

Nuclear Weapons Stability or Anarchy in the 21st Century: China, India, and Pakistan
Thomas W. Graham, Ph.D.
Brookhaven National Laboratory*

Introduction

During the 20th century, the dominant nuclear weapons competition was between the Soviet Union and the United States. The U.K., France and Israel were loosely allied with the U.S., and China was allied with Russia until the Sino-Soviet split. However these four nuclear countries played a relatively minor role in the primary 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 super powers engaged in massive over-kill producing tens of thousands of nuclear weapons with yields from tons to Megatons.³ Both super powers 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 super powers 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 its massive over investment in nuclear weapons. Such expenditures provided relatively few positive economic or technical spin offs. This 20th century nuclear narrative is not likely to be repeated in the 21st century. However, its lessons are not now 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. decision makers 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 U.S.S.R., and relegation of Russia to second or third power status.

Twenty-first century nuclear postures in these two former super powers are driven by partisan and bureaucratic politics, NATO alliance relations, and fear --on the part of Russia -- that it can not 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

* The views expressed in this paper are those of this author and do not reflect Brookhaven National Laboratory, the Department of Energy or any other organization. The analysis is based entirely on open source and unclassified information.

Both the U.K. and France have reduced their nuclear forces to the point where 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 un-safeguarded 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 or the promise of cooperation with the global community.¹²

The next two decades of the 21st century will look very different than the 20th century with respect to nuclear weapons if today's business as usual paradigm continues. 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 U.S., Russia, the U.K., France, Israel, Iran, and the D.P.R.K. will be bystanders in this South West Asian nuclear drama. As a result, to help us assess forthcoming global nuclear stability, it is imperative to take a fresh look at the dynamics of contemporary nuclear force structures and modernization in South West Asia.

To more accurately describe 21st century nuclear proliferation, this essay introduces a ten-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 paper will describe the emergence of five incompatible nuclear dogmas that seem to be driving approximately twenty nuclear relevant countries in the 21st century. This essay 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 South West 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 South West Asia over the next two decades. This essay ends with a challenge to current conventional wisdoms with respect to South West Asia's role to foster or undermine global nuclear stability.

Vocabulary for 21st Century Nuclear Proliferation

In this century, the old vocabulary used to describe 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 are not adequate to describe meaningful differences in countries' nuclear status today. To solve this problem, a ten-stage categorization of nuclear weapons status has been developed. It draws on seventy years of nuclear history, see **Appendix One**. Stage One (Watch List Nations) and Stage Two (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 Two and Stage Three (Tiny Nuclear Forces). At the other end of this categorization, Stage Ten (Superpower Nuclear Forces) describes the U.S. and U.S.S.R. with tens of thousands of nuclear weapons and sophisticated associated capabilities. These two countries largely defined the vocabulary of nuclear weapons status. However, 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 two decades, it is conceivable both the U.S. and Russia will reduce their nuclear forces to the level of ~1,000 operationally deployed nuclear weapons.¹⁵ If they do so, this would move them down to Stage Nine (Massive Nuclear Forces).

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

Nations that have developed first generation nuclear weapons vary from Stage Three (Tiny Nuclear Forces) to Stage Six (Medium Nuclear Forces). Virtually all of the open source or academic literature on nuclear proliferation lumps countries that have passed the nuclear weapons threshold into one category, *de facto* nuclear weapons states. This paper argues the degree of nuclear weapons production, development and deployment of delivery systems, and creation of nuclear doctrine and postures cannot be described in a single category. This ten-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 South West Asia--China, India, and Pakistan--the key question is whether each country will chose as its end point nuclear forces and postures associated with Large, Mature, or Massive Nuclear Forces. It is the thesis of this essay 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 One or Stage Two. 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 Two**. 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 South West Asia.¹⁶ If hedging in the Middle East & East Asia and modernization in South West Asia take place, the prediction that twenty states obtain or maintain nuclear weapons that President Kennedy feared in 1960 may become real 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 1*.

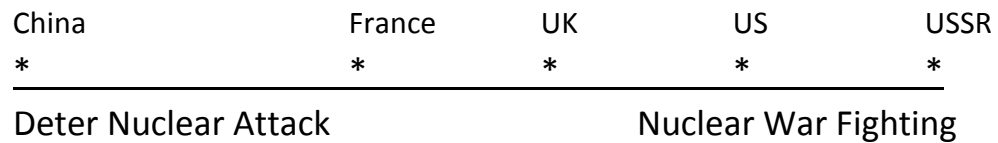


Figure 1: Twentieth Century Nuclear Dogma

Countries on the right, such as the U.S.S.R/Russia and the U.S., built excessive nuclear forces for nuclear war fighting. 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 war fighting and deterrence, but their small nuclear forces were relatively marginal to the 20th century nuclear balance of power.

In retrospect, Cold War history demonstrated that nuclear weapons served many different functions in addition to deterring the use of nuclear weapons, see *Figure 2*.



Figure 2: Functions of Nuclear Weapons in the 20th Century

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 stand-off was characterized by the U.S. and NATO attempting to deter over-whelming conventional forces from the U.S.S.R. and Warsaw Pact with nuclear weapons in the context of 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 preparations, 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 decision-makers never anticipated authorizing a first strike despite their considerable preparations to do so.

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 twenty countries have nuclear programs that can be described from 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 U.S., U.K. 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 remain broad. Nuclear weapons continue to play an important role in domestic and bureaucratic politics. For example, the recently completed 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 U.S., even this incremental change triggered dramatic increases in spending on offensive nuclear weapons and infrastructure and intense partisan political struggle over future 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 is more extreme today than it was during the Cold War.²⁴ This suggests that in political terms, movement toward zero nuclear weapons is dead in the United States. In the U.K. 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 D.P.R.K., and Iran—seem to be embracing the broadest possible function for nuclear weapons. At least two of them have adopted doctrines that emphasize nuclear war fighting. Russia and Pakistan are treating nuclear weapons as the single essential military capability to allow them to defend their territory against superior conventional forces of NATO and India respectively. The D.P.R.K. and Iran have incorporated nuclear weapons into hyper nationalism associated with protection of their country’s 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 America of 2011.

Countries in a third group include China, Israel, and India. 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 One, Stage Two or Stage Three, 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 with-out much stake in the existing world order. These countries are rejecting 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 under-investing in other tools to maintain their sovereignty 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 3*.

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

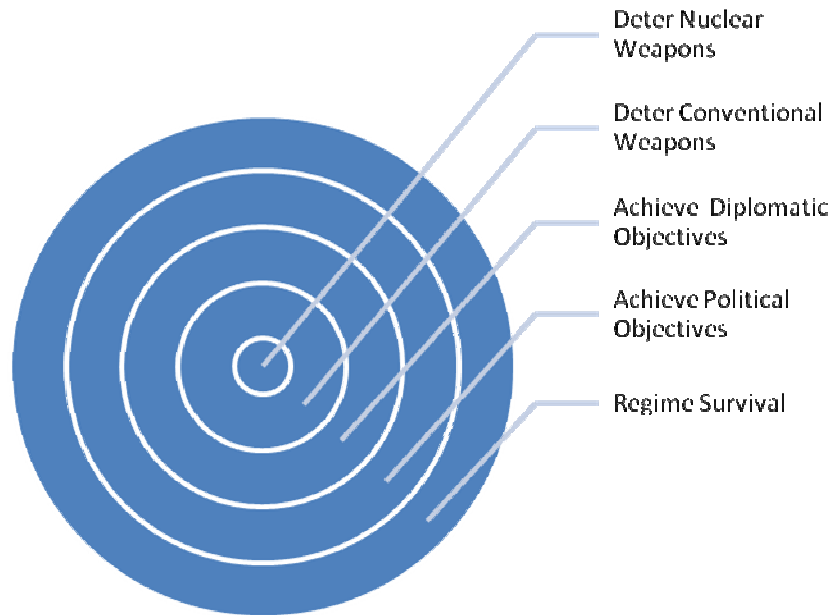


Figure 3: Functions of Nuclear Weapons in the 21st Century

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 five 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 U.S. 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 its nuclear weapons may be most vulnerable to theft from terrorists.³² Authoritative Pakistani statements of its 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, 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 terrorist groups it created

suggest that another terrorist attack against India could take place at any time. 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 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.³⁴ 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 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 which is reported to be designed to have inter-continental range to hit all targets in China.³⁵ India is also engaged in research on ballistic missile defense that 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 India can use fission weapons and accurate delivery systems to achieve the same deterrent effect that thermonuclear weapons and inaccurate ICBMs achieved in the 20th century.³⁶ 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.³⁷ The Prime Minister's entire career has been dedicated to give 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 life long goal to make India a major world power by using its proven comparative advantages such as skilled manpower, the rule of law, a vibrant civil society, and 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.³⁸

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.³⁹ Whether Pakistan is ahead of India or not in terms of nuclear weapons capabilities is a debatable point. However, if 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 U.S. in a 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, or 400 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 more dependent on nuclear weapons? Will Pakistan continue its own Cold War ideology toward India?⁴⁰ Will Pakistani military decision making continue to exhibit deeply flawed logic that led it to start and lose four conflicts with India?⁴¹ If Pakistan follows this path, the lesson of the former Soviet Union should loom large.

There is no debate China is building up its conventional military capabilities across the board.⁴² China is modernizing its nuclear force, but it is also retiring old nuclear delivery systems. Some descriptions of the growth in Chinese missile systems describe medium range systems that may be armed with both nuclear and conventional warheads.⁴³ Thus it is not clear whether the *net increase* in Chinese operationally deployed nuclear weapons is significant in quantitative terms.⁴⁴ It is clear China is replacing vulnerable liquid-fueled systems with mobile and solid-fueled systems. Thus 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 give it a massive break-out potential in terms nuclear capable delivery systems.⁴⁵ As a result, Chinese perceptions of the legitimate role for nuclear weapons and Chinese perceptions on how the United States targets China are extremely important. This goes back to the emerging consensus of the legitimate role for nuclear weapons in the 21st century. Will it be narrowed in the 21st century to the inner most circle shown in Figure 2 or will it be expanded to the outer-most circle in Figure 3?

Beginning in 1970 China has embarked on the largest expansion of nuclear power in the world.⁴⁶ 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 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 US/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 (HTGR) reactors and breeder reactors.⁴⁷

The magnitude of this expansion has several implications for nuclear proliferation on a global basis. First it will create financial pressure on the IAEA to safeguard all these nuclear power plants. Second, in terms of the world export market, once China firmly establishes which reactor will become its dominant 3rd Generation model and proves its indigenous construction capabilities, it will become a major potential exporter of nuclear 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).⁴⁸ 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 suggests China may have a huge potent break-out capability up to 800 nuclear weapons.⁴⁹ 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 the 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 essay, it is assumed China has 150 operationally deployed nuclear weapons +/- 50.⁵⁰ It is assumed that both India and Pakistan have approximately 80 nuclear weapons +/- 20.⁵¹

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.⁵² Second, most assessments of the India-Pakistan nuclear balance have argued India has been ahead of Pakistan for several decades.⁵³ This may or may not be correct today. Based on the assumptions used in this essay, 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 reactor grade plutonium in their nuclear weapons. Pakistan has a huge appetite for nuclear weapons and has publicized no statements that provide any suggestion an end point is yet in sight.⁵⁴

A review of the history of Chinese, Indian, and Pakistan nuclear weapons programs reveals that each started with multiple drivers, see **Appendix 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, 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 decision-makers 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 war fighting 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 South West Asia, not in the Middle East or North East Asia.

A close examination of the drivers in each country suggests that Indian scientists have a major influence on government decision-making. Drawing on the excellent article in this volume by Mian and Ramana, Indian policy makers have always sought to maintain the capability to use its civilian nuclear power program for weapons purposes. Not only does India have an estimated 6.8 ton stockpile of mostly un-safeguarded RGPu, but it has the potential to produce WGPu in its eight un-safeguarded power reactors and its breeder reactor. 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 South West Asia

A review of **Appendix Four** reveals that even 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 two decades. Unclassified assessments of China, India, and Pakistan show that each country has the technical infrastructure to produce un-safeguarded nuclear material at this level of magnitude.⁵⁵ 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 U.S. and Russia, it could reach the level of ~1,000 nuclear weapons within two decades. This would probably require it to resume production of fissionable material for weapons purposes or use RGPu to produce nuclear weapons.⁵⁶

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 South West 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 two 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 among China, India, and Pakistan could stabilize around 150-200. From Pakistan's perspective, this would require that its legitimate security concerns vis a 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 decision makers in China, India, and Pakistan. As recommended by Mian and Ramanna 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. However, 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 war fighting over the next two 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 CTBT and 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.⁵⁷ However, its actions reflect a business as usual proclivity. The administration

is acting as if nuclear weapons represent one issue area which can be partitioned into its own narrow policy lane and managed by mid-levels officials within the U.S. government. This is understandable given the pressing economic, environmental, terrorism 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 Capital 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 U.S. and China, one can predict with a high degree of confidence that business as usual will produce nuclear arms races in South West Asia for decades.

Other reasons to sustain a business as usual approach are obvious. America will continue to spend approximately ten billion dollars per year on national missile defense to neutralize potent domestic constituencies regardless of technical feasibility and negative impact on Russia and China.⁵⁸ 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.⁵⁹ Honest and capable civilian political leadership in Pakistan is almost entirely lacking and will take many years to develop and mature. Pakistani born Islamic terrorists and "India-phobic and paranoid"⁶⁰ Pakistani strategic culture is acknowledged by American decision makers as a key problem, but American decisions and actions are focused almost exclusively on the war on terror.⁶¹ The perception persists in both Washington and Islamabad that "the U.S. needs Pakistan more than Pakistan needs the U.S.." In this context, adding the nuclear weapons issue to an overly crowded policy agenda with Pakistan will definitely over-load 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 highly enriched uranium. They will take symbolic steps to better secure nuclear materials and weapons, but the question of "how much is enough" is off the table.⁶²

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 two decades of the 21st century. South West Asia will be the dominant driver to an unstable world our children will rightly accuse us of having ignored to their peril. American decision makers in the 1980s

chose to ignore on the ground realities after the Soviets were defeated in Afghanistan.
The blow back next time will be orders of magnitude larger and more tragic.

Appendix One: 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 Mega Tons; 100s Metric Tons of HEU and WGPu; Tritium and other materials production relevant to advanced nuclear weapons; ~ 50 nuclear weapons designs with full range of yields from sub Kt to MT; 700-1,000 atmospheric, underground and under water 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 MegaTons; ~ 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, IRBM; SSBNs; MIRV or multiple RV technology; some tactical nuclear weapons systems</p>
7	<p>Large Nuclear Forces 150-200 weapons Stockpile 20-70 MegaTons 8-52 nuclear tests ~ 10 nuclear weapons designs hundreds kg of HEU & WGPu</p>	<p>Not necessarily a true triad</p>
6	<p>Medium Nuclear Forces 100 +/- 25 weapons 7-38 nuclear tests ~ 5 nuclear weapons designs</p>	<p>Aircraft and 2nd generation ballistic missiles</p>
5	<p>Modest Nuclear Forces 50 +/- 15 weapons 3-30 nuclear tests a few nuclear weapons designs</p>	<p>Aircraft and 1st generation ballistic missiles</p>

Stage	Nuclear Weapons, Materials & Testing Characteristics	Delivery Characteristics
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, S&T potential, and other country's fears

Appendix Two: Elaboration of Stages One and Two

Stage	Stage Name and Indicators
1	Education, Training and Nuclear Institution Building
	<p>Indicators: Beginning to establish a nuclear vision or dream among individuals who become future political or S&T leaders; initiate the development of personal networks of individuals who become key future decision-makers with respect to nuclear issues; initiate advanced nuclear-related education and training of key individuals; establish nuclear organizations; start nuclear and related scientific R&D projects; start construction of nuclear infrastructure and facilities; indicators of adequate levels of funding; cadre of individuals identify external sources of technology and intellectual support. Nothing during this stage points <u>specifically</u> to a nuclear <u>weapons</u> 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	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 <u>option</u>; general external national security geo-political threats stimulates 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 problem by other policy approaches (i.e. security assurances, diplomacy, conventional military build up); attempts to obtain nuclear technology and training from a friendly foreign sources 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 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.</p>

Stage	Stage Name and Indicators
2B	Accelerate Nuclear Weapons Option Program
	<p>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 cements 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 push back 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.</p>
2C	Opaque Crossing of the Technical Nuclear Weapons Threshold
	<p>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.</p>

Appendix Three: Heuristic Drivers of Nuclear Proliferation and 21st Century Modernization

Drivers for China	1944-1976 ⁶³		1977-1998 ⁶⁴		1999-present ⁶⁵	
	%	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 ⁶⁶		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 ⁶⁷		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

Appendix Four: 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

End Notes

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¹¹ Exceptions to the proclivity to ignore Israel's nuclear weapons program can be seen in Avner Cohen (1983), Israel and the Bomb (New York: Columbia University Press). Victor Gilinsky, "Casting a

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¹² Joel S. Wit, Daniel B. Poneman, and Robert L. Gallucci (2004), Going Critical: The First North Korean Nuclear Crisis (Washington, D.C.: The Brookings Institution Press). A highly informed assessment that the DPRK might be willing to give up its nuclear weapons if the U.S. implemented its agreements is contained in Leon V. Sigal, (2010) "Primer-North Korea, South Korea, and the United States: Reading between the lines of the Cheonan attack," Bulletin of the Atomic Scientists, Vol. 66, No. 5 pp. 35-66.

¹³ This author is in agreement with a comment made by George Perkovich that the South West Asia triangle of China, India, and Pakistan is influenced by a U.S.-Russia-China triangle. This comment was made at the conference Life After START: New Challenges, New Opportunities, Washington D.C. January 27, 2011.

¹⁴ Bruno Tertrais, "After Iran: Prospects for Nuclear Proliferation in North Africa." Douglas Frantz "Nuclear Proliferation Prospects in the Middle East to 2015."

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²² United States Institute of Peace op. cit.

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 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.

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⁵⁷ Remarks of President Barach Obama, Prague, Czech Republic, April 5, 2009.

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⁶² David E. Sanger (2009), The Inheritance: The World Obama Confronts and the Challenges to American Power (New York: Harmony Books, p. 219)

⁶³ Most scholars date the beginning of China's nuclear weapons program from 1955. However, even before establishment of the PRC in 1949, the senior political leadership of the Communist Party emphasized training scientists over-seas in advanced fields such as physics and then enticing them to return home. This laid the ground-work for a successful nuclear weapons program.

⁶⁴ 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 force at the time were limited (30-40 weapons) and rudimentary. Internal decisions to slow down deployment of nuclear weapons took place some time 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. He put first priority on the economy.

⁶⁵ The year 1999 is very important to Chinese thinking about nuclear weapons. In this year the U.S. acceleration of SDI, the Cox Commission issues 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 war fighting nuclear doctrine. It is clear Chinese nuclear modernization is taking place. This makes its strategic forces both more stable but also more potent.

⁶⁶ 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 concern 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.

⁶⁷ 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, he explicitly authorized a program to develop nuclear weapons. Steve Weissman and Herbert Krosney (1981), The Islamic Bomb: The Nuclear Threat to Israel and the Middle East (New York: Times Books) pp. 42-52, 181. Most unclassified sources say Pakistan "crossed the line" in 1989. Adrian Levy and Catherine Scott-Clark (2007), Deception: Pakistan, the United States, and the Secret Trade in Nuclear Weapons (New York: Walker & Company).