Security Doctrines, Technologies and Escalation Ladders: A Pakistani Perspective

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South Asia's strategic landscape is characterized by a decades-old and deeply-rooted rivalry between two unequal states, India and Pakistan, which is grounded in history. Their mutual relationship is embedded in a perpetual cycle of hostility in which overt nuclearization of the region has brought a semblance of stability in an otherwise unequal equation. Pakistan is continually faced with a security dilemma emanating from a perceived threat to its existence from a much larger and more resourceful India. This stability is increasingly challenged by existing and projected asymmetries and disparities in conventional forces, fissile material stockpiles, high-technology hardware inductions, missile defences (BMDs), and ballistic missile nuclear submarines (SSBNs). This strategic imbalance is being further aggravated by multi-lateral international support for India's military and nuclear modernization programs while Pakistan continues to be left out. Therefore, the only feasible option available for Pakistan is to increase the credibility of its minimum nuclear deterrent and to rely more on the nuclear option from the menu of available choices.

Conventional Asymmetries

Conventional asymmetries are at the heart of Pakistan's security dilemma, and an important motivating factor in the country's drive to acquire nuclear capability. The South Asian conventional asymmetry is reflected by the fact that India currently fields the world's third largest conventional army with 1,325,000 active personnel and another 2,142,821 in reserve with an annual military budget of $36.67 billion, the world's tenth largest. Its Air Force is the fourth largest in the world, with 170,000 personnel and approximately 1,351 aircraft including fourth-generation SU-30 MKI multi-role aircraft. The Indian Navy stands as the fifth largest in the world, with over 171 vessels, around 250 aircraft, and 16 submarines.[1] The India-Pakistan conventional imbalance, as of 2009-2010, can be seen in the following tables[2]:

India and Pakistan Active Military Manpower Strength

(in thousands)

	Air Force	**Navy**	**Army**
India	127.2	58.35	1129.9
Pakistan	45	22	550

[1] Masood-ur-Rahman Khattak, "Indian Navy: A Force to Reckon With," *Weekly Pulse*, July 16, 2011. Available at: http://www.weeklypulse.org/details.aspx?contentID=959&storylist=10. Accessed on September 15, 2011.

[2] Anthony H. Cordesman and Robert Hammond, *The Military Balance in Asia: 1990-2010—A Quantitative Analysis* (Washington DC: Center for Strategic and International Studies, September 14, 2010). Available at: http://csis.org/files/publication/100914_AsiaMilitaryBalance2010.pdf . Accessed on September 15, 2011.

Army Manpower and Equipment

Countries	Guns	Surface-to-Air Missiles	Artillery	Helicopters	Personal Carriers	Tanks
India	2395	3500	11258	222	1786	4047
Pakistan	1900	2990	4291	161	1266	2461

Armored Fighting Vehicles

Countries	Armored Personal Carriers	Main Battle Tanks
India	331	4107
Pakistan	1266	2461

Air Force Manpower and Equipment

Countries	Fighter/Ground Attack Aircraft	Aircraft, transport	Air Force Combat fixed wing
India	96 + 536	213	632
Pakistan	233+ 104	25	337

Navy Manpower and Equipment

Countries	Aircraft	Frigates	Helicopters	Mine Warfare Vessels	Patrol and Coastal Combatants	Coastal Patrol Craft	Submarines	Other Patrol Craft
India	94	12	107	10	28	15	17	28
Pakistan	12	7	10	3	8	2	8	4

Air Force Manpower and Equipment

Countries	Fighter Aircraft	Fighter Ground Attack Aircraft	Aircraft Recee	Aircraft, Transport	Air Force Combat Aircraft Fixed Wing
India	96	536	3	213	632
Pakistan	233	104	15	25	337

These existing conventional asymmetries are poised to grow significantly in the next decade when India is likely to spend more than $112 billion through 2016 on arms acquisitions. These include the co-production of 250-300 Indo-Russian stealth Fifth Generation Combat Aircraft (FGFA/PAK FA) by 2020, worth $30 billion; acquisition of 126 Medium Multi-Role Combat Aircraft (MMRCA) worth over $12 billion, $6 billion worth transport aircraft such as C-17[3], and six C-130J `Super Hercules' aircraft for Indian special forces worth $962 million. In pursuit of building a blue-water navy, India is acquiring eight Boeing P-8I long-range maritime reconnaissance (LRMR) aircraft worth $2.1 billion with a provision for ordering four to eight more such planes. These aircraft will be equipped with Harpoon anti-ship missiles and capable of anti-submarine warfare and anti-surface warfare. India has already concluded deals worth $1.5 billion for the Russian aircraft carrier Admiral Gorshkov and $1.1 billion for three Israeli 'Phalcon' AWACS (Airborne Warning and Control Systems) prior to the 2004 general elections.[4]

Moreover, the Indian Navy is likely to spend about $40 billion between 2008 and 2013 on acquiring state-of-the-art weapons systems and force multipliers. As part of its Field Artillery Rationalization Plan, the Indian Army plans to induct 4000 new 155mm artillery pieces worth contracts of more than $4 billion.[5] These will include Self-Propelled Artillery pieces, which India lacks and will be critical to the success of Cold Start Doctrine (CSD) or any other proactive and offensive operation against Pakistan. During 2009-2010, India became the world's largest importer of conventional arms and equipment.[6]

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[3] Pratab Chakravarty, "India Arms Race offers Prizes for Presidential Visits," AFP, October 25, 2010. Available at: http://www.google.com/hostednews/afp/article/ALeqM5he1sy8N9lhJQxzmBAoi5_1Cn8K2w?docId=CNG.208b9d6ccaec0fec7dab7bf5ab33762a.e1. Accessed on September 15, 2011.

[4] Rajat Pandit, "India Inks Largest Ever Defence Deal with U.S," *The Times of India,* January 5, 2009. Available at: http://articles.timesofindia.indiatimes.com/2009-01-05/india/28045146_1_vivek-lall-boeing-p-8i-defence-deal. Accessed on September 15, 2011.

[5] "Murky Competitions for Indian Howitzer Orders May End Soon… Or Not," *Defense Industry Daily*, January 27, 2011. Available at: http://www.defenseindustrydaily.com/murky-competition-for-2b-india-howitzer-order-may-end-soon-0805/. Accessed on September 15, 2011.

[6] "TIV of Arms Imports to the top 50 Largest Importers: 2009-2010," Stockholm International Peace Research Institute (SIPRI) Arms Transfer Data Base, September 15, 2011. Available at: http://armstrade.sipri.org/armstrade/html/export_toplist.php. Accessed on September 15, 2011.

The Indian Strategic Triad and Ballistic Missile Defenses

India is believed to be heading towards developing a strategic triad force of 400 plus nuclear warheads consisting of nuclear and thermonuclear weapon designs.[7] This goal is earmarked to be achieved by 2030. [8] India's National Command Authority (NCA), with Prime Minister Manmohan Singh in the chair, reviewed progress towards setting up a nuclear triad in May 2011, during which development work on the 5000 km range Agni-V ballistic missile and on India's nuclear submarine, INS Arihant, were discussed.[9] South Asian strategic stability is likely to be adversely affected by India's massive acquisition spree for state-of-the-art conventional weapon systems, which are being sought to replace existing obsolete hardware, or improve the fighting capability of the Indian military. India currently holds five land-based, nuclear capable ballistic missile systems. These range from the short-range Prithvi-I to the under-development Inter-continental Ballistic Missile (ICBM), Agni-V. Between 2015 and 2020, India's strategic nuclear missile force will include Agni III and Agni IV missiles and these may be equipped with enhanced warheads. It is possible that these two systems will be designed to carry multiple independently targetable reentry vehicles (MIRVs), to beat any enemy (likely Chinese) ballistic missile defences.[10]

India is also seeking to develop the sea-leg of its triad which will include the Sagarika/ K-15 Submarine Launched Ballistic Missile (SLBM) for its *Arihant* nuclear powered submarines. It has a payload of 500-600 kg and a range of 300-700 km and was first test launched on February 26, 2008 from a submerged platform.[11] The mainstay of India's sea-based nuclear deterrent will be the Advanced Technology Vessel (ATV) or *Arihant*. It was launched from India's Ship-building Center at Visakhapatnam, situated on India's east coast on July 26, 2009. India plans to have a fleet of five ATVs by the end of the current decade. The submarine is designed to have twelve vertical launch tubes for the K-15 class SLBMs and a dedicated naval base is also being planned to house the ATVs. The K-15 missiles are being augmented with the nuclear-capable 350 km Dhanush ship-launched ballistic missile.[12]

These capabilities will be supplemented by India's own Ballistic Missile Defence (BMD) architecture, designed to neutralize Pakistani and Chinese ballistic missiles which will serve to degrade the effectiveness of Pakistan's nuclear deterrent. NATO has recently offered BMD technologies to India, which is poised to deploy an operational BMD system by 2014.[13] India is also collaborating with Israel in BMD technologies, especially in the joint development of radars for interceptor missiles and claims to have carried out a successful test of against an incoming ballistic

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[7] Bharat Karnad, *India's Nuclear Policy* (London: Praeger Security International, 2008), p. 143
[8] Ibid, p. 84.
[9] Rajat Pandit, "Manmohan Singh Takes Stock of Country's Nuclear Arsenal," *The Times of India,* May 17, 2011. Available at: http://articles.timesofindia.indiatimes.com/2011-05-17/india/29551329_1_ins-arihant-nuclear-arsenal-uranium-based-nuke-program. Accessed on September 15, 2011.
[10] Robert S. Norris and Hans M. Kristensen, "Indian Nuclear Forces 2010," *Bulletin of the Atomic Scientists*, Vol. 66, No.5(September/October 2010), pp. 76–81.
[11] Ibid.
[12] Ibid.
[13] "NATO offers Missile Defence Cooperation to India," *The Times of India*, September 4, 2011. Available at: http://articles.timesofindia.indiatimes.com/2011-09-04/india/30112637_1_ballistic-missile-defence-defence-system-missile-threats. Accessed on September 15, 2011; Raja Pandit, "India Kicks off Work on Advanced Missile Defence Shield," *The Times of India*, May 10, 2009. Available at: http://articles.timesofindia.indiatimes.com/2009-03-10/india/28027742_1_interceptor-missile-missile-defence-bmd-system. Accessed on September 15, 2011.

missile.[14] The country has evaluated Patriot PAC-3 and the Israeli Arrow-2, and the Russian S-300V BMD systems, [15] with the latter reportedly deployed in limited numbers around Delhi.

Even though the effectiveness of any BMD system is debatable, the likely deployment of an Indian BMD would presumably be effectiveagainst Pakistan. This will provide a false sense of security and invulnerability to Indian strategic decision-makers in times of crises, which can lead them into believing that they can probably absorb a Pakistani first strike and then carry out massive retaliation. Any such miscalculation may prove to be disastrous for stability in South Asia and will inevitably drive Pakistani decision-makers towards building countermeasures and improving the quantity and quality of their strategic forces. Coupled with growing conventional asymmetries, a triad-based strategic nuclear force, doctrines such as Cold Start, and ever increasing Indian fissile material stockpiles, Pakistan should only be expected to feel isolated. International support for India's nuclear and strategic build-up while denying Pakistan support for purely civilian uses of atomic energy will only push the country deeper into an increasingly acute security dilemma.

Pakistan's Response: Options and Trends

In view of these developments and possible future trends, the choices before Pakistan are limited, yet quite obvious. These are considered necessary to ensure the credibility of the country's minimum deterrent as conventional asymmetries with India and its growing fifth-generation technologies cannot be matched by Pakistan. The deployment of any Indian BMD system is likely to trigger a new missile race in South Asia, as Pakistan will be forced to develop more accurate and survivable missile systems. These are likely to be equipped with countermeasures designed to defeat or at least significantly reduce the effectiveness of the adversary's ability to detect, intercept and destroy incoming ballistic missiles.

Countermeasures could range from Maneuverable Re-entry Vehicles (MRVs) to maneuverable warheads deployed on single warhead systems such as the road-mobile Shaheen-I & II. These missiles can be launched on relatively short notice and are capable of striking targets deep inside India. Pakistan may already have developed MRVs for its Shaheen series of missiles, which would make it difficult for Indian BMD's to shoot them down.[16] However, the development and deployment of Multiple Independently Targetable Re-entry Vehicles (MIRVs) seems to be the logical next step for Pakistan as a response to India's BMD. But MIRVs require mastery in developing miniaturized, efficient, lightweight, powerful warheads whose yield may vary from kilotons to megatons. If the official claim of having built a nuclear-capable tactical/battlefield ballistic missile NASR is credible, then Pakistan appears to have succeeded in acquiring the capability to miniaturize nuclear warheads to the extent that these can be launched from tactical, MIRVs and cruise missiles.

With MIRV and miniaturized warhead capability in place, Pakistan is likely to proceed with the deployment of compact and sophisticated plutonium-based boosted-fission and/or thermonuclear warheads on a variety of launch platforms, such as aircraft, land-based mobile or silo-launched ballistic missile sites, and most importantly submarines. The technological-push factor compels the various organizational stakeholders in the security establishment of a nation-state to lobby for more potent weapon systems so as to secure continued funding and influence in strategic

[14] Y. MalikkArjun, "Interceptor Missile Hits the Bulls Eye," *The Hindu*, July 26, 2010. Available at: http://www.thehindu.com/news/article535042.ece. Accessed on September 15, 2011.
[15] "India Kicks off Work on Advanced Missile," op. cit.
[16] Dr. Samar Mubarakmand, Interview with Hamid Mir. *Capital Talk*. Geo Television. March 05, 2004.

decision-making. Hence, with the miniaturization barrier overcome, the logical next step for Pakistan would be to develop MIRVs for all its medium and long-range ballistic missiles and continue to improve the range of its cruise missiles. Since Pakistan does not have access to any BMD technology, and does not have any resources for acquiring such high-technology systems from a foreign supplier, its only option is to develop suitable countermeasures.

Miniaturization of warheads has also allowed India and Pakistan to deploy nuclear-tipped Submarine Launched Cruise Missiles (SLCMs). In Pakistan's case, availability of plutonium and possibly tritium from the Khushab Nuclear Complex in the last fourteen years and the expansion in the production capacity at this site will allow Pakistan to develop boosted-fission warheads for its SLCMs, such as the naval version of Babar.[17] Such warheads can also be deployed on conventional attack submarines (SSKs) such as the Pakistani Air Independent Propulsion (AIP) equipped Agosta 90-Bs in the future. Pakistan will also be acquiring six Chinese Qing-class AIP SSKs which can launch anti-ship and land-attack cruise missiles from its torpedo tubes. This does come close to a reliable, if not assured second strike capability. Both countries also have ongoing uranium enrichment programs to provide the highly-enriched uranium fuel for naval propulsion reactors.

Cold Start and Tactical Nuclear Weapons

While the prospect of deterrence based on Mutually Assured Destruction (MAD) provides stability by reducing incentives for aggression, it encourages limited conventional war under the nuclear umbrella. This puzzle, popularly known as the stability-instability paradox, offers a safety valve against escalation to full-scale conventional war. The lessons of the Kargil conflict and India's unsuccessful maneuvering against Pakistan in the 2002 and 2008 crises led to the genesis of the Cold Start Doctrine (CSD). It reflects Indian strategic thinking on limited war under the nuclear umbrella while the concept itself has been put to the test in various exercises, close to the border with Pakistan. However, it seeks to avoid escalation of the conflict to an all-out war, which may lead to a nuclear exchange and stops short of triggering Pakistan's nuclear thresholds. Writing in *Indian Army Vision: 2020,* Brig. (Ret.) Gurmeet Kanwal, Director of Center for Land Warfare Studies (CLAWS) and one of the chief proponents of the CSD, epitomizes Indian strategic thinking on Cold Start:

> Pakistan relies heavily on its first strike doctrine to deter conventional conflict with India and, under the shadow of its nuclear umbrella, it continues to wage a low-intensity 'proxy war.'[18] Deterrence, as is well known, is ultimately a mind game. There is an undeniably close link between nuclear weapons and a nation's conventional military capabilities. Any nation with a weaker conventional warfare capability vis-à-vis a nuclear-armed adversary would be inclined to rely on a first use strategy to defeat a conventional military offensive that may otherwise be unstoppable. Pakistan finds itself in this situation. However…while Pakistan may initiate a graduated nuclear response…, and achieve short-term tactical gains, India is likely to retaliate massively as per its declared nuclear doctrine of punitive retaliation and Pakistan would cease to exist as a viable nation state… It is a suicidal policy indeed for

[17] Usman Ansari, "Pakistan Seeks To Counter Indian ABM Defenses," *Defense News,* March 21, 2011. Available at: http://www.defensenews.com/story.php?i=6012501. Accessed on September 15, 2011.

[18] Gurmeet Kanwal, "Conventional Operations under Nuclear Overhang," *Indian Army: Vision 2020* (New Delhi, Harper Collins, 2008), p.70.

> Pakistani defence planners and policy makers to glibly talk of initiating nuclear exchanges with India without having an escalation dominance capability.[19]

> India too has many rather vocal advocates of tactical nuclear weapons who are critical of the country's no first use strategy and recommend a tit-for-tat response. Many Indian analysts recommend that in response to a Pakistani nuclear strike on Indian forces, India too should employ only tactical nuclear weapons on Pakistani forces, rather than raise the nuclear ante to full-scale retaliation.[20]

Callingit a valid argument, he claimed that it would undermine the efficacy of India's nuclear deterrence and its conventional superiority vis-à-vis Pakistan. He then goes on to advocate "India's Best Option" which is to "Strike Hard, Strike Deep."[21]

> Of course, Pakistan may choose to drop nuclear weapons over one or two Indian cities in addition to or instead of attacking the advancing mechanized forces. It is this scare scenario that appears to worry Indian analysts and policy planners and has given rise to the view that India should plan to limit its ground offensive against Pakistan to tactical-level, shallow-depth objectives such that the offensive formations will not cross Pakistan's low nuclear threshold. If this logic is accepted, India's conventional superiority against Pakistan will stand negated. Such a course of action would naturally play straight into Pakistan's hands[22]… The Indian Army would be left with the option to plan to seize a long narrow strip of Pakistani territory virtually all along the front by launching a number of limited, shallow-objective offensives without setting off Pakistan's nuclear alarm bells. The only sensible option for India would be to call Pakistan's nuclear bluff and plan to launch Strike Corps offensive operations to achieve strategic gains in as early a time-frame as is militarily possible.[23]

The CSD is further aimed at the destruction of major components of Pakistan's war-waging machine by launching joint air-land offensives employing conventional forces. All of these objectives can only be achieved if deep sledgehammer blows are launched jointly by the Indian Army and Air Force during the next war with Pakistan. The need to be able to mobilize quickly ('Cold Start') and launch multi-pronged offensives deep into Pakistan, as well as the need to mass firepower rather than forces when planning to fight in a nuclear environment, prompted the need for some fresh thinking about force structures for offensive operations. [24]

> One of the options would be to split the three Strike Corps into several division or division-plus size 'battle groups' of the size and capabilities of Russia's famed OMGs (operational maneuver groups). 'The new "Cold Start Strategy" visualizes the use of eight "integrated battle groups"…. (meaning) eight integrated armored division/mechanized infantry division-sized forces with varying composition of armor, artillery, infantry and combat air support---all integrated.[25]

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[19] Ibid, p. 72.
[20] Ibid, p.76.
[21] Ibid, p. 81.
[22] Ibid.
[23] Ibid.
[24] Ibid, p. 84
[25] Ibid, p. 85.

The Indian armed forces have carried out eleven different military exercises between 2004 and 2011, to test the concepts of the CSD. These exercises were held close to the Pakistani border wherein Indian troops and equipment were tested in a Nuclear, Chemical, Biological (NCB) environment. One such major exercise "Vijay Bhava" involved more than 50,000 troops, only 70 km from the Pakistani border. Over 1000 artillery pieces, 250 tanks including the T-90 and T-72, participated along with fighters and ground attack aircraft from the Indian Air Force. [26]

CSD appears to have been designed to explore and exploit gaps and options for limited conventional war below Pakistan's nuclear thresholds. Therefore, a perceived gap in Pakistan's deterrence posture was felt in the wake of India's interest in limited conventional war on its own terms, reflected through the CSD. In this context, Pakistan decided to introduce Tactical Nuclear Weapons (TNWs), from a limited menu of options available to plug the gaps at the tactical level. Some consider battlefield use of nuclear weapons highly destabilizing, with potentially strategic consequences. Alternatively, TNWs can be seen as force-multipliers which augment an otherwise relatively weak conventional defense. It can be argued that in Pakistan's case, TNWs would enhance deterrence stability by denying India the incentive to pursue limited war by exploiting any weak spots in the country's defense. Pakistan recently tested the 60 km range NASR, a tube-launched tactical ballistic missile on the heels of an earlier test of the 180 km range Abdali ballistic missile.[27] These tests, particularly of NASR, were followed by official statements indicating that Pakistan had acquired an "operational level capability." The Inter-Services Public Relations (ISPR) press release stated:

> The missile has been developed to add deterrence value to Pakistan's Strategic Weapons Development program at shorter ranges. NASR, with a range of 60 km, carries nuclear warheads of appropriate yield with high accuracy, shoot and scoot attributes. This quick response system addresses the need to deter evolving threats. The test was a very important milestone in consolidating Pakistan's strategic deterrence capability at all levels of the threat spectrum. He said in that hierarchy of military operations, the NASR Weapon System now provides Pakistan with short range missile capability in addition to the already available medium and long range ballistic missiles and cruise missiles in its inventory.[28]

NASR is believed to have a diameter of around 300 mm (11.8 inches),[29] which appears to be close to the design of the U.S. W-80, W-84 and B-61 nuclear warheads. The W-80 is a small thermonuclear warhead yield varying between 5 to 150 kilotons and weighs around 132 kg. The W-84 is almost similar to the W-80 with a range of 10-50 kilotons.[30] Thus, if Pakistan's claim of having developed miniaturized nuclear warhead designs for a missile as small as NASR is considered credible, then similar designs for the country's air, land and sea-launched versions of the Babar

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[26] Masood-ur-Rahman Khattak, "An Assessment of the Indian Military Exercises," *Weekly Pulse*, May 20, 2011. Available at: http://www.weeklypulse.org/details.aspx?contentID=634&storylist=10. Accessed on September 15, 2011.
[27] Mansoor Ahmed, "Why Pakistan Needs Tactical Nuclear Weapons," *Weekly Pulse*, May 06, 2011. Available at: http://www.weeklypulse.org/details.aspx?contentID=563&storylist=9. Accessed on September 15, 2011.
[28] ISPR Press Release, April 19, 2011. Available at: http://www.ispr.gov.pk/front/main.asp?o=t-press_release&id=1721 (accessed on September 7, 2011).
[29] Rodney Jones, "Pakistan's Answer to Cold Start," *The Friday Times*, Vol. 23, No. 13, May 13-19, 2011. Available at: http://www.thefridaytimes.com/13052011/page7.shtml. Accessed on September 15, 2011.
[30] Chuck Hansen, *U.S. Nuclear Weapons: The Secret History* (Arlington, Texas: Aerofax Inc, 1988, pp. 201-203.

cruise missile may not be too far away. Following the first successful cold test of a working nuclear device on March 11, 1983, the Pakistan Atomic Energy Commission continued over two dozen cold or hydrodynamic tests of different warhead designs through the early 1990s, including a sophisticated miniaturized warhead suitable for ballistic missiles.[31]

Hence, it is logical to assume that Pakistan would have proceeded towards building more compact and powerful warheads and conducting more cold tests in the wake of data obtained through hot tests in 1998. At the time, some Pakistani scientists claimed that they could produce thermonuclear devices if tasked by the government to do so. The availability of tritium from the Khushab Nuclear Complex, where a tritium production plant was installed as far back as 1987, indicates that fusion fuel for boosted fission or thermonuclear devices may be available at some point. The 1998 nuclear tests were also believed to have been "boosted-fission" devices which were "like a half-way stage towards thermonuclear bombs."[32] NASR, in all likelihood, will deploy a boosted-fission, plutonium-based, linear-implosion design or thermonuclear warhead with yields from sub-kilotons to several kilotons, depending on the strength of an enemy attack.

Nevertheless, the need for carrying out more hot tests of fission and possibly thermonuclear devices may continue to be an attractive proposition for India and Pakistan, at least on technical grounds. Ostensibly, TNWs are intended to add another layer of deterrence, at the tactical level, to foreclose the possibility of a limited Indian conventional attack and will supplement the deterrence already in place at the strategic levels. This is not to suggest that Pakistan is moving towards a nuclear war- fighting strategy and the country's mainstay in case of limited conventional war would continue to be based on its existing conventional forces.

To this end, Azm-e-Nau III, carried out in 2010, was the latest in a series of Pakistani military exercises designed to validate and practice strategic concepts for checkmating India's Cold Start strategy using conventional forces.[33] That the NASR test came on the heels of this exercise demonstrates the integral linkage between conventional and nuclear forces in the country's overall strategic defense plans. Therefore, it can be presumed that Pakistan would only resort to the use of non-strategic/tactical or battlefield nuclear weapons, once its conventional defense is in danger of collapsing in the face of an Indian attack at a vulnerable point that triggers the country's nuclear thresholds. In the event of a rapidly escalating conflict, the decision to deploy and use any battlefield or tactical nuclear weapons would probably be taken by the National Command Authority. There has been no public information or sign which shows that an assertive control over all Pakistani strategic forces would not continue to be maintained as matter of policy. This centralized command would most likely be made through secure communications established by the Strategic Communications Command (STRATCOM) of the NCA.

It is reasonable to assume that STRATCOM would supplement the C^4I^2SR for all Pakistani strategic nuclear forces and would have been developed and improved over the last decade with tailor-made arrangements for battlefield nuclear systems. Like other nuclear weapon systems in the

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[31] Dr. Samar Mubarakmand, "A Science Odyssey: Pakistan's Nuclear Emergence," Speech delivered at the Khwarzimic Science Society, Centre of Excellence in Solid State Physics, Punjab University, Lahore, November 30, 1998.; Haris N Khan, "Pakistan's Nuclear Program: Setting the Record Straight," *Defence Journal* (Karachi), September 2010.

[32] Munir Ahmad Khan, (Chairman, PAEC 1972-1991) quoted in "Pakistan's Nuclear Weapons Program—1998: The Year of Testing," Nuclear Weapon Archive. Available at: http://nuclearweaponarchive.org/Pakistan/PakTests.html. Accessed September 15, 2011.

[33] "Largest Ever Military Exercise Azm-e-Nau Begins Today," *Daily Times*, April 10, 2010.

country's arsenal, NASR and other TNWs would have Permissive Action Links (PALs) built in to prevent any accidental or unauthorized use. It is safe to assume that the deployment and/or eventual employment of TNWs would only take place in times of crises when the leadership of the country, through the NCA, is convinced that no other option is left for the security of Pakistan and conventional deterrence is nearing collapse. For its part, the Indian military has indicated that any Pakistani decision to use non-strategic or tactical nuclear weapons against Indian conventional forces would trigger a massive nuclear response, regardless of the scale or place of the Pakistani attack. Pakistan's eventual development of assured second strike capabilities would largely exclude the possibility of such an Indian punitive retaliation/ disproportionate response. The Indian Chief of Air Staff also stated that NASR or any such system deployed by Pakistan in a crisis would be the first amongst a list targets for Indian preventive attacks. [34]

However, the shoot and scoot capabilities of such systems as claimed in the ISPR statement indicates that tactical nuclear weapons would not be deployed in the field for extended periods of time that would make them and their launchers vulnerable to detection or attack. This appears to have been a calculated claim designed to address possible apprehensions about Pakistan's ability to deploy, handle, and use such systems in a crisis. Whether or not TNWs are actually used in a conflict, their deployment itself would have deterrence value and symbolize Pakistan's will and ability to deter aggression at all levels of conflict. Nonetheless, Pakistan is not the only nuclear armed state that still considers TNWs an integral component of its deterrence strategy. Russia continues to retain several hundred of these weapons, which it perceives as a superior conventional military threat, despite possessing extremely survivable and hugely destructive strategic nuclear forces.

Nonetheless, NASR is not the only available platform for Pakistan to deploy TNWs in crisis situations. The country has already developed the 700 km range *Babar* Land Attack Cruise Missile[35] and its air-launched version, *Raad,* with a range of 350 km.[36] These are believed to be capable of beating Indian ballistic missile defenses. A naval version of this cruise missile, deployed at sea, will further supplement and diversify Pakistan's nuclear delivery options and help improve the survivability of its arsenal. To some, these developments may seem reckless, or a driver for escalation, but a credible deterrent based on land, sea, and air is more stabilizing as it provides an assured second strike capability. NASR is also advertised as a multi-tube or tube-launched missile, thereby implying that such weapons can be launched from torpedo tubes of conventional attack submarines. Thus, a nuclear-tipped submarine-launched version of a cruise missile, armed with a miniaturized plutonium warhead, can give Pakistan the much-needed second strike capability, and hence more credibility of the nuclear deterrent. It may be upsetting for India, but stabilizing for South Asian stability from a Pakistani viewpoint

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[34] Rajat Pandit, "Response to strike from Pak will be very heavy: IAF Chief," *The Times of India*, July 26, 2011. Available at: http://articles.timesofindia.indiatimes.com/2011-07-26/india/29815644_1_iaf-indian-air-force-nuclear-attack. Accessed on September 15, 2011.

[35] "Pakistan Test-fires Nuclear Capable Missile," CNN/Reuters, July 26, 2007. Available at: http://edition.cnn.com/2007/WORLD/asiapcf/07/26/pakistan.missile.test.reut/index.html. Accessed on September 15, 2011.

[36] "Pakistan Tests Hatf-8 Cruise Missile," *The Asian Age*, April 29, 2011. Available at: http://www.asianage.com/international/pakistan-tests-hatf-8-cruise-missile-864. Accessed on September, 15, 2011.

Fissile Material Asymmetries and the FMCT

Coupled with the issue of TNWs is that of a perceived exponential growth in Pakistan's nuclear arsenal, particularly fissile material production at the Khushab Nuclear Complex and the country's seemingly rigid stance on the FMCT. From a Pakistani standpoint, expansion in its plutonium production capabilities is necessitated by strategic calculations, based on India's existing and projected fissile material potential, especially in the wake of the Indo-U.S. nuclear deal. According to the 2006 International Panel on Fissile Materials (IPFM)[37] estimates, India's current weapon-grade plutonium stocks from its 40 MWt CIRUS and 100t MWt Dhruva military reactors stand at 950 kg. India's stocks of reactor-grade plutonium from its unsafeguarded heavy water power reactors stands at 11.5 tons, which is also potentially weapon-usable. At 5 kg for weapon-grade and 10 kg of reactor-grade plutonium per warhead, these stocks are worth 190 and 1150 nuclear warheads respectively.[38]

Under the Indo-U.S. nuclear deal, India's eight unsafeguarded heavy water power reactors can potentially add 1250 kg of weapon-usable reactor grade plutonium to its existing inventory each year. India can also produce 130 kg of weapon-grade plutonium from each of its five unsafeguarded fast breeder reactors, both under construction and planned, all of which are believed to be made operational by 2020. In addition, the 100 MWt Dhruva-II reactor can add 24 kg of weapon-grade plutonium to India's stocks each year, while it continues to produce about 200 kg of highly enriched uranium (HEU) from its Rare Materials Project for use in nuclear submarines and potentially for nuclear weapons. Pakistan's current stocks, however, stand at about 100-120 kg of weapon-grade plutonium from the 50 MWt Khushab-I production reactor and New Labs reprocessing plant and 2600 kg of HEU from UF_6 production Chemical Plants Complex (CPC) and Kahuta gas-centrifuge plant. An assessment based on the discussion above of fissile stockpiles for India and Pakistan as of 2011 is as under:

	Weapon-Grade Pu (kg)	Reactor-Grade Pu (kg)	Highly Enriched Uranium (kg)	Warhead-Worth HEU 20 kg/warhead	Warhead Worth Weapon-Grade Plutonium 4 kg/warhead	Warhead Worth Reactor-Grade Plutonium 8 kg/ warhead
India	700-890	15800	200-500 (30-45% Enriched)*	2-5 @ 45% HEU 10-25 @ 90	175-222	1975

[37] Please see: Zia Mian, A.H. Nayyar, R. Rajaraman and M.V. Ramana, "Fissile Materials in South Asia and the Implications of the US-India Nuclear Deal," International Panel on Fissile Materials, September, 2006. Available at: http://www.fissilematerials.org/ipfm/site_down/rr01.pdf. Accessed on September 15, 2011.

[38] Mansoor Ahmed, "Understanding Pakistan's Plutonium Option," *Weekly Pulse,* June 3, 2011. Available at: http://www.weeklypulse.org/details.aspx?contentID=706&storylist=2. Accessed on September 15, 2011.

				% HEU		
Pakistan	60-130	0	1600-3800 (90-93 % Enriched)	80-190	15-32	0

***Although India's HEU program is aimed at producing fuel for its nuclear submarine reactor, the HEU percentage can be quickly raised from 45% to 90% weapon-grade enrichment.**

At present, Pakistan has at least nine different ballistic and cruise missile systems in its inventory, i.e. Hatf-1 to Hatf-9. Each of these will require warheads of different designs and yields, and hence more fissile material for each category of missiles. Given the advantages which plutonium offers over HEU in terms of miniaturization and weight to yield ratio, Pakistan appears to be proceeding towards the production of more weapon-grade plutonium, at least for the foreseeable future. Currently, Pakistan's disparity with India in stocks of weapon-grade plutonium stands at a ratio of almost 1:10, even if India's reactor-grade stocks are not considered. Hence Pakistan's drive to accumulate more plutonium stockpiles and expansion of plutonium production and reprocessing facilities ought to be seen in the context of this disparity.

It is also obvious that Pakistan will produce tritium in one of the production reactors at Khushab to replenish its stocks, which is essential for developing advanced, compact warheads and boosted-fission composite warheads of Pu/HEU. This will also allow Pakistan to build thermonuclear designs, both for its medium and short-range ballistic and cruise missiles. Increasing the number of warheads is also a means of dealing with India's upcoming BMDs. Pakistan is perceived to be the sole "obstructionist" at the Conference on Disarmament (CD) in Geneva on the FMCT. But a future cut –off of production without actually accounting for existing stockpiles is widely seen in Pakistan as a means of freezing current fissile material asymmetries with India and capping Pakistan's future production of fissile material, particularly plutonium. India has huge existing and projected advantages in fissile material stocks, especially plutonium. Whether or not India has separated/reprocessed plutonium in the spent fuel of its dedicated production and unsafeguarded heavy water power reactors and converted it into warheads will not determine Pakistan's position on the issue. The mere existence of these stocks in India's military and unsafeguarded production facilities and potential for future production poses a direct threat to the credibility of its nuclear deterrent. India is also believed to use its vast reactor-grade plutonium stocks to fuel its planned breeder-reactor program. Nevertheless, these stocks are weapon-usable and India's unsafeguarded breeder program will add 130 kg of weapon-grade plutonium each year.[39] Equally significant is the perception created in Pakistan in the wake of the Indo-U.S. nuclear deal that the country is being discriminated and a selectively treated by the United States.

Pakistan is also widely seen to be pursuing the world's fastest growing nuclear program. This is again with regard to the expansion of the plutonium production and reprocessing facilities at Khushab, New Laboratories, and Chashma. It would be helpful to put this program in the correct perspective. Pakistan did not jump-start plutonium production during the last decade, and this program was not a knee-jerk response to the Indo-U.S. nuclear deal, even though it served to

[39] "Fissile Materials in South Asia and the Implications of the U.S.-India Nuclear Deal," op. cit.

increase the constituency for increasing fissile material production at Khushab. It is well known that Pakistan has been pursuing the plutonium route since the early 1970s, with work on the New Labs reprocessing plant completed in 1981. The work on the Khushab Nuclear Complex began in the mid-1980s with the first 50 MWt production reactor, and heavy water and tritium production plants being commissioned within a decade.[40]

Hence, it was logical for Pakistan, particularly after overt nuclearization in 1998, to further develop this capability, especially to expand its plutonium program, given that fissile material production had earlier focused on HEU. Nevertheless, this is not to suggest that Pakistan will go on producing more fissile material indefinitely. Pakistan is also reportedly facing a possible constraint on its domestic natural uranium production, which will limit its ability to produce more fissile material from 2020 onwards.[41] Therefore, the few options left for Pakistan include slowing down or at some stage, capping further production of HEU for the weapons program, while using the available natural uranium to meet the needs for the plutonium program. Eventually Pakistan may also stop production of plutonium once a comfortable stage in its plutonium stocks is reached. This does not imply that plutonium production is designed to match India's stocks of this material.

Concluding Comments

These developments suggest that the credibility of claims of pursuing a policy of minimum deterrence by India and, by implication, Pakistan is likely to wither away as both countries are locked in an action-reaction syndrome. Even as the South Asian strategic equation is further complicated by India's perceived threat from China, whatever military and nuclear capability India adds to its current potential is seen as a threat by Pakistan. There cannot be any strategic/nuclear restraint in the region in the presence of increasing conventional and nuclear asymmetries between India and Pakistan. While Pakistan continues to maintain that it is following the policy of a credible minimum deterrent, this posture is dynamic, not static, and sensitive to the threat originating from India's military potential. Nevertheless, Pakistan does not have the resources or the need to match India in conventional and nuclear forces, but growing qualitative and quantitative asymmetries will force it to rely more on nuclear weapons, both strategic and tactical/battlefield.

It is obvious that India's Cold Start has led to the lowering of Pakistan's nuclear thresholds and may require a redefining of the country's nuclear doctrine. The introduction of missile defenses and India's growing nuclear potential and second strike capabilities will also push Pakistan towards building similar capabilities. TNWs and emerging triads now appear to be a reality and cannot be wished away. Triads and second strike capabilities on both sides will enhance strategic stability in South Asia whereby the incentives for preemptive strikes or fighting limited conventional wars (in the hope of preventing the use of TNWs with a threat of massive retaliation by either side), will eventually be eliminated. Unless Pakistan's security dilemma, either based on actual or perceived threats, is addressed, South Asia will continue to remain embroiled in a conventional and nuclear arms race.

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[40] "Understanding Pakistan's Plutonium Option," op. cit.; "Pakistan's Nuclear Program: Setting the Record Straight," op. cit.

[41] Zia Mian, A.H. Nayyar, and R. Rajaraman, "Exploring Uranium Resource Constraints on Fissile Material Production in Pakistan," *Science and Global Security*, Vol. 17, No. 2 (2009), pp. 77-108.