of foreign threats; and (3) the inclination of states to imitate one another and to become socialized to the international system. Realists say that states usually balance against the most serious military threats to their security; rarely do they *bandwagon*, that is, accommodate or appease those making the threats. States can try to balance “internally” by relying on their own military capabilities or “externally” by relying on the military capabilities of allies. Defense planners generally prefer internal balancing because it leaves less to chance and less to the will of others; however, this strategy requires levels of national determination and resources that are beyond the reach of many countries. See Kenneth N. Waltz, *Theory of International Politics* (New York: Random House, 1979), pp. 128, 168; and John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: W. W. Norton, 2001), pp. 156–157.
  3. For a detailed application of this point using social psychology, see Jacques Hymans, *The Psychology of Nuclear Proliferation: Identify, Emotions, and Foreign Policy* (Cambridge, UK: Cambridge University Press, 2006).
  4. For examples, see Paul Bracken, *Fire in the East: the Rise of Asian Military Power and the Second Nuclear Age* (New York: HarperCollins, 1999); and Paul Bracken, “The Structure of the Second Nuclear Age,” Nov. 5, 2003, MIT Security Studies Program website, <[http://web.mit.edu/ssp/seminars/wed\\_archives\\_03fall/bracken.htm](http://web.mit.edu/ssp/seminars/wed_archives_03fall/bracken.htm)>.
  5. For background on this point, see Peter R. Lavoy, “Pakistan’s Strategic Culture: A Theoretical Excursion,” *Strategic Insights* 4 (Oct. 2005), <[www.ccc.nps.navy.mil/si/2005/Oct/lavoyOct05.asp](http://www.ccc.nps.navy.mil/si/2005/Oct/lavoyOct05.asp)>.
  6. See J. David Singer, “The Level-of-Analysis Problem in International Relations,” *World Politics* 14 (Oct. 1961), pp. 77–92; and William B. Moul, “The Level of Analysis Problem Revisited,” *Canadian Journal of Political Science* 6 (Sept. 1973), pp. 494–513.
  7. For background on this approach, see Peter R. Lavoy, “Nuclear Myths and the Causes of Nuclear Proliferation,” *Security Studies* 2 (Spring/Summer 1993), pp. 192–212; and Peter R. Lavoy, *Learning to Live with the Bomb: India, the United States, and the Myths of Nuclear Security* (New York: Palgrave Macmillan, forthcoming 2007).
  8. By highlighting the security factor in all nuclear proliferation decisions, this approach differs from those that point to insecurity as the cause of some states’ nuclear programs, but not others, which are said to be motivated by domestic politics, the search for prestige, or some other factor. For example, see Scott D. Sagan, “Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb,” *International Security* 21 (Winter 1996/97), pp. 73–85.
  9. For background, see Stanley Wolpert, *Zulfi Bhutto of Pakistan* (Oxford/New York: Oxford University Press, 1993).
  10. The third kind of belief, which relates to the strategic utility of owning nuclear weapons, is often discussed and debated at the outset of a nuclear bomb program, but it is far less important than other nuclear myths in actual decisions to embark on such a program.

Discussion and debates over the strategic utility of nuclear arsenals tend to be much more salient *after* nuclear weapons are produced.

11. Stephen Burgess, "South Africa's Nuclear Weapons Policies," in this issue.
12. See also Wyn Q. Bowen, *Libya and Nuclear Proliferation: Stepping Back from the Brink*, Adelphi Paper 380 (London: Routledge for International Institute for Strategic Studies, 2006).
13. Zulfikar Ali Bhutto, *Awakening the People* (Rawalpindi: Pakistan Publications, 1970), p. 21. For background, see Peter R. Lavoy, "Pakistan's Nuclear Doctrine," in Rafiq Dossani and Henry S. Rowen, eds., *Prospects for Peace in South Asia* (Stanford, CA: Stanford University Press, 2005).
14. Michael Slackman and Mona El-Naggar, "Mubarak's Son Proposes Nuclear Program," *New York Times*, Sept. 20 2006, p. A14.
15. "North Korea Statement on Nuclear Test," *BBC News*, Oct. 3, 2006, <<http://news.bbc.co.uk/2/hi/asia-pacific/5402292.stm>>.
16. *New York Times*, Oct. 5, 1964. In Dec. 1959, Bhabha exaggerated: "We can now manufacture atomic weapons if we mean to." *Hindustan Times* (New Delhi), Dec. 16, 1959. In Feb. 1961, he boasted that India could produce a nuclear weapon in two years. Shortly thereafter, Nehru affirmed Bhabha's claim, as reported in "India Could Have Bomb by 1963," *Manchester Guardian*, Oct. 23, 1961.
17. *Hindu* (Chennai), Oct. 27, 1964; Thomas F. Brady, "Pressure Grows for India A-Bomb," *New York Times*, Oct. 27, 1964.
18. This argument is developed much more fully in Lavoy, *Learning to Live with the Bomb*.
19. See also Gordon Corera, *Shopping For Bombs: Nuclear Proliferation, Global Insecurity, and the Rise and Fall of A.Q. Khan's Nuclear Network* (New York: Oxford University Press, 2006).
20. This issue is relevant to the debate now fashionable in academic circles as to whether democracies are less prone to nuclear proliferation than authoritarian societies. The approach taken here suggests that the nature of governments or societies does not matter much for nuclear proliferation, but it does determine to a great degree the ability of outside analysts to obtain early warning about the evolution of nuclear myths and mythmakers, and thus about the initiation, acceleration, or even termination of nuclear bomb programs.
21. For background, see Lorne J. Kavic, *India's Quest for Security: Defence Policies, 1947–1965* (Berkeley: University of California Press, 1967).
22. See Central Intelligence Agency, "Indian Test Will Spur Pakistani Effort," *National Intelligence Daily*, May 24, 1974, declassified document available at the CIA's Electronic Reading Room, <[www.foia.cia.gov](http://www.foia.cia.gov)>.
23. Iraq Survey Group, *Comprehensive Report of the Special Advisor to the DCI on Iraqi WMD*, vol. 1, "Regime Strategic Intent," Sept. 30, 2004, esp. p. 46, <[www.foia.cia.gov/duelfer/Iraqs\\_WMD\\_Vol1.pdf](http://www.foia.cia.gov/duelfer/Iraqs_WMD_Vol1.pdf)>.
24. This is a conclusion reached in the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, *Report to the President of the United States*, March 31, 2005, p. 156, <[www.wmd.gov/about.html](http://www.wmd.gov/about.html)>.
25. Scott D. Sagan "How to Keep the Bomb from Iran," *Foreign Affairs* 85 (Sept./Oct. 2006).

26. Cited in "Outcry at N. Korea 'Nuclear Test,'" BBC News, Oct. 9, 2006, <<http://news.bbc.co.uk/2/hi/asia-pacific/6033457.stm>>.
27. Institute for Science and International Security, "Case Studies of Illicit Procurement Networks: Education and Training," 2003, <[www.exportcontrols.org/education.html](http://www.exportcontrols.org/education.html)>.
28. Iraq Survey Group, *Comprehensive Report*, Vol. 1, "Regime Finance and Procurement," Sept. 30, 2004, esp. pp. 3–5, <[www.foia.cia.gov/duelfer/Iraqs\\_WMD\\_Vol1.pdf](http://www.foia.cia.gov/duelfer/Iraqs_WMD_Vol1.pdf)>.
29. *Ibid.*, pp. 116–32.
30. *Ibid.*, pp. 77–82.
31. See Ariel Levite, "Never Say Never Again: Nuclear Reversal Revisited," *International Security* 27 (Winter 2002–2003), p. 66.
32. Jungmin Kang, Peter Hayes, Li Bin, Tatsujiro Suzuki, and Richard Tanter, "South Korea's Nuclear Surprise," *Bulletin of the Atomic Scientists* 61 (Jan./Feb. 2005), pp. 40–49, <[www.thebulletin.org/article.php?art\\_ofn=jf05kang](http://www.thebulletin.org/article.php?art_ofn=jf05kang)>.
33. Technically speaking, these U.S. alliances provided an assurance of security more than dissuasion to these states. For a discussion of the distinction, see Chuck Lutes, "The Role of Dissuasion in Combating Weapons of Mass Destruction," *Strategic Insights* 3 (Oct. 2004), <[www.ccc.nps.navy.mil/si/2004/oct/lutesOct04.pdf](http://www.ccc.nps.navy.mil/si/2004/oct/lutesOct04.pdf)>; and Peter R. Lavoy, Barry Zellen, and Christopher Clary, "Dissuasion in U.S. Defense Strategy," *Strategic Insights* 3 (Oct. 2004), <[www.ccc.nps.navy.mil/events/recent/dissOct04\\_rpt.pdf](http://www.ccc.nps.navy.mil/events/recent/dissOct04_rpt.pdf)>.
34. For background on the CDI, see Peter R. Lavoy and Gayle D. Meyers, "U.S. Counterproliferation Cooperation with Allies," in Jim A. Davis and Barry R. Schneider, eds., *Avoiding the Abyss: Progress, Shortfalls, and the Way Ahead in Combating the WMD Threat* (Montgomery, ALA: USAF Counterproliferation Center, 2005), pp. 315–46.
35. See also Muthiah Alagappa, ed., *Asian Security Order: Instrumental and Normative Features* (Stanford, CA: Stanford University Press, 2003).
36. See also Lewis A. Dunn, Peter R. Lavoy, and Scott D. Sagan, "Conclusions: Planning the Unthinkable," in Peter R. Lavoy, Scott D. Sagan, and James J. Wirtz, eds., *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, and Chemical Weapons* (Ithaca, NY: Cornell University Press, 2000), pp. 223–57.
37. Peter R. Lavoy, "The Costs of Nuclear Weapons in South Asia," in D.R. SarDesai and Raju G.C. Thomas, eds., *Nuclear India in the Twenty-First Century* (New York: Palgrave-Macmillan, 2002).
38. Kevin O'Neill, "Building the Bomb," in Stephen I. Schwartz, ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940* (Washington, D.C.: Brookings Institution Press, 1998), pp. 32–103.
39. UNDP, *Human Development Report 1999* (New York: Oxford University Press, 1999), pp. 134–37.
40. Lt. Gen. R.K. Jasbir Singh, "The Costs of Nuclear Weaponisation," in R.K. Jasbir Singh, ed. *Indian Defence Yearbook: 1999* (Dehra Dun: Natraj, 1999), pp. 135–36.