

CHAPTER 9

NUCLEAR WEAPONS STABILITY OR ANARCHY IN THE 21ST CENTURY: CHINA, INDIA, AND PAKISTAN

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INTRODUCTION

During the 20th century, the dominant nuclear weapons competition was between the Soviet Union and the United States. The United Kingdom (UK), France, and Israel were loosely allied with the United States, and China was allied with Russia until the Sino-Soviet split. However, the UK, France, China, and Israel played a relatively minor role in the 20th-century nuclear competition and in the development of global nuclear strategy.¹ Terminology describing nation-state nuclear weapons status and the elaborate nuclear doctrines built by the superpowers had a dominant bipolar perspective.² Both superpowers engaged in massive overkill, producing tens of thousands of nuclear weapons with yields from tons to megatons.³ Both superpowers designed, built, deployed, and exercised nuclear forces to conduct a first strike. However, they described their nuclear doctrines in terms of second strikes planned to be launched only after they were attacked out of the blue by their mortal Cold War enemy.⁴ Both superpowers spent trillions of dollars on their nuclear infrastructure, weapons, and delivery systems.⁵ The Soviet Union was driven to ruin by its inability to keep up with U.S. high-technology precision strike capabilities and massive over-investment in nuclear weapons. Such expenditures provided rela-

tively few positive economic or technical spin-offs. This 20th-century nuclear narrative is not likely to be repeated in the 21st century. However, these important lessons are not being learned by an increasing number of 21st-century nuclear actors.

Only at the end of the Cold War did one American President mention the impossibility of achieving a military victory in fighting a nuclear war.⁶ Memoirs or editorials written by American atomic scientists or former U.S. decisionmakers that attempt to put the actual utility of nuclear weapons into context have been largely ignored.⁷ Dramatic reductions in U.S. and Russian nuclear forces took place only *after* the end of the Cold War, the dissolution of the Union of Soviet Socialist Republics (USSR), and the relegation of Russia to second- or third-power status.

Partisan and bureaucratic politics in the United States and Russia are driven by 21st-century nuclear postures, North Atlantic Treaty Organization (NATO) Alliance relations, and Russia's fear that it cannot defend itself without the threat to use nuclear weapons early in a conflict.⁸ However, what is missing is a realistic political rationale for the use of nuclear weapons to protect either country's vital national interests.⁹

Both the UK and France have reduced their nuclear forces to the point that the logical next step is to go to zero, a move inconceivable as long as their world status continues to be associated with 20th-century nuclear norms.¹⁰ Most countries are content to ignore Israel's unsafeguarded nuclear program, whose original strategic rationale died with the end of the Cold War.¹¹ North Korea, an exceedingly poor but tough nation with a tiny nuclear force, appears on the surface to be immune from either pressure from or the promise of cooperation with the global community.¹²

If today's business-as-usual paradigm continues, the next 2 decades of the 21st century will look very different than the 20th century with respect to nuclear weapons. Current conventional wisdoms suggest change in nuclear status, and politics will be incremental. This may turn out to be tragically wrong if global nuclear dogma is influenced strongly by the unstable triangular nuclear weapons competition among China, India, and Pakistan.¹³ Three indicators are worth watching to foreshadow whether the world will move toward nuclear stability or anarchy in South West Asia. First, will countries stabilize their operationally deployed nuclear forces at the approximate level of 150-200, 300-500 or larger? Second, will these three countries adopt compatible and increasingly stable nuclear postures, or will they continue to cling to three divergent nuclear postures? Third, will future military crises be resolved with or without use or threatened use of nuclear weapons? By and large, the United States, Russia, the UK, France, Israel, Iran, and the Democratic People's Republic of Korea (DPRK) will be bystanders in this Southwest Asian nuclear drama. As a result, to help assess forthcoming global nuclear stability, it is imperative to take a fresh look at the dynamics that are driving contemporary nuclear force structures and modernization in South-west Asia.

To describe more accurately 21st-century nuclear proliferation, this chapter introduces a 10-stage categorization of nuclear weapons status. This conceptual framework combines elements from both vertical and horizontal dimensions of nuclear proliferation popularized in the 1960s.

Subsequent sections of this chapter will describe the emergence of five incompatible nuclear dogmas

that seem to be driving approximately 20 countries in the 21st century. This chapter then describes the evolution of nuclear doctrines in China, India, and Pakistan. The next section will assess heuristic drivers of Chinese, Indian, and Pakistani nuclear proliferation and force modernization. These factors will influence whether these Southwest Asian countries move toward excessive expansion of their nuclear forces or the politically risky path toward greater stability in both numbers and doctrine. The final analytical section will discuss the quantitative growth potential of nuclear forces in Southwest Asia over the next 2 decades. This chapter ends with a challenge to current conventional wisdoms with respect to Southwest Asia's role to foster or undermine global nuclear stability.

VOCABULARY FOR 21ST-CENTURY NUCLEAR PROLIFERATION

In this century, old vocabulary used to categorize nuclear weapons status is inadequate to describe the evolution and complexity of the nuclear environment. The old terms were relevant for the 20th century. The terms "Nuclear Weapons States (NWS), de facto nuclear weapons states, threshold nuclear weapons states, and Non-Nuclear Weapons States (NNWS)" are not adequate to describe meaningful differences in the nuclear status of countries today. To solve this problem, a 10-stage categorization of nuclear weapons status has been developed. It draws on 70 years of nuclear history (see Appendix 9-1). Stage 1 (Watch List Nations) and Stage 2 (Threshold Nations) describe nation-states that are beginning to walk down a path that could lead to three different end points: nuclear weapons, latent nuclear weapons capability, or robust

use of nuclear power. Many states in these first two categories may be hedging against growing nuclear infrastructure being developed by their neighbors.¹⁴

Crossing the nuclear weapons threshold occurs between Stage 2 and Stage 3 (Tiny Nuclear Forces). At the other end of this categorization, Stage 10 (Superpower Nuclear Forces) describes the United States and the USSR, who had tens of thousands of nuclear weapons and sophisticated associated capabilities. These two countries largely defined the vocabulary of nuclear weapons status. No country in the 21st century is likely to repeat the process that led to the creation of similar gargantuan nuclear forces. Over the next 2 decades, it is conceivable both the United States and Russia will reduce their nuclear forces to the level of approximately 1,000 operationally deployed nuclear weapons.¹⁵ If they do so, this would move them down to Stage 9 (Massive Nuclear Forces).

During the Cold War, British, French, and Chinese nuclear forces had characteristics associated with Stage 8 (Mature Nuclear Forces). Over the last decade, British nuclear forces have dropped to Stage 7 (Large Nuclear Forces).

Nations that have developed first-generation nuclear weapons vary from Stage 3 (Tiny Nuclear Forces) to Stage 6 (Medium Nuclear Forces). Virtually all open source or academic literature on nuclear proliferation puts countries that have passed the nuclear weapons threshold into one category, *de facto* nuclear weapons states. This chapter argues the degree of nuclear weapons production, development, and deployment of delivery systems, and the creation of nuclear doctrine and postures cannot be described in a single category. This 10-stage categorization is capable of being used to describe more precisely where countries stand and how each might change in the future.

For the countries in Southwest Asia—China, India, and Pakistan—the key question is whether each country decides its end point to be nuclear forces and postures associated with Large, Mature, or Massive Nuclear Forces. It is the thesis of this chapter that *all* three stages are credible under realistic assumptions for China, India, and Pakistan. The implications for the world will be profound, depending on which end point each country chooses or is forced to choose.

As countries in the Middle East develop nuclear research and development programs as a hedge against Iran's move toward nuclear weapons, characterizing their nuclear activities will place them into either Stage 1 or Stage 2. If history is any guide, by the time a country crosses from Stage 2A to Stage 2B, it becomes virtually impossible for external powers to turn it around (see Appendix 9-2). If a nuclear proliferation cascade takes place in the Middle East or East Asia, it will reinforce, not create, *more pressing* negative trends that are already evident in Southwest Asia.¹⁶ If hedging in the Middle East and East Asia and modernization in Southwest Asia take place, the prediction that 20 states will obtain or maintain nuclear weapons, which President John Kennedy feared in 1960, may become true in the 21st century.¹⁷ If this occurs, it will be a truly historic and bipartisan accomplishment over the next two decades.¹⁸

NUCLEAR DOCTRINES AND FUNCTIONS OF NUCLEAR WEAPONS IN THE 20TH CENTURY

During the Cold War, nuclear dogma of the five declared nuclear weapons states can be placed along a continuum (see Figure 9-1). Countries on the right, such as the USSR/Russia and the United States, built

excessive nuclear forces for nuclear warfighting. China, the country on the extreme left, built a small number of relatively crude operationally deployed nuclear weapons devoted to deterring an attack on their country.¹⁹ Countries in the middle had capabilities associated with both nuclear warfighting and deterrence, but their modest nuclear forces played a marginal role in the 20th-century nuclear balance of power.

China	France	UK	US	USSR
*	*	*	*	*
Deter Nuclear Attack			Nuclear Warfighting	

Figure 9-1. Nuclear Dogma for the 20th Century.

In retrospect, Cold War history demonstrated that nuclear weapons served many different functions in addition to deterring the use of nuclear weapons (see Figure 9-2). During the Cold War, nuclear weapons were utilized not only to deter the use of nuclear weapons, but for several other purposes as well. In terms of military policy, they were used to deter the use of other weapons of mass destruction (WMD) and to deter an opponent with superior conventional forces. The classic NATO-Warsaw Pact standoff was characterized by the United States and NATO attempting to deter perceived overwhelming conventional forces from the USSR and Warsaw Pact with nuclear weapons. This was called “extended deterrence.” No such Soviet attack on Western Europe took place, so advocates of nuclear weapons argue nuclear deterrence worked. However, despite massive spending, force prepara-

tions, exercises, and war gaming, it is not clear from the historical record whether these specific NATO nuclear forces deterred a Soviet attack or whether Soviet decisionmakers never anticipated authorizing a first strike despite their considerable preparations to do so.



Figure 9-2. Functions of Nuclear Weapons in the 20th Century.

Less described in the academic literature is the fact that nuclear weapons were used to achieve other diplomatic and political objectives only indirectly related to military operations.²⁰

Emerging 21st Century Nuclear Dogma.

During our contemporary era, approximately 20 countries have had nuclear programs that can be described as Stage 1 to Stage 10.²¹ They seem to fall into five not mutually exclusive groups. The first group consists of the “declining nuclear powers.” The United States, UK, and France are reducing their nuclear forces and are de-emphasizing their role in military strategy. However, even in these declining nuclear countries, the function of nuclear weapons remains broad. Nuclear weapons continue to play an important role in domestic and bureaucratic politics. For example, the Obama administration’s *U.S. Nuclear Posture Review* saw a limited reduction in nuclear force size and a small narrowing of nuclear weapons use doctrine.²² In the United States, even this incremental change triggered dramatic increases in spending on offensive nuclear weapons and infrastructure and intense partisan political struggle over ratification of nuclear arms control treaties.²³ Ironically, one distinguished participant in decades of nuclear politics, Brent Scowcroft, has argued the intense partisan politics associated with nuclear weapons are more extreme today than they were during the Cold War.²⁴ This suggests that in political terms, the movement toward zero nuclear weapons is dead in the United States. In the UK, controversy continues over the size of Britain’s remaining sea-based leg of its nuclear force, the Trident.²⁵

The second group consists of “maximalist” countries. Four such nations—Russia, Pakistan, the DPRK, and Iran—seem to be embracing the broadest possible function for nuclear weapons. At least two of them have adopted doctrines that emphasize nuclear warfighting. Russia and Pakistan are treating

nuclear weapons as the *single* essential military capability that allows them to defend their territory against the superior conventional forces of NATO and India, respectively. The DPRK and Iran have incorporated nuclear weapons into the hypernationalism associated with the protection of their countries' national security and sovereignty. Both countries assume hostile neighbors and foreign powers intent on fomenting regime change.²⁶ Both countries paint a picture of being threatened by the United States in ways that seem laughable to anyone who is living in an increasingly divided, inward-looking, and budget-cutting-obsessed America of 2012.

Countries in the third group include China, Israel, and India. For different reasons, these three countries seem to be engaged in limited nuclear weapons modernization. They seem to be waiting to see which way the world nuclear order will move before deciding on the final end point for their nuclear forces and postures.

A fourth group consists of countries that seem to be using nuclear weapons to strengthen their legitimacy, resist internal reforms, and guarantee regime survival. If one looks at the countries associated with Stage 1, Stage 2, or Stage 3, more than a few appear to be thinking about nuclear weapons as the new "weapons of the weak."²⁷ Burma, Iran, North Korea, and Syria, to name a few, are fragile countries without much stake in the existing world order. These countries reject interaction with the rest of the world and perceive that nuclear weapons will allow their regimes to continue on their present course. These nations are placing a bet that nuclear weapons will provide them with *total security*, internal as well as external. Thus, they are underinvesting in other tools to maintain their sover-

eignty and secure their prosperity. If this model gains traction, one of the most important functions of nuclear weapons in the 21st century may become to secure regime survival among totalitarian governments (see Figure 9-3).

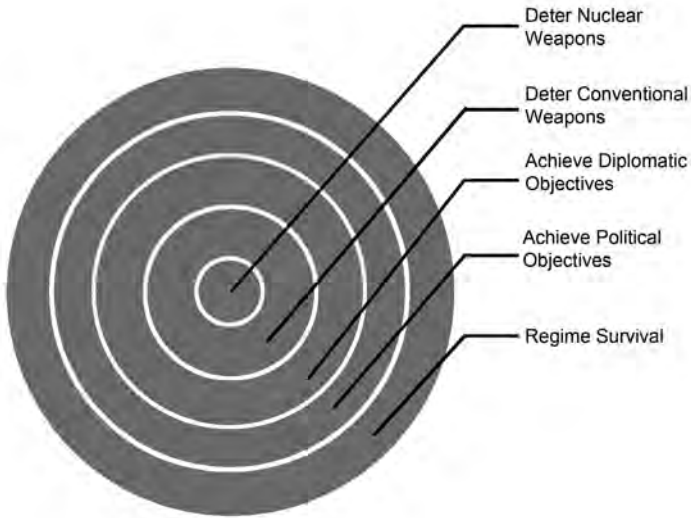


Figure 9-3. Functions of Nuclear Weapons in the 21st Century.

Countries in a fifth category seem to be hedging against the prospect that Iran and North Korea's nuclear weapons program continues to gain strength and triggers a nuclear proliferation cascade, primarily in the Middle East and North East Asia.

Nuclear Dogma in Southern Asia.

Equally important as the steady, quantitative growth of nuclear forces that has taken place in South-west Asia is the existence of three mutually incompatible nuclear doctrines in the region.²⁸ For over 5 decades, China has maintained a nuclear posture that has been built around a relatively small, operationally deployed force and no first use. China deterred both the Soviet Union and the United States with medium-sized nuclear forces in the Cold War. During the 1970s through at least 2010, China has maintained a robust nuclear research, development, testing and evaluation (RDT&E) system, but it has deployed relatively few nuclear weapons.²⁹ While academic debates in China can be identified – advocating larger and more offensively oriented nuclear forces and doctrine – such debates seem to be theoretical at present.³⁰

In contrast, Pakistan has an openly first-strike-oriented nuclear force. Its nuclear weapons must be dispersed very early during a military crisis with India.³¹ It is during movement that Pakistan's nuclear weapons may be most vulnerable to theft from terrorists.³² Authoritative Pakistani statements of the country's nuclear doctrine emphasize that India could cross one of Pakistan's "red lines" relatively early during a conventional conflict.³³ Pakistan is thus playing a big game of chicken with itself, India, and the whole world. Pakistan's refusal or inability to terminate its use of Islamic terrorists to further its goals in Kashmir and Afghanistan and its decreasing ability to control the terrorist groups it created suggest that another terrorist attack against India could take place at any time.³⁴ Such an attack could take place with or without explicit Pakistani government approval. Given

India's Cold Start conventional military doctrine and modernization, the world could face another nuclear crisis in South Asia at any time. Such a crisis could be started by a terrorist group that has limited means and capabilities and no proclivity to foster stability among nuclear-armed states.

This picture illustrates that we are already very far from the logic of 20th-century nuclear deterrence, even if a proliferation cascade does *not* take place in the Middle East or East Asia. It is within this context that the 2009 Indian debate generated by former defense scientist Dr. K. Santhanam is fascinating.³⁵ During this debate, a vast amount of information about India's nuclear weapons program was presented to the Indian public. Many former heads of India's Department of Atomic Energy argued that India must resume nuclear weapons testing and both develop and deploy thermonuclear weapons. In this same time frame, India announced plans to develop the Agni 5 ballistic missile, reportedly designed to have the intercontinental range to hit all targets in China.³⁶ India is also engaged in research on ballistic missile defense, which is already being used by Pakistani strategists to justify production of more nuclear weapons. From this perspective, Indian nuclear and missile technical elites have set the stage for a nuclear arms race with both China and Pakistan that could last decades into the future.

On the other hand, some Indian strategists who often reflect thinking within South Block, such as the late K. Subrahmanyam and Dr. V. S. Arunachalam — who brought Santhanam into the nuclear weapons business and was his immediate superior — argue that India can use fission weapons and accurate delivery systems to achieve the same deterrent effect that thermonuclear

weapons and inaccurate intercontinental ballistic missiles (ICBMs) achieved in the 20th century.³⁷ It is known that current Prime Minister Manmohan Singh is a relative dove toward both Pakistan and China. When he was Finance Minister, he was skeptical of the ability of the Department of Atomic Energy to achieve results.³⁸ The Prime Minister's entire career has been dedicated to giving India the opportunity to compete on the global stage in terms of economics and technology. Thus, a dramatic expansion of India's nuclear weapons force under his watch would conflict with his lifelong goal to make India a major world power by using its proven comparative advantages — such as its skilled manpower, the rule of law, a vibrant civil society, and a relatively productive interaction with the global community.

These two schools of thought have existed in India for many years. Today, India seems to be unsure where it is headed. Some in India advocate renewed nuclear testing and thermonuclear weapons on ICBMs to approach capabilities associated with China. Others argue that nuclear deterrence can be achieved at lower levels, in part because Chinese nuclear forces are relatively small.³⁹

If one puts the evolution of nuclear doctrines in China, India, and Pakistan into a global context, the key driver is Pakistan. All unclassified indications suggest Pakistan is expanding its nuclear weapons program, with no end in sight.⁴⁰ Whether Pakistan is ahead of India or not in terms of nuclear weapons capabilities is a debatable point. However, if the high estimates of Pakistan's nuclear force and low estimates of Chinese nuclear force are compared, it is logical to conclude Pakistan may surpass China in quantitative terms over the next decade, if not before.

Pakistani writings emphasize the need for nuclear weapons to balance India's superior conventional forces. While this logic was compelling for the United States in the Cold War, it is a *hollow concept* in terms of justifying *how many* nuclear weapons Pakistan needs to build and deploy to deter only one country, India. Does Pakistan require 50, 100, 150, 200, 250, 300, 350, 400, or more nuclear weapons? If Pakistan feels it must target India's entire military, industrial, and research complex; hold India's major cities at risk; and be prepared to fight using nuclear weapons on the battlefield, it will require at least 300-500 nuclear weapons. This would require a huge expenditure of funds with even larger opportunity costs. If Pakistan follows this path, will it essentially give up maintaining a credible conventional military force and put all of its eggs into a nuclear basket? Will the drain on Pakistan's military to fight Islamic terrorists and make up for inadequate civilian government capacity make it depend even more on nuclear weapons? Will Pakistan continue its own Cold War ideology toward India?⁴¹ Will Pakistani military decisionmaking continue to exhibit deeply flawed logic that led it to start and lose four conflicts with India?⁴² If Pakistan follows this path, the lesson of the former Soviet Union should loom large. Who in Pakistan has the courage to raise these issues?

There is no debate that China is building up its conventional military capabilities across the board.⁴³ China is modernizing its nuclear force, but it is also retiring old nuclear delivery systems. Some descriptions of the growth in Chinese missile systems include medium-range systems that may be armed with both nuclear and conventional warheads.⁴⁴ Thus, it is not clear whether the *net increase* in Chinese operationally deployed nuclear weapons is significant in quantita-

tive terms.⁴⁵ It is clear China is replacing vulnerable liquid-fueled systems with mobile and solid-fueled systems. This means China's nuclear force of the future will be more stable, not less. However, China's large (1,000-plus) ballistic missile and cruise missile force, armed with conventional weapons, gives it a massive breakout potential in terms of nuclear-capable delivery systems.⁴⁶ As a result, Chinese perceptions of the legitimate role for nuclear weapons and Chinese perceptions of how the United States targets China are extremely important. This, in turn, relates to the debate over the legitimate role for nuclear weapons in the 21st century. Will it be narrowed in the 21st century to the innermost circle shown in Figure 9-2, or will it be expanded to the outer-most circle in Figure 9-3?

Beginning in 1970, China has embarked on the largest expansion of nuclear power in the world.⁴⁷ In 2010, China has 13 operating nuclear power plants, 62 nuclear power plants under construction or firmly planned, and an additional 76 units proposed. It plans to have 80 Giga-watts electric (GWe) by 2020, 200 GWe by 2030, and 400 GWe by 2050. A close reading of construction schedules reveals that China is proceeding from first pouring concrete to hooking up a reactor to the grid in approximately 5 years. China has imported nuclear reactor technology and equipment from Canada (AECL), France (Framatome/AREVA), the United States/Japan (Westinghouse/Toshiba), and Russia (Atomstroyexport). It is starting to manufacture major components of its nuclear power reactors. China also has ambitious plans for 18 high temperature gas-cooled reactors (HTGR) and breeder reactors.⁴⁸

The magnitude of this expansion has several implications for nuclear proliferation on a global basis.

First, it may create financial pressure on the International Atomic Energy Agency (IAEA) if safeguards are going to be applied to all these nuclear power plants. Second, in terms of the world export market, once China firmly establishes which reactor will become its dominant third-Generation model and proves its indigenous construction capabilities, it will become a major potential exporter of nuclear power reactors. At that stage, China will have one simple sales pitch: We have built more modern nuclear reactors than any other country in the world over the last decade. Western companies that have sold China their nuclear power reactor technology may have sealed their own fate. Third, China has ambitious plans to utilize recycled reactor-grade plutonium (RGPu).⁴⁹ Associated reprocessing and fuel fabrication facilities will stress the state of the art for safeguarding bulk handling facilities. The combination of a large future stockpile of RGPu and significant error margins in outside knowledge of China's past production of weapons-grade plutonium (WGPu) and highly enriched uranium (HEU) suggests China may have a huge potent breakout capability of up to 800 nuclear weapons.⁵⁰ While this scenario is just a scenario, these theoretical projections indicate just how important China will be to the global nuclear balance of power in the 21st century.

For the present, the technical, management, capital, materials, and diplomatic requirements for this peaceful nuclear program and the lack of an acute national security threat suggest a major expansion in China's nuclear weapons force is not likely in the immediate future. China faced more acute nuclear threats during the Cold War and reacted by deploying a relatively small nuclear force. However, most unclassified publications continue to describe the growth in China's

military and its lack of transparency. Most assessments assume China's nuclear force will be on the rise in a big way. The view that China may be a smaller nuclear threat than advertised is clearly a minority perspective in the U.S. strategic community.

WHAT DRIVES CHINESE, INDIAN, AND PAKISTANI NUCLEAR FORCE DEVELOPMENT?

For purposes of this chapter, it is assumed China has 150 operationally deployed nuclear weapons plus or minus 50.⁵¹ It is assumed that both India and Pakistan have approximately 80 nuclear weapons plus or minus 20.⁵²

These numbers differ from conventional wisdom in several ways. First, China's operationally deployed nuclear forces may be significantly smaller than the oft-quoted number of 400 nuclear weapons.⁵³ Second, most assessments of the India-Pakistan nuclear balance have argued India has been ahead of Pakistan for several decades.⁵⁴ This may or may not be correct today. Based on the assumptions used in this chapter, three possibilities exist for the Indo-Pak nuclear balance. India and Pakistan may be approximately equal. India may be ahead by as much as 100 to 60. Alternatively, Pakistan may be ahead by as much as 100 to 60.

Two important conclusions can be drawn from this assessment. First, if India is ahead of Pakistan or Pakistan is ahead of India in quantitative terms, the differences are relatively *small*. They are insignificant in terms of military power or deterrence impact. Second, when viewed in terms of the history of nuclear weapons, China, India, and Pakistan all have relatively modest nuclear forces at present. However, this situation may not remain static for the future. China

and India have significant breakout potential if they decide to use RGPU in their nuclear weapons. Pakistan has a huge appetite for nuclear weapons and has publicized no statements that provide any suggestion that an end point is yet in sight.⁵⁵

A review of the history of Chinese, Indian, and Pakistani nuclear weapons programs reveals that each started with multiple drivers (see Appendix 9-3). These drivers have *changed* over time. Today, we find that the primary driver for China is a fear of a conventional or nuclear attack on its nuclear forces by the United States. For India, the primary pressure seems to be from its nuclear and defense scientists, who want to prove against most evidence to date that they are world class. For Pakistan, the primary driver appears to be a fear of India's superior conventional force. For each of these three countries, one could see a future with two dramatically different nuclear futures. One would feature a nuclear arms race that takes place for several decades, leading to several hundred nuclear weapons. The other would be relatively stable nuclear forces maintained close to current levels. The key will be elite decisionmakers *within each country*. If senior leaders want nuclear weapons to play a limited role in their national security to deter the use of nuclear weapons, then medium-sized and stable nuclear forces are compatible with their countries' national security interests and targeting requirements. On the other hand, if senior leaders believe their national survival rests on nuclear warfighting capabilities to deter superior conventional forces, then large nuclear forces and hair-trigger nuclear postures will be required. These key decisions will be made in Southwest Asia, not in the Middle East or Northeast Asia.

A close examination of the drivers of proliferation in each country suggests that Indian scientists have a major influence on government decisionmaking. Drawing on the excellent article in this volume by Mian and Ramana, Indian policymakers have always sought to maintain the capability to use the country's civilian nuclear power program for weapons purposes. Not only does India have an estimated 6.8 ton-stockpile of mostly unsafeguarded RGPu, but it has the potential to produce WGPu in its eight unsafeguarded power reactors and its breeder reactors. Figures calculated by Mian and Ramana suggest India could have an arsenal of over 850 nuclear weapons using these sources.

QUANTITATIVE GROWTH POTENTIAL FOR NUCLEAR WEAPONS IN SOUTHWEST ASIA

A review of Appendix 9-4 reveals that even a relatively small monthly production of nuclear materials used for weapons purposes could lead to potential growth of hundreds of nuclear weapons over a period of 2 decades. Unclassified assessments of China, India, and Pakistan show that each country has the technical infrastructure to produce unsafeguarded nuclear material at this level of magnitude.⁵⁶ On the high end of the scale, if China were to determine as a matter of urgent national priority it needed to approach quantitative parity with the United States and Russia, it could reach the level of approximately 1,000 nuclear weapons within 2 decades. This would probably require it to resume production of fissionable material for weapons purposes or use RGPu to produce nuclear weapons.⁵⁷

The primary conclusion from this theoretical mathematical projection is to alert global decision-makers that the range of future nuclear force sizes and postures in Southwest Asia is *extremely broad*. There are no technical or institutional controls capable of preventing China, India, and Pakistan from developing substantial nuclear forces over the next 2 decades. Thus, the primary driver will be the direction in which the world moves in terms of the perceived legitimate function of nuclear weapons. If the United States, China, and other major powers are able to convince the world that the sole legitimate function of nuclear weapons is to deter the use of nuclear weapons, then it is plausible nuclear forces in China, India, and Pakistan could stabilize around 150-200. From Pakistan's perspective, this would require that its legitimate security concerns vis-à-vis India are addressed by creative solutions involving both China and the United States.

CONCLUSION

The world faces a stark choice between business as usual and a concerted effort to deal with the root causes of serious national security threats seen by decisionmakers in China, India, and Pakistan. As recommended by Mian and Ramana and supported by this author, "A basic reordering of priorities in each of these countries is long overdue."

All governments are forced by events to manage short-term crises and thus give lower priority to long-term problems. From an American perspective, there are more than enough reasons to avoid addressing the nuclear weapons challenge in the context of U.S. bilateral relations with China, India, and Pakistan. How-

ever, if this proclivity persists among U.S. decision-makers, the result is likely to be both larger nuclear forces and nuclear postures that shift toward nuclear warfighting over the next 2 decades.

This business-as-usual approach is likely to yield the following: China, India, and Pakistan will continue to maintain three mutually incompatible nuclear doctrines. Multiple drivers for nuclear force modernization in each country will provide sufficient domestic and bureaucratic political pressure to expand and modernize nuclear weapons for decades to come.

Given this situation, proposed arms control treaties such as the Comprehensive Test Ban Treaty (CTBT) and Fissile Material Cutoff Treaty (FMCT) will not be implemented. Both proposed agreements are opposed by all three countries to varying degrees. The roots of their opposition are not being addressed seriously with policy research, strategic planning, or diplomacy.

The Obama administration's rhetoric associated with nuclear weapons sounds idealistic.⁵⁸ However, its actions reflect a business-as-usual proclivity. The administration is acting as if nuclear weapons represent one issue that can be partitioned into its own narrow policy lane and managed by mid-level officials within the U.S. Government. This is understandable, given the pressing economic, environmental, terroristic and Afghanistan-Pakistan war agendas the Obama administration inherited and has created for itself.

The United States has adopted a neo-Cold War nuclear posture to keep a few European allies quiet and to avoid a major bureaucratic fight between the White House and a few civilian Pentagon officials who work closely with Republican allies on Capitol Hill. How U.S. nuclear weapons based in Europe will translate

into greater security in Europe is never discussed with any degree of rigor or intellectual honesty. Perhaps the administration's logic was that it perceived the demonstration effect of a fundamentally new American nuclear posture would have little significant impact on thinking in China, India, and Pakistan. So why pay a short-term domestic political price for the prospects of marginal increases in long-term stability? However, absent such a fundamental change and serious discussions between the United States and China, one can predict with a high degree of confidence that business as usual will produce nuclear arms races in Southwest Asia for decades.

Other reasons to sustain a business-as-usual approach are obvious. America will continue to spend approximately \$10 billion per year on national missile defense to neutralize potent domestic constituencies regardless of its technical feasibility and negative impacts on Russia and China.⁵⁹ The United States does not want to think seriously about steps it could take to address the Kashmir conflict because it is so complex; India's position has been set in stone for decades, and it is easier to think of India as a global economic power sympathetic to American values. The United States has not invested in civilian governance and rebuilding civil administrative capability in Pakistan because the military is the only functioning entity in the country in the short term.⁶⁰ Honest and capable civilian political leadership in Pakistan is almost entirely lacking and will take many years to develop and mature, if it ever occurs. Pakistani-born Islamic terrorists and the "India-phobic and paranoid"⁶¹ Pakistani strategic culture is acknowledged by American decisionmakers as a key problem, but American decisions and actions are focused almost exclusively on the War on Terror.⁶² (To date, even after Osama bin Laden was killed, no

significant policy changes seem to be taking place in Washington or Islamabad.)

The perception persists in both Washington and Islamabad that the United States needs Pakistan more than Pakistan needs the United States. In this context, adding the nuclear weapons issue to an overly crowded policy agenda with Pakistan will definitely overload the circuits. The net result is probably that Pakistan leaders have concluded they can build as many nuclear weapons as they can produce plutonium and HEU. They will take symbolic steps to appear to secure nuclear materials and weapons better, but the question of "how much is enough" is off the table.⁶³

If this business-as-usual situation continues, the world should ready itself for a very rough ride in terms of nuclear weapons in the next 2 decades of the 21st century. Southwest Asia will be the dominant driver to the unstable world our children will rightly accuse us of having ignored to their peril. American decisionmakers in the 1980s chose to ignore realities on the ground after the Soviets were defeated in Afghanistan. The blowback next time will be orders of magnitude larger and more tragic.

ENDNOTES - CHAPTER 9

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5. Stephen I. Swartz, *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons since 1940*, Washington, DC: Brookings Institution Press, 1998; Stephen I. Schwartz and Deepti Choubey, *Nuclear Security Spending: Assessing Costs, Examining Priorities*, Washington, DC: Carnegie Endowment for International Peace, 2009.

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We live in a troubled world, and the United States and China, as two great nations, share a special responsibility to help reduce the risks of war. We both agree that there can be only one sane policy to preserve our precious civilization in the modern age. A nuclear war cannot be won and must never be fought. And no matter how great the obstacles may seem, we must never stop our efforts to reduce the weapons of war. We must never stop at all until we see the day when nuclear arms have been banished from the face of this Earth.

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Schuster, 1949; George F. Kennan, *The Nuclear Delusion: Soviet-American Relations in the Atomic Age*, New York: Pantheon Books, 1976; James R. Killian, *Sputnik, Scientists, and Eisenhower: A Memoir of the First Assistant to the President for Science and Technology*, Cambridge, MA: MIT Press, 1982; McGeorge Bundy, William T. Crowe, Jr., Sidney Drell, *Reducing Nuclear Danger: The Road Away from the Brink*, New York: Council on Foreign Relations, 1983; Robert S. McNamara, *Blundering Into Disaster: Surviving the First Century of the Nuclear Age*, New York: Pantheon Books, 1986; Morton H. Halperin, *Nuclear Fallacy: Dispelling the Myth of Nuclear Strategy*, Cambridge, MA: Ballinger, 1987; Herb York, *Making Weapons, Talking Peace: A Physicist's Odyssey from Hiroshima to Geneva*, New York: Basic Books, 1987; McGeorge Bundy, *Danger and Survival: Choices About the Bomb in the First Fifty Years*, New York: Random House, 1988; Sidney D. Drell, *In the Shadow of the Bomb: Physics and Arms Control*, New York: American Institute of Physics, 1993; Graham Allison, *Nuclear Terrorism: The Ultimate Preventable Catastrophe*, New York: An Owl Book, 2004; George P. Schultz, William J. Perry, Henry A. Kissinger, and Sam Nunn, "A World Free of Nuclear Weapons," *The Wall Street Journal*, January 4, 2007.

8. Daryl G. Kimball and Greg Thielmann, "Obama's NPR: Transitional, Not Transformational," *Arms Control Today*, Vol. 40, No. 5, May 2010; Morton H. Halperin, "A New Nuclear Posture," *Arms Control Today*, Vol. 40, No. 5, May 2010; Jacob W. Kipp, "Asian Drivers of Russia's Nuclear Force Posture," Arlington, VA: Nonproliferation Policy Education Center, Unpublished Essay, 2010.

9. David E. Sanger, *The Inheritance: The World Obama Confronts and the Challenges to American Power*, New York: Harmony Books, 2009, p. 176.

10. "British Nuclear Arsenal Stands at 225 Warheads," *Nuclear Threat Initiative: Global Security Newswire*, available from www.nti.org/gsn/article/british-nuclear-arsenal-stands-at-225-warheads/; see United States Institute of Peace, p. 111.

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Finesse Israel's Bomb," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis, 2011; Avner Cohen, *The Worst-Kept Secret: Israel's Bargain with the Bomb*, New York: Columbia University Press, 2010.

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14. Bruno Tertrais, "After Iran: Prospects for Nuclear Proliferation in North Africa," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis, 2010; Shraham Chubin, "Nuclear Proliferation Prospects in the Middle East to 2025," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis, 2011.

15. McGeorge Bundy, William T. Crowe, Jr., Sidney Drell, *Reducing Nuclear Danger: The Road Away from the Brink*, New York: Council on Foreign Relations, 1983, p. 99.

16. International Security Advisory Board, "Report on Discouraging a Cascade of Nuclear Weapons States," Washington, DC: Department of State, October 19, 2007.

17. Presidential candidate John Kennedy's oft-referenced prediction about the spread of nuclear weapons: "There are indications, because of new inventions that 10, 15, or 20 nations will have a nuclear capability—including Red China—by the end of the presidential office in 1964." Cited in Joseph Cirincione, *Bomb*

Scare: The History and Future of Nuclear Weapons, New York: Columbia University Press, 2007, p. 28.

18. Since the Nixon administration, both Democrats and Republicans have supported nuclear nonproliferation efforts at the rhetorical level, but they have rarely been willing to pay a significant diplomatic, economic, or domestic political price to achieve nuclear nonproliferation outcomes.

19. Robert E. Johnson, "China's Nuclear Forces and Policies," in Larry M. Wortzel, ed., *China's Military Modernization and International Implications*, New York: Greenwood Press, 1988.

20. Thomas W. Graham, *The Politics of Failure: Strategic Nuclear Arms Control, Public Opinion and Domestic Politics in the United States*, MIT Ph.D. dissertation, 1989.

21. The most interesting category is Stage One: Watch List Nations. With the prospects of Iran crossing from Stage 2 to Stage 3 and the DPRK moving from Stage 3 to Stage 4, an unusually large number of countries can be considered Watch List Nations. For purposes of this chapter, they would include Algeria, Egypt, Saudi Arabia, Syria, and Turkey (in the Middle East); Japan, South Korea, and Taiwan (in East Asia); and Burma/Myanmar (in South Asia). Unlike in the 20th century, when Watch List countries were mostly Third World countries with emerging technical capabilities, in the 21st century these countries range in technical capabilities from Japan on one end to Burma on the other.

22. United States Institute of Peace.

23. This is best demonstrated by the April 6, 2010, cover letter to the *Nuclear Posture Review* signed by Secretary of Defense Robert Gates. It committed to transferring nearly \$5 billion from the Department of Defense to the Department of Energy to be used for purposes of maintaining offensive nuclear weapons. Thus, the United States will spend more money on offensive nuclear weapons research, development, testing, and evaluation (RDT&E) than it did during the Cold War. This figure increased to approximately \$ 80 billion in the context of the debate over ratification of the New START treaty in 2010.

24. "John Kerry Puts off Key Vote on Arms Treaty; Hopes Dim for Quick Passage," *The Washington Post*, August 4, 2010.

25. BBC News, "Trident Scale Back Urged Amid Cost Worries," July 28, 2010.

26. It seems ironic that the "Axis of Evil" concept used by President George W. Bush in his 2002 State of the Union Address seems to continue to frame how many Americans view nuclear proliferation long after President Bush left office. Fear associated with Iran and North Korea obtaining or increasing small stockpiles of nuclear weapons dominate fear that operationally deployed nuclear forces will expand in Southwest Asia.

27. The phrase "weapons of the weak" comes from James C. Scott, *Weapons of the Weak: Everyday Forms of Peasant Resistance*, New Haven, CT: Yale University Press, 1985.

28. For a discussion of growth in nuclear forces in China, India, and Pakistan, see the excellent essay written by Zia Mian and M. V. Ramana, "Imbricated Regional Rivalries and Global Order: South Asia, China and the United States," Washington, DC: Non-proliferation Policy Education Center, Unpublished Analysis, 2010.

29. Jeffrey Lewis, "How Many Chinese Nuclear Weapons?" cited from *Arms Control Wonk*, March 7, 2004, available from Lewis.Armscontrolwonk.com/archive/99/howmany-chinese-nuclear-weapons; *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, Washington, DC: Department of Defense, 2011, pp. 3-4, 34-35, 38, 78.

30. *Annual Report to Congress: Military and Security Developments*, 2011, p. 34; *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, Washington, DC: Department of Defense, 2010, p. 35; *Annual Report to Congress: Military Power of the People's Republic of China*, Washington, DC: Department of Defense, 2006, p. 25; *Annual Report to Congress: Military Power of the People's Republic of China*, Washington, DC: Department of Defense, 2008, pp. 26-27.

31. Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security*, Vol. 34, No. 3, Winter 2009/10, p. 44.

32. Sanger, p. 179.

33. Peter Lavoy, "Islamabad's Nuclear Posture: Its Premises and Implementation," in Henry D. Sokolski, ed., *Pakistan's Nuclear Future: Worries beyond War*, Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2008; Vipin Narang, pp. 59-62.

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35. L. K. Krishnan, "Why Pokhran Yield Does Not Matter Now," *Rediff News*, August 31, 2009; K. Santhanam and Ashok Parthasarathi, "Pokhran-II Thermonuclear Test, a Failure," *The Hindu*, September 17, 2009.

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37. K. Subrahmanyam and V.S. Arunachalam, "Deterrence and Explosive Yield," *The Hindu*, September 21, 2009.

38. George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation*, Berkeley, CA: University of California Press, 1999, pp. 320-21, 347, 351; Raj Chengappa, *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power*, New Delhi, India: HarperCollins Publishers India, 2000, pp. 368-69, 380-81, 390-97.

39. Manpreet Sethi, *Nuclear Deterrence in Second Tier Nuclear Weapon States: A Case Study of India*, CHS Occasional Paper No. 25, Pondicherry, India: French Research Institute of India, December 2009, pp. 6, 37-9, 43.

40. David Albright and Paul Brannan, "Pakistan Appears to be Building a Third Plutonium Production Reactor at Khushab

Nuclear Site," the Institute of Science and International Security, June 21, 2007; Zian Min, "Pakistan May Have Completed New Plutonium Production Reactor, Khushab-II," International Panel on Fissile Materials, February 28, 2010; Discussion at the Stimson Center on February 23, 2011, suggested the increasing conventional imbalance between India and Pakistan will result in Pakistan's building more nuclear weapons and relying more on terrorists to counter India.

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43. Robert D. Kaplan, "The Geography of Chinese Power: How Far Can Beijing Reach on Land and at Sea?" *Foreign Affairs*, Vol. 89, No. 3, May/June 2010; Henry Sokolski, "Missiles for Peace," *Armed Forces Journal*, July 2010; *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, 2011; *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, 2010.

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46. *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, 2011, pp. 30, 33, 78; *Military and Security Developments*, 2010, p. 35; Ian Easton, "The Asia-Pacific's Emerging Missile Defense and Space Competition," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis, 2010; Mark Stokes and Ian Easton, "Evolving Aerospace Trends in the Asia-Pacific Region," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis.

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51. The assumption China has approximately 150, plus or minus 50, operationally deployed nuclear comes from multiple public estimates. A comprehensive nongovernment assessment concluded in 2006 that China had 93 land-based nuclear-armed ballistic missiles, 12 JL-1 SLBMs, and 40 aircraft-delivered nuclear weapons, for a total of approximately 145 operational warheads. Hans M. Kristensen, Robert S. Norris, and Matthew G. McKinzie,

Chinese Nuclear Forces and U.S. Nuclear War Planning, Washington DC: The Federation of American Scientists and the Natural Resources Defense Council, 2006, p. 202. A retired Indian military intelligence officer associated with the Chennai Centre for China Studies assessed that China has around 130 nuclear warheads deployed on missiles and aircraft. See Colonel R. Hariharan, "Nuclear Capability of India and China," *The Island*, July 13, 2010. On February 28, 2006, the Director of the DIA, Lieutenant General Michael D. Maples, presented before the Senate Armed Services Committee the following prepared statement: "It is likely the number of deployed Chinese nuclear-armed theater and strategic systems will increase in the next several years. China currently has more than 100 nuclear weapons." Michael D. Maples, Lieutenant General USA, Director DIA, *Current and Projected National Security Threats to the United States*, Statement for the Record before the Senate Armed Services Committee, February 28, 2006, p. 4. Jeffrey Lewis concluded China has around 100 nuclear weapons in "How Many Chinese Nuclear Weapons?" March 7, 2004, cited from *Arms Control Wonk*, available from Lewis.Armscontrol-wonk.com/archive/99/howmany-chinese-nuclear-weapons. "The Public Estimates of the Size of the Chinese Nuclear Arsenal are Less than 200 Warheads, cited in Mian and Ramana, p. 9. Senior Colonel Yao Yunzhu, "China's Perspective on Nuclear Deterrence," *Air and Space Power Journal*, Spring 2010; Michael Wines and Edward Wong, "China's Push to Modernize its Military Is Bearing Fruit," *The New York Times*, January 6, 2011. In 2011, Hua Han stated China has approximately 150 operationally deployed nuclear weapons. Statement made at a panel called "Two Triangles: India-Pakistan-China and China-U.S.-Russia," at the 2011 Carnegie Endowment International Nuclear Policy Conference, Washington, DC; "China Least Potent among N-powers, Says Harvard Study," *Times of India*, May 8, 2011. "The military's nuclear deterrent estimated by experts at no more than 160 [nuclear] warheads, has been re-deployed since 2008 into mobile launchers and advanced submarines that no longer are sitting ducks for attacks," *The New York Times*, January 6, 2011, p. A4.

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70 to 90 strategic nuclear weapons as opposed to India's 60 to 80. "Pakistan Has More Nukes and Fissile Materials than India," *Economic Times*, August 2, 2010.

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54. Leonard S. Spector, *Nuclear Proliferation Today*, New York: Vintage Books, 1984; Leonard S. Spector, New York: Vintage, 1985; Leonard S. Spector, *Going Nuclear*, Cambridge, MA: Ballinger Publishing Company, 1987; Leonard S. Spector, *The Undeclared Bomb*, Cambridge, MA: Ballinger Publishing Company, 1988; Leonard S. Spector with Jacqueline R. Smith, *Nuclear Ambitions*, Boulder, CO: Westview Press, 1990; Rodney W. Jones and Mark G. McDonough with Toby F. Dalton and Gregory D. Kolbentz, *Tracking Nuclear Proliferation: A Guide in Maps and Charts*, Washington, DC: Carnegie Endowment for International Peace, 1998; Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenal: Nuclear, Biological, and Chemical Threats*, 2nd Ed., Washington, DC: Carnegie Endowment for International Peace, 2005; Jeffery T. Richardson, *Spying On The Bomb: American Nuclear Intelligence From Nazi Germany to Iran and North Korea*, New York: W. W. Norton, 2006; Joseph Cirincione, *Bomb Scare: The History & Future of Nuclear Weapons*, New York: Columbia University Press, 2007.

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56. Alexander Glaser, "Weapons-grade Plutonium Production Potential in the Indian Prototype Fast Breeder Reactor," December 13, 2006, p. 38.

57. Hui Zhang.

58. Remarks of President Barack Obama, Prague, Czech Republic, April 5, 2009.

59. George N. Lewis and Theodore A. Postal, "A Flawed and Dangerous U.S. Missile Defense Plan," *Arms Control Today*, Vol. 40, No. 4, May 2010. To date, the United States has spent approximately \$100 billion on missile defense. Steven A. Hidreth and Amy F. Woolf, "National Missile Defense: Issues for Congress," Washington, DC: Congressional Research Service, July 17, 2001; Joseph Cirincione, "Brief History of Ballistic Missile Defense and Current Programs in the United States," Washington, DC: Carnegie Endowment for International Peace, July 1998; Sanger, p. 188.

60. Sanger, pp. 175-344.

61. Feroz Hassan Khan, "Prospects for Indian and Pakistani Arms Control and CBMs," Washington, DC: Nonproliferation Policy Education Center, Unpublished Analysis, 2010, p. 5.

62. Bob Woodward, *Obama's Wars*, New York: Simon & Schuster, 2010, pp. 3, 89, 99, 101, 108-9, 111, 187-88, 194, 203, 208-10, 214-16, 284-89, 296, 302-3, 328, 330, 355, 363-69, 379.

63. Sanger, p. 219.

APPENDIX 9-1

TEN STAGES OF NUCLEAR PROLIFERATION

Stage	Nuclear Weapons, Materials & Testing Characteristics	Delivery Characteristics
10	<p>Superpower Nuclear Forces 1,000-40,000 nuclear weapons; Stockpile 1,000-19,000 megatons; 100s metric tons of HEU and WGPu; Tritium and other materials production relevant to advanced nuclear weapons; around 50 nuclear weapons designs with full range of yields from sub KT to MT; 700-1,000 atmospheric, underground and underwater nuclear tests; 6-7 years from fission to multi-stage thermonuclear tests</p>	<p>Multi-generation triad systems: air (gravity bombs and ALCMs), land (MRBMs, IRBMs, ICBMs), and sea (SSBNs, SLBMs and SLCMs); MIRVs; Full range of ground-based tactical systems (ADMs, short range artillery, etc.); elaborate tactical nuclear weapons at sea (cruise missiles, depth charges, etc.)</p>
9	<p>Massive Nuclear Forces 600-1,000 nuclear weapons 34-210 nuclear tests; dozens of nuclear weapons designs tens metric tons HEU & WGPu</p>	<p>Similar to stage 10 except smaller number of delivery systems.</p>
8	<p>Mature Nuclear Forces 300-500 nuclear weapons; Stockpile 100-400 MT; around 1 metric ton of HEU & WGPu 24-210 atmospheric and underground tests 10-20 nuclear weapons designs 3-8 years from fission to multistage thermonuclear test</p>	<p>Two generations of triad systems: aircraft, IRBMs; SSBNs; MIRV or multiple RV technology; some tactical nuclear weapons systems</p>
7	<p>Large Nuclear Forces 150-200 weapons Stockpile 20-70 Mega Tons 8-52 nuclear tests around 10 nuclear weapons designs hundreds kg of HEU & WGPu</p>	<p>Not necessarily a true triad</p>

Stage	Nuclear Weapons, Materials & Testing Characteristics	Delivery Characteristics
6	Medium Nuclear Forces 100 +/- 25 weapons 7-38 nuclear tests around 5 nuclear weapons designs	Aircraft and 2nd-generation ballistic missiles
5	Modest Nuclear Forces 50 +/- 15 weapons 3-30 nuclear tests a few nuclear weapons designs	Aircraft and 1st-generation ballistic missiles
4	Small Nuclear Forces 20 +/- 5 weapons 1-16 nuclear tests 1-2 nuclear weapons designs	Aircraft only
3	Tiny Nuclear Forces 5 +/- 4 weapons 0-1 tests	Aircraft only
2	Threshold Nations	Assessment based on nuclear material production and nuclear weapons design capabilities
1	Watch List Nations	Assessment based on intentions, science and technology potential, and other country's fears

APPENDIX 9-2

ELABORATION OF STAGES ONE AND TWO

Stage	Stage Name and Indicators
1	Watch List Nations: Education, Training, and Nuclear Institution Building
	<p>Indicators: Beginning to establish a nuclear vision or dream among individuals who become future political or science and technology (S&T) leaders; initiate the development of personal networks of individuals who become key future decisionmakers with respect to nuclear issues; initiate advanced nuclear-related education and training of key individuals; establish nuclear organizations; start nuclear and related scientific research and development (R&D) projects; start construction of nuclear infrastructure and facilities; indicators of adequate levels of funding; cadre of individuals identifying external sources of technology and intellectual support. Nothing during this stage points specifically to a nuclear weapons program per se, but the level of effort suggests nuclear R&D may be favored over a broad S&T development strategy. Thus, it is possible a state at this stage is preparing a nuclear weapons option or just building a nuclear science infrastructure.</p>
2A	Threshold Nations: Initiate Gray-Area Activities Associated with a Nuclear Weapons Option
	<p>Indicators: Involvement of the head of state or very senior officials in discussion of relevant nuclear R&D decisions, suggesting either high-level interest or an initial government commitment to create, at a minimum, a nuclear weapons option; general external national security geo-political threats stimulate early development of a nuclear weapons "ideology" in the minds of individuals who become leaders; senior leaders attempt, but fail, to solve their national security problems through other policy approaches (i.e., security assurances, diplomacy, conventional military buildup); attempts to obtain nuclear technology and training from a friendly foreign source and try to keep the full extent of such cooperation secret; initiate gray-area nuclear purchasing of equipment and materials relevant to a nuclear weapons option; recruit people with specific skills and orientation relevant for possible production of nuclear weapons; make relevant organizational changes that show more than a normal nuclear science and technology R&D program is being developed; accelerate</p>

2A (cont.)	or initiate design and construction of unique facilities more relevant to a nuclear weapons option than to a peaceful nuclear program; experiments are conducted to give leaders evidence a nuclear weapons program might be successful, given their country's constraints; nuclear weapons advocates overcome domestic opposition from scientists who want to pursue strictly peaceful research; the country resists inclusion into some parts of the NPT regime; increased secrecy in parts of the nuclear program; indicators the nuclear weapons program, still at an "option" stage, is receiving significant funding and/or access to senior political leaders.
2B	Threshold Nations: Accelerate Nuclear Weapons Option Program
	Indicators: A consensus view develops among senior officials that your enemy is working on nuclear weapons or may even be ahead; there may or may not be an explicit decision by the head of state to build a nuclear bomb; evidence of institutional learning and maturation indicates the nuclear weapons development "system" is moving up a learning curve; specific external threats cement an orientation that the country must have nuclear weapons at all costs, essentially removing normal budget and organizational constraints; preliminary milestones are achieved, including successful operation of specific nuclear weapons-oriented facilities; successful diplomatic pushback against external nation-state efforts to get the country to participate in the NPT regime; internal opposition to a nuclear weapons-oriented program dissipates or disappears entirely.
2C	Threshold Nations: Opaque Crossing of the Technical Nuclear Weapons Threshold
	Indicators: The state acquires strategic quantities of un- safeguarded nuclear weapons material; successful nuclear weapons R&D completed; successful testing of non-nuclear components for nuclear weapons; a second echelon of scientists emerges to manage RDT&E of a full range of technologies relevant to nuclear weapons.

APPENDIX 9-3

HEURISTIC DRIVERS OF NUCLEAR PROLIFERATION AND 21ST-CENTURY MODERNIZATION

Drivers for China	1944-1976 ¹		1977-1998 ²		1999-present ³	
	%	Rank	%	Rank	%	Rank
Fear of U.S. attack	50	1	25	1	30	1
Senior leadership pressure & nationalism	20	2	15	3	10	6
Soviet-Russian Influences	20	3	10	5	15	3
Nuclear and missile scientists' pressure	5	4	20	2	10	5
PLA bureaucratic politics	5	5	10	6	5	7
Nuclear balance with India and Pakistan	0	-	0	-	5	8
Anti-Americanism	0	-	5	7	10	4
Desire for broad technical hegemony	0	-	15	4	20	2

Drivers for India	1946-1974 ⁴		1975-1998		1999-present	
	%	Rank	%	Rank	%	Rank
Head of state pressure	35	1	20	1	10	6
Nuclear and missile scientists' pressure	30	2	15	2	15	1
International prestige	15	3	10	4	10	5
China threat and its nuclear posture	15	4	15	3	15	2
Anti-Americanism	5	5	10	6	10	8
Pakistan terrorist threat	0	6	10	7	15	4
Nuclear balance with Pakistan and its nuclear posture	0	7	15	5	15	3
Bureaucratic politics within the military	0	8	5	8	10	7

Drivers for Pakistan	1955-1989 ^a		1990-1998		1999-present	
	%	Rank	%	Rank	%	Rank
Head of state pressure	25	1	10	7	5	7
Chinese support	20	2	15	2	15	3
Nuclear and missile scientists' pressure	20	3	25	1	10	6
Nuclear balance with India and its nuclear posture	15	4	10	4	15	4
Conventional balance with India	15	5	15	3	20	1
International prestige	5	7	5	8	5	8
Anti Americanism	5	8	10	5	10	5
Bureaucratic politics within the military	0	6	10	6	20	2

ENDNOTES - APPENDIX 9-3

1. Most scholars date the beginning of China's nuclear weapons program from 1955. However, even before the establishment of the PRC in 1949, the senior political leadership of the Communist Party emphasized training scientists overseas in advanced fields such as physics and then enticing them to return home. This laid the groundwork for a successful nuclear weapons program.

2. The beginning of this second phase in China's nuclear weapons program is hard to date. In contrast with the first phase—when development of nuclear weapons was the top national security priority—during the second phase, Chinese leaders began to moderate their deployment of nuclear weapons, as they emphasized other national priorities. The beginning of this second phase might have been as early as 1969, when Chinese leaders concluded the Soviets or Americans would find it difficult to initiate a nuclear war against them, even though Chinese nuclear forces at the time were limited (30-40 weapons) and rudimentary. Internal decisions to slow down deployment of nuclear weapons took place sometime between 1971 and 1975. Nixon went to China in 1972, which had the effect of convincing Chinese

leaders that war was not likely for many years or even decades. Mao died in 1976, and Deng returned to power thereafter. His first priority was the economy.

3. The year 1999 is very important to Chinese thinking about nuclear weapons. That year, the U.S. acceleration of SDI took place, the Cox Commission issued its harshly anti-China report, and the United States bombed the Chinese Embassy in Belgrade. It is still not clear whether the current phase of Chinese nuclear modernization will result in a significantly larger nuclear force or one that makes a dramatic break from the past and follows a warfighting nuclear doctrine. It is clear that Chinese nuclear modernization is taking place. This makes its strategic forces both more stable but also more potent.

4. The historical record is clear that India's nuclear energy program was designed to produce a nuclear weapons capability from its very beginning. Initial decisions were made by Nehru and Bhabha in 1946, before Indian independence. Additional decisions were taken in 1948, and the program was accelerated in 1958, due to concerns that China was working to develop nuclear weapons. India increased its nuclear budget and staff. The Department of Atomic Energy received even more autonomy, and Nehru approved Project Phoenix, a reprocessing plant designed to produce 10 kg of plutonium per year.

5. Pakistan set up its nuclear program in 1955. Ali Bhutto tried, and failed, to get Pakistan to take steps to build nuclear weapons in the 1960s. Then, in 1972, when he became Prime Minister, Ali Bhutto explicitly authorized a program to develop nuclear weapons. Steve Weissman and Herbert Krosney, *The Islamic Bomb: The Nuclear Threat to Israel and the Middle East*, New York: Times Books, 1981 pp. 42-52, 181. Most unclassified sources say Pakistan "crossed the line" in 1989. Adrian Levy and Catherine Scott-Clark, *Deception: Pakistan, the United States, and the Secret Trade in Nuclear Weapons*, New York: Walker & Company, 2007.

APPENDIX 9-4

THEORETICAL GROWTH POTENTIAL OF NUCLEAR WEAPONS

Scale	Monthly	Annual	One Decade	Two Decades
Small	0.5	5	50	100
	1	10	100	200
	1.5	15	150	300
	2	20	200	400
Medium	2.5	25	250	500
	3	30	300	600
	3.5	35	350	700
	4	40	400	800
	4.5	45	450	900
High	5	50	500	1,000

Click on map to expand to clarity. The following are excerpts from an article Nuclear Weapons Stability or Anarchy in the 21st Century: China, India, and Pakistan, dated February 25, 2011 by Thomas W. Graham, Ph.D. The article carries this disclaimer: "The views expressed in this paper are those of this author and do not reflect Brookhaven National Laboratory, the Department of Energy [America's nuclear weapon development umbrella organisation (DOE)] or any other organization. The analysis is based entirely on open source and unclassified information.". While the following is la On Limited Nuclear War in the 21st Century. Jeffrey A. Larsen. 4.5 out of 5 stars 4.Â "This book is an excellent contribution to the debate on the future role of nuclear weapons and nuclear deterrence in American foreign policy [Roberts] rightly argues that the USA cannot ignore North Korea's, Russia's and China's 'red theories of victory' and his book is an invaluable source that helps to understand them." (Mario E. Carranza Contemporary Security Policy). "Brad Roberts combines analytical skills and government experience to illuminate the nuclear choices of the 21st century. This lucid and original analysis of the deterrence landscape is