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Nuclear Signaling, Missiles, and Escalation Control in South Asia

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"India is not impressed with 'missile antics' by Pakistan."
Nirupama Rao, Ministry of External Affairs spokeswoman, May 26, 2002.

"W*e were compelled to show then, in May 1998 that we were not bluffing and in May 2002, we were compelled to show that we do not bluff."*
President Pervez Musharraf, June 17, 2002

Ballistic missiles were introduced into the South Asian security environment just over two decades ago. Missile development programs in the 1980s proceeded in tandem with covert nuclear weapons development. In the 1990s, missile programs raised proliferation concerns; after the open testing of nuclear weapons in 1998, missile flight tests raised new concerns of escalation control and regional stability. In South Asia, threat making, provocative military maneuvers, displays of offensive force capabilities, and large military exercises close to the borders have been common. Public displays of military equipment and defense exhibitions have become routine, but flight tests of missiles accompanying military confrontations are recent phenomena, associated with the development of new missiles. Missile parading on national days in India and Pakistan announce the existence of these new missiles, but missile flight testing confirms and enhances their deterrent capability.

The ordinary purpose of missile flight-testing is to validate technical designs, but when flight tests are timed with other developments, they can tacitly convey the message of determination to use a missile, if required. Missile flight-testing in a crisis may also serve to instill confidence in a domestic audience that national security is intact. Missile testing activities may also be used to induce outside diplomatic intervention. Indeed, over the last five years, Indian and

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Pakistani officials have attempted to master the technique of using missiles to further political objectives and deterrence signaling during crises. On that note, an Indian government official has selectively referred to these activities as "missile antics."

This essay assesses the challenges ballistic missiles in South Asia present to efforts by both countries to deal with the problems of nuclear crisis stability and escalation control. I argue that missile flight tests are dangerous when conducted primarily to send political messages and therefore could have particularly serious escalatory consequences during an unfolding military crisis. This essay analyzes the impact of missiles on deterrence stability and potential escalation during periods of peace, crisis, and war. It examines the following questions in light of recent cases of missile testing, pre-deployment activity, and operational requirements in the regional environment:

- Why has high value been attached to the acquisition of ballistic missiles in South Asia?
- Why do missiles cause more concern than other ways to deliver nuclear weapons?
- What effects do missiles have on regional stability and instability in South Asia?
- How do missiles shape crisis behavior in South Asia?
- How have missiles been applied as tools of policy and for conveying signals to the opponent in South Asia?
- What lessons do these practices suggest for the reduction of nuclear risks in the region?

WHY MISSILES ARE VALUED IN SOUTH ASIA

Ballistic missiles have been given high importance by both India and Pakistan because they are generally believed to be the most reliable vehicles for the delivery of nuclear weapons in a retaliatory strike intended to inflict mass destruction. Ballistic missiles are relatively inexpensive and their speed and accuracy make it virtually impossible to take effective defensive measures against them. These characteristics of ballistic missiles enhance the credibility of a nuclear deterrent based on their assured delivery capacity. The inherent vulnerability to a ballistic missile attack also endows a missile-based offensive nuclear force with exceptional psychological influence. By their nature, attacking missiles project terror.[1]

[1] Observing the terrifying impact of the relatively inaccurate, non-nuclear V-2 ballistic missiles launched by Nazi Germany against Great Britain in World War II, British Air Force Chief R.V. Jones noted, "[N]o weapon yet produced has a comparable romantic appeal. Here is a 13-ton missile, which traces out a flaming ascent to heights hitherto beyond the reach of man, and hurls itself 200 miles across the stratosphere at unparalleled speed to descend - with luck - on a defenseless target." R. V. Jones, *Most Secret War: British Scientific Intelligence: 1939-45* (London: Hamish Hamilton, 1978), p. 455.

Reinforcing their awesome reputation is the fact that once launched, ballistic missiles cannot be recalled. Aircraft, by contrast, can be scrambled for a "just in case" contingency. If scrambled by mistake, miscalculation or false warning, they can be recalled to their bases, avoiding the outbreak of war. A missile launched by mistake would require sophisticated control systems to disarm or disable it during flight. Self-destruct features could be incorporated but this has not been the practice with operational strategic missiles, even in the United States.[2] Nor are there reported plans to do so in the Pakistani or Indian missile development programs.[3]

Reliance on ballistic missiles in South Asia means little or no time to clarify ambiguous intelligence or communicate with the opponent. If ballistic missiles were launched in a conflict between India and Pakistan, the short distances to targets combined with the missiles' high-speed results in warning times of five to ten minutes at best. During the Cold War, intercontinental ballistic missile flight time between the United States and the Soviet Union was approximately thirty minutes, itself a very brief interval. Both superpowers, however, developed early warning systems that they believed were sufficient to alert their forces for a retaliatory strike before the first incoming missile struck. They also introduced communication systems for rapid consultation in the event of an accidental military launch or misinterpreted civilian launch.

It is worth noting that in Europe, the intermediate-range nuclear missiles deployed by the opposing alliances provided short warning times similar to those in South Asia. Factors that helped Europe escape escalation during major crises involving missiles were the absence of a tinderbox conflict like Kashmir, well developed surveillance and early warning systems (particularly in NATO), and the redundancy of long-range and theater nuclear forces that provided confidence in second-strike retaliatory capabilities. India and Pakistan do not have these advantages today and are unlikely to for many years.

The unavailability of effective passive or active measures of self-defense against nuclear attack (implying the prospect of assured mutual destruction) usually contributes to crisis stability between nuclear-armed opponents. In other words, because of mutual vulnerability, neither side has an incentive to strike preemptively during a crisis. However, in the South Asian environment, while the vulnerability is mutual, it is not symmetrical. One party - Pakistan - is far more vulnerable to preemption than the other. This asymmetry could become

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[2] Kent Biringer, "Missile Threat Reduction and Monitoring in South Asia" in Michael Krepon and Chris Gagne, eds., *The Stability - Instability Paradox: Nuclear weapons and Brinksmanship in South Asia* (Washington DC: The Henry L. Stimson Center, 2001), p. 76.

[3] The irrevocability of a ballistic missile launch decision puts a very high premium on command and control measures that safeguard against inadvertent launch. Soviet and US ICBMs presumably have long had positive control systems to guard against unauthorized launch by operators or saboteurs. In South Asia, however, operational missiles do not necessarily have reliable positive control mechanisms to prevent accidental or unauthorized launch and this can be regarded as a technical but serious source of instability.

more pronounced if India acquires missile defenses in the future.[4] This instability is more dangerous in South Asia because the region is crisis-prone, and because each military crisis has been more intense than the last.

India and Pakistan lack the resources and ability to adopt launch-on-warning postures. The best remaining option is to have the capability to disperse mobile missiles during a crisis in order to protect them from preemptive strikes. Although this missile dispersal capability helps maintain general deterrence against nuclear attack, it can also be destabilizing because neither India nor Pakistan has an independent and sophisticated ability to distinguish between defensive missile moves and combat-ready missile dispersal. Defensive movement implies that the missile is not mated with the warhead, while combat-readiness measures would include mating. This intelligence dilemma is compounded by still evolving command and control systems in both countries.

Planners usually assume that ballistic missiles would be key targets for preemptive strikes by an adversary. Two general defensive strategies, each with particular advantages and risks, have been adopted elsewhere to counter this threat. One is the hardening of missiles in fixed sites, typically by housing the missiles in silos. The other is to mate ballistic missiles with mobile transporter systems. Fixed sites are likely to be detected by an adversary, so their survivability depends on being able to withstand attack. Mobile systems are vulnerable to attack if their storage locations are detected, so their survivability depends on dispersal, camouflage, concealment, deception, and mobility. To date, both India and Pakistan rely on the second strategy of integrating their strategic ballistic missiles and mobile launchers for mobility and survivability, rather than on deployment at fixed, hardened sites.

Maintenance of mobile missile systems, along with nuclear warhead safety and security measures, normally requires that the missiles and mobile launchers be kept in garrisons. During periods of crisis, mobile missiles are dispersed to counter the risk of preemptive strikes. Keeping nuclear-capable missile systems both safe and dispersed places an extraordinary strain on national command and control systems. Scott Sagan calls this dilemma the "vulnerability-invulnerability" paradox.[5] Sagan contends that nuclear weapons dispersed under crisis to increase survivability become vulnerable to terrorist predators, thereby

[4] The question of the overall impact of missile defenses on stability in South Asia is not examined at length here. Point-based missile defenses could marginally increase stability but only if both sides could defend their national command centers, thereby complicating potential decapitating attacks. While area-based defenses have little chance of defending the region's mega cities, they could still spur the additional employment of more missiles and warheads by the other side to counter their effect. See Michael Krepon and Chris Gagne, eds., *The Impact of US Ballistic Missile Defenses on Southern Asia* (Washington DC: The Henry L. Stimson Center, 2002).

[5] See Scott Sagan, "Nuclear Dangers in South Asia," reprinted in part from "The Perils of Proliferation in South Asia," *Asian Survey* (November/December 2001), pp. 1064-1086, available at http://iisdb.stanford.edu/pubs/20573/sagan_nuc_sasia.pdf.

risking the loss of military control over nuclear weapons by the National Command Authority (NCA) -- at the very same time that tensions are high and both sides fear the other might initiate war.[6] Although Sagan's assessment of such a risk is hypothetical, nevertheless the command system could be vulnerable to loss of control whenever the weapons are dispersed, which necessitates negative technical controls and redundant communications to guard against theft or sabotage and to prevent unauthorized or inadvertent missile launches.[7]

The military utility of dispersed missiles, on the other hand, implies that they are self-sufficient and capable of being launched at pre-designated targets should communication with the central authority be lost due to decapitation or jamming. Missile units under threat of attack, in the event their higher command links are disrupted, might be prone to act in unpredictable ways, regardless of the level of discipline and training of the crews. Clearly this dispersed mobile missile posture has inherent instability. But it is also regarded in the subcontinent as a realistically and operationally justified means of maintaining nuclear deterrence against the expansion of any conventional war.

Perhaps the most destabilizing factor related to ballistic missiles in South Asia is the ambiguity that arises because Indian and Pakistani ballistic missiles are designed to be capable of carrying either a conventional or a nuclear warhead. An adversary might presume that any missile launched against it might be carrying a nuclear warhead.[8] This ambiguity is preserved as an operational requirement because it helps mask the numbers and locations of missiles that support nuclear deterrence objectives. Dual-capable ballistic missile systems carry greater dangers of hasty decisions and fateful mistakes in a crisis because the opposing command may be unable to ascertain that missiles launched for conventional battlefield objectives, or launched by accident, are not the beginning of a strategic nuclear attack. Without suitable and effectively verifiable arms control and restraint agreements that segregate nuclear-equipped ballistic missiles, this inherently destabilizing problem will persist.[9] As the former Indian Ambassador to the United States, Lalit Mansingh, has warned, "We do not have the means to verify whether or not the missile warheads are nuclear tipped or not. It means danger." This raises the strategic policy question

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[6] Term used in a presentation by Scott Sagan in a South Asia Conference arranged by Arête Associates, Washington DC June 25- 26,2003. See Chapter Three of the revised edition of Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons, A Debate* (New York: W.W. Norton, 1995), p. 100.

[7] For a detailed discussion see Feroz Hassan Khan, "Challenges to Nuclear Stability in South Asia," *The Nonproliferation Review* 10, no. 1, (Spring 2003), pp. 67-68.

[8] Naeem Ahmad Salik, "Missile Issues in South Asia," *The Nonproliferation Review* 9, no. 2, (Summer 2002), pp. 47-48 and Feroz Hassan Khan with Gaurav Rajen and Michael Vannoni, "A Missile Stability Regime for South Asia," Sandia National Laboratories, Cooperative Monitoring Center Occasional Paper 35, June 2004.

[9] See transcript of the Public Broadcasting System's series, "Avoiding Armageddon," broadcast on April 15, 2003. Also see transcript of "The NewsHour with Jim Lehrer," broadcast on May 31, 2002, available at http://www.pbs.org/newshour/bb/asia/jan-june02/nuclear_5-31.html.

about whether any conventionally-armed, offensive ballistic missiles should be deployed in South Asia.

MISSILES ON THE SUBCONTINENT

Both India and Pakistan have maintained civilian space programs since the 1960s, but it was only after India began the Integrated Guided Missile Development Program (IGMP) in 1983 that the missile arms race actually got underway in earnest. India began this missile development program with a modest technological base. India combined technologies from the civilian space program with reverse engineering of military missile technology from Russia to develop the *Agni* and *Prithvi* ballistic missiles. The short-range *Prithvi* (first tested in 1986) was derived from a high-altitude Soviet air defense interceptor missile (SA-2), and the medium-range *Agni* (first tested in 1989) was partly based on the US Scout (a civilian space program vehicle) and partly on the Russian SA-2.[10]

The beginnings of the Indian missile program paralleled a series of crises that disturbed Indo-Pakistan relations in the mid-1980s. The first was triggered by India's military occupation of the un-demarcated Siachen Glacier in the disputed territory of Kashmir in 1984. Code-named *Meghdoot* (Cloud Messenger), this operation was conducted during tensions fueled by Prime Minister Indira Gandhi's enforcement action (Operation Blue Star) against armed Sikh separatists who had occupied the Golden Temple of Amritsar in the Indian state of Punjab bordering Pakistan.

The second crisis came two years later, when India authorized the ambitious Brasstacks military exercise over the winter of 1986-87. The provocative nature of that exercise (corps-sized forces and mobile maneuvers, reportedly with live ammunition, close to the international boundary) brought the two countries very close to war. In each of these two crises, India reportedly weighed contingency plans for a preventive strike against Kahuta, Pakistan's uranium enrichment facility, but later decided against this dangerous action.[11]

A third, less widely reported crisis occurred in 1990, as the Cold War came to an end. The Soviets had recently withdrawn from Afghanistan. Concurrently, Kashmir became the location of a renewed freedom struggle, with an armed insurgency that continues to date. Meanwhile, conditions affecting Pakistan in the global and regional environment had changed significantly. Once the Soviet withdrawal from Afghanistan was complete, the United States began to distance itself from its partnership with Pakistan. The most abrupt manifestation of this

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[10] For details see Rodney W. Jones et al., *Tracking Nuclear Proliferation: A Guide in Maps and Charts* (Washington DC: Carnegie Endowment for International Peace, 1998), pp. 127-129.
[11] See Scott Sagan, "The Perils of Proliferation," CISAC Stanford University workshop on *Preventing War in South Asia*, Bangkok, August 2001. Also see Raj Chengappa, *Weapons for Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: Harper Collins Publishers, 2000), pp. 322-323.

change was the US imposition of nuclear non-proliferation sanctions (the Pressler Amendment) on Pakistan due to concerns over Pakistani uranium enrichment to weapon-grade material. The sanctions cut off the delivery to Pakistan of previously purchased F-16 aircraft. At the time, aircraft were the only operationally viable delivery means for nuclear weapons by either India or Pakistan. It was against this backdrop that operationally viable, nuclear-capable ballistic missiles were introduced into the region.

The Kashmir uprising that began in 1989 further complicated the already tense security situation in the region. By 1990, Pakistan found itself trapped in a bind. Assuming Pakistan's nuclear capability was to be the ultimate guarantor of deterrence against India, the F-16 was expected to be the main Pakistani delivery system enabling a measure of military balance with India. The US decision not to deliver the F-16s was a major blow to Pakistan's quest for a security balance, as the air force imbalance worsened from Pakistan's standpoint with India's continued purchases of state-of-the-art fighters and ground-attack aircraft from Russia and France. These factors combined to drive the Pakistani decision to rely on ballistic missiles as a matching response to India's growing military capabilities. The US embargo of the F-16s moved the Pakistani missile program into high gear. The missile program, along with nuclear weapon development, became a top national security priority in Pakistan.

Pakistan faced two major problems: a limited indigenous missile technology base, and the Missile Technology Control Regime (MTCR). At the time, the deficiencies in Pakistan's missile technology base were not in soft technology (know-how, data, designs, organization, technical advice, management techniques, technical staff, finance management, etc.) but rather in the realm of hard technology (reentry vehicles, guidance systems, engines, and launch platforms). Pakistan's level of rocket technology then revolved around its *Hatf I* and *Hatf II* missiles with capabilities not greater than those of the short-range Scud B.

As in the case of its nuclear program, Pakistan was a late starter in missiles and faced similar non-proliferation challenges. India's lead in missiles and its strategy to "indigenize" the technology by reverse engineering and expanding its technical base could not easily be matched by Pakistan. But Pakistan attached a high priority to redressing its security gap quickly, before the window of opportunity for obtaining technical know-how and hardware transfers closed.

Pakistan's quest for the acquisition of missile technology met stiff resistance from western suppliers, most of which had joined the MTCR. Pakistan embarked on two paths for both liquid-fueled and solid-fueled propulsion systems. By the early 1990s, the only suppliers accessible to Pakistan for these two propulsion systems were North Korea and China, respectively. Thus, Pakistan's liquid-fueled and solid-fueled missile acquisition was accomplished despite MTCR strictures. By combining various earlier

technologies such as French Centaur sounding rockets and Soviet Scuds, Pakistan was able to produce *Hatf I* and *Hatf II* missiles in the initial phases. The reverse engineering of M-series missiles from China and *No-dong* missile technology from North Korea enabled Pakistan to develop a sufficient missile technological base independent of MTCR restrictions. Ballistic missiles finally became the mainstay of Pakistan's strategic delivery means.[12]

Pakistan was constrained in its flight test program by two political factors. First, Pakistan wished to avoid triggering MTCR sanctions, not just for itself but also to avoid embarrassing China, its principal ally. Second, Pakistan was under constant diplomatic pressure from the United States to exercise missile "self-restraint." In practical terms, the United States understood this "self-restraint" to mean that Pakistan should: 1) not conduct live missile tests; 2) not carry out field training with missiles; 3) not co-locate warheads and other key missile components at the same sites; 4) not mate warheads and launch vehicles; 5) and not store key systems of missile hardware and components in operational missile bases.

Given the missile developments across the border in India that were not similarly restricted, it was impossible for Pakistan to unilaterally accept such restrictive measures. To placate US non-proliferation concerns, Pakistan proposed a "zero missile" regime in South Asia, but India refused. It was, therefore, not possible to reverse the missile acquisition trend. The United States continued to put singular pressure on Pakistan, but tacitly looked for ways to grandfather past technology transfers if Pakistan agreed to refrain from public displays and flight tests of its missiles. Pakistan's missile development was thus constrained by a restriction on flight-testing and Pakistani officials were always forced to weigh the trade-off between diplomatic costs and developmental imperatives.

India continued to conduct missile flight tests regularly. By 2000, India had conducted sixteen *Prithvi* and four *Agni* flight-tests, confirming missiles as an operationally viable means of nuclear delivery. Each Indian flight test advanced its readiness to deploy nuclear-capable ballistic missiles. In the course of India's tests, India and Pakistan exchanged rhetorical messages. India stressed its own "indigenous" technical prowess and slighted that of Pakistan, arguing that Pakistan's missile program was based on foreign supply and therefore should be subjected to MTCR sanctions. Pakistan in turn emphasized the Russian elements in India's missile technology and the double standard in MTCR leniency on India.

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[12] For a recent analysis of the Indo-Pakistan nuclear balance covering both aircraft and missile delivery systems, see Rodney W. Jones, *Minimum Nuclear Deterrence Postures in South Asia - An Overview*, Final Report by Policy Architects International for DTRA/ASCO, October 2001, available at http://www.dtra.mil/about/organization/south_asia.pdf.

MISSILE DISPLAYS

Missiles displays in India and Pakistan serve five unstated but distinct purposes. Both countries have become accustomed to parading military equipment and displaying weapon technologies to their countrymen and foreign onlookers annually. First, national day celebrations are used to boost domestic morale, increase national pride, and impress the international community with new levels of military accomplishment. Second, these displays send a latent message to an adversary that can be construed as a deterrence or warning signal. Third, missiles displays demonstrate the promise of scientific progress to the nation. Fourth, military displays symbolize defiance to outside powers, clarifying that technical strides can be made despite the hurdles posed by foreign export control agencies. Fifth, missile displays project a currency of national power.

In India, the aim is prestige and symbolism of parity with the middle-level powers, such as France and Britain.[13] In the case of Pakistan, besides the prestige factor, the displays reflect a matching response to balance India's technological progress militarily.

MISSILE FLIGHT TESTS

Missile displays in ceremonial parades demonstrate capability in a passive sense. A more active way to demonstrate real capabilities is through flight tests that validate designs and are thus proof of technical prowess. Flight tests send three messages. First, because a successful flight test proves the missile in question has been acquired and developed, the domestic audience gains confidence in the nation's technical and defense capacity. Testing wins popular support for the missile program. Second, missile flight tests provide technical validation, which is crucial for confidence in operational capacity. Successful ballistic missile flight tests establish credibility to an adversary for the delivery system, thereby enhancing nuclear deterrence. Separate demonstrations of nuclear warhead tests (May 1998) and flight tests are sufficient to prove capability for the purpose of deterrence.

The third type of message is directed beyond the subcontinent. By the late 1990s, flight tests and public displays aroused great international concern and political repercussions. One memorable example dates to March 1998 when Pakistan was preparing its first major missile validation tests. Pakistan was ready to flight test the liquid-fueled *Ghauri* (*Hatf V*) and was nearly ready to test the solid-fueled *Shaheen I* (*Hatf IV*), both of strategic importance to Pakistan. At just that time, however, the conservative and hawkish Bharatiya Janata Party (BJP) which had campaigned on a pro-nuclear weapons platform won an electoral victory and was forming a coalition government. Hoping to dissuade an

[13] See W.P.S. Siddhu, "India's Nuclear Missile Program," A Presentation at the Carnegie Endowment for International Peace Proliferation Roundtable, June 15, 1995.

overt Indian nuclear weapon declaration or nuclear explosive tests, the US government requested a "strategic pause" from Pakistan. The US State Department formally asked Pakistan not to publicly display missiles and not to conduct flight tests of ballistic missiles.[14] In deference to the US request, Pakistan cancelled the scheduled flight test of *Ghauri* (*Hatf V*) in March 1998 and did not display ballistic missiles on its March 23 national day parade that year. Bellicose Indian rhetoric was greeted by US silence, which in Pakistan was viewed as a US failure to publicly acknowledge Pakistan's restraint. Pakistan thus faced the question of whether it would benefit from a sustained strategic pause. On balance, Pakistan concluded that a unilateral strategic pause was not in its security interests and rescheduled the *Ghauri* test. Thus, on April 6, 1998, its first flight test was conducted successfully.

As expected, the April *Ghauri* test met with immediate MTCR sanctions, the third in the decade for Pakistan and the first for North Korea. India's long series of *Agni* and *Prithvi* flight tests, on the other hand, met with relatively mild western protests and disapproval and escaped direct sanctions. India remained largely immune to sanctions because the MTCR regime targets transfers and not indigenous production. India's program is perceived to be largely indigenous primarily because its imported element was progressively reduced as India's indigenous base expanded.[15]

In the wake of international opprobrium following the conduct of nuclear tests and intense US diplomacy led by Deputy Secretary of State Strobe Talbott, there was a general strategic pause in the region for nearly a year. This pause was broken on April 12, 1999, when India conducted another *Agni* missile test. Within two days Pakistan responded by again flight-testing the liquid-fueled *Ghauri*. On this occasion, Pakistan also successfully flight-tested the solid-fueled *Shaheen I* (*Hatf IV*) missile. Pakistan's introduction of a solid-fueled missile with strategic capability was done in a tit-for-tat manner, engaging India now in a pattern of one-upmanship in flight test demonstrations. Although the ballistic missile tests were conducted essentially to validate designs and technical parameters, domestic expectation grew for a matching response for every flight test by the other side. Both sides notified each other about the tests citing the "spirit of the Memorandum of Understanding" that was signed at Lahore in February 1999.

MISSILE MOVES DURING CRISES

Ballistic missiles became an instrument of public politics and coercive strategy in two major crises in South Asia in 1999 and 2001-2002. An

[14] The US government verbally conveyed this message to the Pakistan Army Chief, General Jehangir Karamat, who was on an official visit to the United States in early March 1998. Subsequently, the US Secretary of State sent a letter to the Pakistan government requesting a "strategic pause."
[15] See Raju C. Thomas, "India's Nuclear and Missile Programs: Strategy, Intentions, and Capabilities," in *India's Nuclear Security* (Colorado: Lynne Rienner Publishers, 2000), pp. 87-89.

examination of the role of ballistic missiles in these two crises reveals a mix of signaling by dispersal moves, flight tests, media leaks of deployments, and precautionary warnings that were intended not to be too provocative.

The movement of missiles during crises is obviously a far more sensitive matter than flight-testing. But moving missiles may be a precautionary operational compulsion rather than a tool for deliberately signaling resolve or intentional brinksmanship. It is unrealistic to expect a freeze on missile movement in an unfolding military crisis, when opposing conventional forces are mobilizing for deployment on the border. Missile movements may be carried out defensively for purposes of dispersal, concealment and security, instead of in preparation for offensive use. Outside powers watching the crisis through their satellite and national technical means of intelligence-gathering may misunderstand these moves even more than the local opponent, even though the opponent's means of intelligence may be technically less sophisticated. Arguably, less sophisticated local intelligence-gathering means might reduce the chances of the crisis spiraling rapidly out of control.

Missiles and the Kargil Crisis

The Kargil crisis began in early May 1999 when India discovered that it had lost control over lightly defended mountainous territory to a covert incursion on the northernmost fringes of the Line of Control (LoC) overlooking the town of Kargil. The incursion interdicted a strategic highway linking Srinagar to the Leh district and onwards to the Siachen Glacier. The fighting escalated vertically in late May when India used combat aircraft, two of which were shot down. Despite the significant escalation, Pakistan did not respond with reciprocal air attacks.

The role of ballistic missiles in the Kargil crisis has become a matter of controversy, as accounts from the United States, India, and Pakistan differ. However, there is general agreement that missiles played a key role, and concerns about their potential use helped diffuse the crisis. It is important to analyze these events in the context of their escalatory potential and identify what might be in store in future crises. Respected Indian journalist Raj Chengappa later claimed that,

> India activated all three types of nuclear delivery vehicles and kept them in what is known as Readiness State 3 – meaning that some nuclear bombs would be ready to be mated with the delivery vehicle at short notice. The air force was asked to keep Mirage fighters on standby. DRDO scientists headed to where Prithvi missiles were deployed and at least four of them were readied for possible nuclear

> strike. Even an *Agni* missile capable of launching a nuclear warhead was moved to a western Indian State and kept in a state of readiness. [16]

While Chengappa's assertions have not been verified by other accounts, these reported missile moves by India, if they were actually carried out, did not elicit a public response from the US administration or were not detected**.** The United States has not publicly stated what it believed India's missile activity to be and whether it concluded that India carried out operational missile deployments.

US officials evidently believed and later openly alleged that Pakistan mounted nuclear weapons on nuclear missiles for deployment during the Kargil crisis. This assertion was made in both print and TV media by former President Bill Clinton.[17]

In another published account, Bruce Riedel, a senior director on the National Security Council (NSC) staff, revealed how President Clinton effectively applied "shock and awe" negotiating tactics on Pakistani Prime Minister Nawaz Sharif in a meeting at Blair House on July 4, 1999. In a one-on-one talk (with Riedel being the sole note taker), President Clinton put the Pakistani Prime Minister on the spot by asking if he had "ordered nuclear missile forces to prepare for action." In Riedel's account, Nawaz Sharif, taken aback, apparently was led to believe that the Pakistani military might be "preparing nuclear-tipped missiles" without his knowledge. In unusually emotional terms, President Clinton reportedly declared that Pakistan was "messing with a nuclear war." In a subsequent interview, President Clinton made the same assertion, leaving the impression that he seriously believed the assertions.[18]

Pakistani military officials consistently denied that they had carried out any nuclear preparations. Preparing missiles for combat readiness is an extensive procedure, which would require mating them with nuclear warheads and would imply operational activities such as the activation of command systems and coordination between combat commands. However, in the last week of June 1999, just days before the Blair House meetings, Pakistani and US experts were meeting in Geneva, Switzerland to discuss arms control negotiations. The Pakistani Director-General of the Strategic Plans Division was present at that

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[16] Raj Chengappa, *Weapons of Peace* (New Delhi: Harper Collins, 2000), p. 437. The terms "activated" and "deployed" have been used which is often confusing in regard to the actual status of weapons from peace time to crises and wars and the state of alert, i.e., Readiness State 3.

[17] President Clinton's interview in "Avoiding Armageddon;" Bruce Riedel, "American Diplomacy and the 1999 Kargil Summit at Blair House," available at http://www.sas.upenn.edu/casi. Also see Strobe Talbot, *Engaging India: Diplomacy, Democracy and The Bomb* (Washington DC: The Brookings Institution, 2004), p. 161.

[18] Former President Bill Clinton, Former Deputy Secretary of State, Strobe Talbott, and former Assistant Secretary of State for South Asian Affairs, Karl Inderfurth were interviewed in the PBS series "Avoiding Armageddon," op. cit.

Geneva dialogue.[19] It stands to reason that if the Pakistani military were contemplating "deploying nuclear-tipped missiles," the head of the Strategic Plans Division (the secretariat of the NCA) would not have left his post for Geneva to discuss nuclear diplomacy issues that were of no immediate urgency.

Two reasons might explain why ballistic missiles were not made combat ready during the Kargil crisis. First, the crisis was already intense and threatening to become worse. The crisis meant different things to both sides. For Pakistan, the Kargil operation was a remote battle, contemplated as a local probe along the LoC in the long-running, low-intensity conflict in Kashmir. For India it was a "war," albeit a limited one, with Pakistan. Any Pakistani missile flight test or missile unit field maneuvers would have been perceived as escalatory, and likely to trigger a deeper crisis in political and military operational terms. Since two Indian aircraft had already been shot down, offensive moves by Pakistani ballistic missile units could have precipitated escalatory Indian reactions.

The second reason was that both sides had already carried out missile flight tests the month before, and there was no compelling technical reason to undertake further flight tests so soon thereafter. Refraining from flight tests during the crisis, then, could be regarded as a conscious decision not to escalate.

It is sobering to consider the possibility during the Kargil crisis that intelligence agencies misread or misrepresented missile moves. It is possible, for example, that alarming US assessments of Pakistan's missile moves were wrong. And if Chengappa's account is accurate, the absence of this episode in US accounts is equally disturbing. If Chengappa's account is true, this also suggests that Indian professions of a relaxed nuclear posture lack credibility.

Missile moves and missile fears during the Kargil crisis highlighted a new factor in crisis management. It is possible that Pakistani missiles were dispersed under standard operating procedures for their protection. Such defensive moves at the local level are to be expected in a crisis. However, Pakistani ballistic missiles were not made combat-ready nor were public statements made to announce such missile moves, nor were flight tests conducted. The United States seemingly could not distinguish between offensive and defensive moves. Either the intelligence was imperfect or the limited intelligence was purposefully used to achieve a desired effect. Regardless of the explanation, the outcome was clear: Pakistan was forced to withdraw, and heavy casualties occurred as India relentlessly attacked the withdrawing troops.

[19] This author was present at the Geneva meetings assisting the Pakistani team with negotiations on June 25 and 28, 1999. Robert Einhorn, then Assistant Secretary of State for Non-proliferation led the US side.

Missiles and the Compound Crisis of 2001-2002

An even more serious crisis between India and Pakistan arose from a sequence of crisis events (hence the term "compound crisis") beginning with the terrorist attack on the Indian parliament on December 13, 2001. This was followed by India's almost immediate mobilization of the bulk of its regular military forces on or near the border with Pakistan. India and Pakistan were widely perceived to be on the brink of war. Missiles introduced a new dimension to this crisis. Indian commentators spoke freely of India launching a "limited war", a concept that gained currency after the Kargil crisis. Hitherto, missile flight tests accompanying a force mobilization and military standoff had never been carried out in South Asia. The intensity and duration of the confrontation, and the prominence of strategic threats, were unprecedented in South Asia, at least through the first half of 2002.

On the eve of the traditional January 2002 parade, India conducted a flight test of a new version of the *Agni I* – configured in this case as a solid-fueled, single-stage missile with a reported range of 700-900 kilometers (km) and payload of 1,000 kilograms (kg). This version of *Agni I* was openly described as a "Pakistan-specific missile."[20] The flight test and accompanying military standoff conveyed a belligerent political message to Pakistan, particularly since it came on the heels of President Musharraf's unprecedented and conciliatory speech of January 12, denouncing all forms of terrorism. It is possible that the missile test was planned in advance rather than concocted as a response to the attack on parliament. Under the circumstances, however, Indian rhetoric became even more strident, so that two simultaneous messages were read in Pakistan. The first message was that India was not impressed with the January 12 public declaration by President Musharraf and was not ready to scale back the military confrontation. The second message was that India was demonstrating a new version of *Agni* that was not China-specific, as conventional wisdom held, but instead was designed to hold Pakistani targets at risk. Belligerent statements from the External Affairs Ministry in New Delhi were interpreted in Islamabad as more than deterrence signals; they were seen as upping the ante of the war-like atmosphere as India's military mobilization continued.

One traditional way for Pakistan to respond to the *Agni I* test would have been to conduct the traditional armed forces parade on March 23, 2002 and to highlight new military capabilities. But Pakistan had cancelled the parade for two consecutive years for security reasons, and therefore did not have this symbolic response option. In May 2002 when the Indian mobilization was nearing its peak, a second crisis was spearheaded by a terrorist attack on the Indian Army's Kaluchak camp in Jammu. Very rapidly the crisis spiraled. In the last week of May, Pakistan flight-tested three ballistic missiles – the *Ghauri* (*Hatf V*), the *Ghaznavi* (*Hatf III*) and the *Abdali* (*Hatf II*). Coming at the height

[20] See, for example, "Future-Fire – The Shorter Smarter Agni Heralds a New Genre of Missiles Directed Towards Pakistan," *India Today*, January 29, 2002.

of the tension, this was the most explicit signal by Pakistan of the readiness of its missile-deliverable deterrent during the composite crisis period. As with the case of the *Agni* test by India in January 2002, these flight tests originally were scheduled for technical reasons for that time of year, but they were timed and ran almost concurrently for multiple purposes.

Analysts found three probable political messages in those tests, inferring that they were intended to placate domestic critics, who had been accusing President Musharraf of neglecting the nation's defense and endangering national security (an allusion to his support to the US Global War on Terrorism); increase pressure on India to refrain from launching military strikes; and indicate that Pakistan was capable of using short- and intermediate-range ballistic missiles with nuclear warheads, and prepared to do so, if necessary. [21]

The Pakistani leadership certainly believed that the missile flight tests carried deterrence value, conveying a message of technical credibility and national resolve. Addressing scientists on June 17, while the military standoff was still in effect (although diplomatic efforts had by then defused the imminence of war), President Musharraf described the previous month's missile flight tests in the following terms:

> By testing, with outstanding success, the delivery systems of our strategic capability, these men (Pakistani scientists) validated the reliability, accuracy, and the deterrence value of Pakistan's premier surface-to-surface ballistic missile systems of the *Hatf* series, namely – *Ghauri*, *Ghaznavi*, and *Abdali*…[W]e need to ensure that the three basic ingredients of the deterrence – capability, credibility and resolve – never get compromised.[22]

President Musharraf's own words made clear that this missile flight-testing sequence was done for more than merely validating designs or measuring technical parameters.

The success of the Pakistani tests evoked a derogatory response in New Delhi, when India's spokeswoman Nirupama Rao said, "India is not impressed with missile antics of Pakistan." Ironically, in January 2002, when the *Agni I* flight test was carried out, India dismissed any notion of that test being provocative or escalatory. The same Indian spokeswoman said at that time, "This step is not intended to be provocative or destabilizing…while our program is not country specific, it is based on an assessment of our own requirements."[23]

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[21] *The Military Balance: 2002-2003* (London: International Institute of Strategic Studies, 2003), p. 126.
[22] "Nation Proud of Missile Test Results, Says Musharraf," *The News*, June 18, 2002.
[23] Nirupama Rao, Indian External Ministry Affairs spokeswoman, *Times of India*, January 26, 2002.

MISREADING THE PAST

During the Kargil crisis and compound crisis, both sides used missile flight tests as a tool for signaling and upping the ante. Each country described its tests as necessary to validate technical parameters but accused the other of irresponsibility. If such tests did convey a deterrent message as intended, it does not necessarily follow that the same tactic of missile signaling would work the next time. Instead, missile moves could either be dismissed by the opponent or misread as unnecessarily escalatory.

Moving ballistic missiles after a crisis has flared up, or during an evolving crisis, can cause a great deal of confusion and send the wrong signals. Over a period of time, the surveillance capability of both India and Pakistan will improve and missile movements may then be detected. In a crisis situation, however, there may still be no way to indicate convincingly that the missiles are moving for self-defense rather than moving into operational deployment for combat–ready use on short notice. The response of the adversary to those missile movements could be unpredictable. In a worst-case scenario, the country moving its missiles could come under preemptive attacks. Upon detecting operational deployment by the adversary, a nation might be forced to go beyond a defensive move to initiate combat-ready missile dispersal. In any case the missile moves from normal peacetime locations would contribute to the potential for escalation.

Moving missiles under the shadow of an unfolding crisis could signal very different messages. This could be read as conveying resolve to use the weapons if a critical threshold is crossed. More ominously, it could be read as beginning preparations for a strike. It was, apparently, the latter reading that the United States made in the summer of 1999. The Clinton administration reached a hurried conclusion about the purpose of Pakistan's missile moves, presuming that they involved the "tipping of missiles with nuclear warheads" and that they were being made ready for formal deployment during the Kargil crisis.[24] During the compound crisis in 2001-2002, India's External Affairs Ministry adopted a dismissive attitude towards Pakistan's missile flight tests and possible missile movements. The US reaction in 1999, three years earlier, was anything but dismissive.

RISK REDUCTION MEASURES FOR MISSILES

The record to date regarding missile moves does not inspire confidence that such moves will be interpreted properly within and outside the subcontinent. Clarifying the terminology of missile movements properly could reduce the potential for misreading and anxiety.

[24] Statement by Karl Inderfurth in the PBS series, "Avoiding Armageddon," op. cit.

Terminology

Operational considerations in South Asia regarding missile deployment are different from those applied by the major powers during the Cold War. In South Asia, deployment status for nuclear weapons and delivery vehicles change in an evolutionary fashion as India and Pakistan move from peacetime to crisis or to alert conditions short of war. In Europe, the evolution of a crisis did not affect the pre-positioning of nuclear weapons. To be sure, the alert status of the already deployed nuclear forces would increase as the crisis advanced, following standard operating procedures. For India and Pakistan, however, the deployment status of nuclear weapons varies from peacetime, recessed conditions to various degrees of alert during crises. This raises key questions about stability pertaining to the status of nuclear weapons during an unfolding crisis.

With regard to ballistic missiles in South Asia, at least three major steps and sequential activities would be required in the event of a crisis. First, nuclear warheads and missile frames must be prepared for mating. Second, the fuel systems of the missile frames would be checked out for integrity and, in the case of liquid-fueled missiles, the fueling procedures would ensue. Third, if deemed necessary, the warhead would be mated with the missile delivery vehicle and its launcher at an operational site. (An analogous final step would be applicable using aircraft as the delivery system.) The last step completes the transition to the full deployment of the missile system, and the fully deployed system then proceeds into its operational deployment mode. How far the national command system proceeds along this sequence depends on the state of weaponization called for at any particular stage of the crisis and the level of alert deemed necessary by continuous assessment of the security situation. In Pakistan's case, incremental changes would have to be authorized by the "employment committee" of the NCA. System patterns and procedures of deployment in India might differ somewhat from Pakistan's because of differences in doctrine, command system, and asymmetric conditions.[25]

The movement of mobile ballistic missiles for dispersal and deployment are two different operational conditions and at times the use of these terms and their connotations are quite different (see Table 1). Commonly used terms such as "activation" and "deployment" are often loosely applied in South Asia. "Activation" might simply mean that a missile regiment has been ordered to be operationally prepared, but may not mean that live warheads have been transferred. "Deployment" implies that a militarily useable weapon system has been physically transferred to a military unit with delivery means. There is a nuance to this definition and what it means in Pakistan. Deployment in Pakistan means that live warheads are mated with the delivery means (such as missiles and aircraft). The key distinction is on whether there has been a transfer of the nuclear weapon for custodial purposes or for the more advanced step of actually

[25] One account of how nuclear alert and deployment may have occurred in India during the Kargil crisis in 1999 may be obtained from Raj Chengappa, *Weapons for Peace*, op. cit., pp. 437-438.

Table 1: Possible Definitions of Nuclear Weapon and Delivery Status in South Asia [26]

Weaponization	The process of developing, testing, and integrating components into a militarily deliverable warhead.
Deployment	The process of transferring a militarily deliverable warhead to an operational military unit for mating with the delivery system. Deployment may consist of three or four stages determined by the NCA: 1. Preparing the delivery vehicles and warheads 2. Moving warheads to the operational site of the delivery vehicle (or *vice versa*) 3. Mating the warhead with the delivery vehicle 4. Mating the missile with the launcher (if a missile).
Activation (Indian term)	The process of preparing combat-ready warheads and assigning them to designated military units that are preparing separately for operational deployment during crisis.
Induction (Indian term)	Implies that a weapon or its delivery system has been transferred to a military unit, needing only a short time for technical preparation for use.
Custody (Pakistani term)	A warhead or delivery system (complete or in components) transferred to a military base for the purposes of safe and secure storage. The unit responsible for custody is not authorized to access or to change the status of the stored weapon.
Alerting	Actions taken to prepare a deployed weapon system for launch at pre-designated targets and initiating procedures for delineating the launch authority. Typically a fully deployed and alerted system would be ready for launch.
De-alerting	Reversing the alert actions to increase the time and effort required to launch a weapon system.

[26] These definitions have been derived from the author's experience and other sources, including Bruce Blair, "Alerting in Crisis and Conventional War," op. cit.; Rodney W. Jones, "Pakistan's Nuclear Posture: Quest for Assured Nuclear Deterrence – A Conjecture," in *Spotlight on Regional Affairs* (Islamabad: Institute of Regional Studies, January 2000), reprinted in *Regional Studies* 18, no. 2, (Spring 2000), pp. 3-39; Gregory Jones, "From Testing to Deploying Nuclear Forces: The Hard Choices Facing India and Pakistan," RAND Issue Paper, (Santa Monica: RAND, 2000)**;** and Neil Joeck, "Nuclear Relations in South Asia," in *Repairing the Regime*, op. cit.

mating the weapon with the delivery system. In the latter case in Pakistan, it would imply that the Strategic Forces Command has been put into an active operational mode. Because this could be construed, if detected, as a threatening posture and might encourage a preemptive strike, and almost certainly would precipitate intense international opprobrium, Pakistani officials have taken pains to stop short of deployment in previous crises.

Alert Status

Tensions have increased in South Asia since overt nuclearization in 1998. The United States reportedly brought strategic nuclear weapons and their delivery systems to a heightened state of alert twice during the Cold War. The US strategic alert scale goes from Defense Condition (DefCon)-4 in normal or peacetime conditions up to DefCon-1, when nuclear war could be imminent. During the Cuban missile crisis in 1962 and the 1973 Arab-Israeli War, the state of strategic alert was reportedly increased to DefCon-3, which implied that "troops are on standby to await further orders."[27] During the South Asian crises, although conventional forces were mobilized and put on the highest state of alert, there has been no evidence of increased nuclear alert status or nuclear weapons operational deployment in the manner that the superpowers exhibited in their Cold War crises.

During the 1999 Kargil crisis and the compound crisis of 2001-2002, strategic missiles and weapon components may have been moved to different locations for defensive reasons. Seeking defensive measures is analogous to the actions taken under an "orange terrorism alert" in the United States, where precautionary security measures are exercised when a state of vulnerability is present.[28] Threat perceptions are driven by anticipated probabilities and assessed consequences of past events, and responses may be based on worst-case scenarios. In 1998, immediately after the nuclear tests by India, concern mounted in Pakistan that India might carry out a preemptive strike at Pakistani nuclear installations. Pakistan took defensive measures as a result, and this apparently stimulated a perception in the United States that Pakistan was "reacting to false alarms" and creating undue instability.

The September 11, 2001 attacks may have changed US perspectives about anticipatory defense measures when there is a possibility of attack. Several orange alerts have since taken place, with the adoption of heightened security measures to meet any "just in case" scenario. Security managers in South Asia undertake similar measures in response to what they regard as threats peculiar to their environment. These measures are part of standard operating procedure that

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[27] See Bruce G. Blair, "Alerting in Crisis and Conventional War" in Ashton Carter, John Steinbrunner, and Charles A. Zraket, eds., *Managing Nuclear Operations* (Washington DC: The Brookings Institution, 1987), pp. 75-120.

[28] Orange alert refers to "high level" or heightened security, terminology employed by the US Department of Homeland Security in the wake of the September 11, 2001 terrorist attacks on US soil.

have evolved over time. Threat perceptions are driven by the hypotheses of a preemptive strike (as conducted by Israel against Iraq's Osiraq nuclear research site in 1981). Security perceptions only change for the better when a structured peace and stable security framework exists and an era of cooperative security dawns. Unfortunately, in South Asia the reverse has happened with both sides having their own narration of "stab in the back" theories: Pakistan over Siachen and Operation Brasstacks, and India over Kargil.

During a crisis, an adversary's overreaction based on misperception could have serious consequences. Currently, there is no way to directly reassure an adversary, which may fear that missiles are being moved for operational deployment rather than defensive dispersal. The goals of crisis stability on one hand, and of operational preparedness and deterrence credibility on the other, present a certain tension. Diplomatic efforts must commence promptly to contain a crisis. Communication links, crisis prevention centers, and third parties can facilitate these efforts. The hotline between the Directors-General of Military Operations (DGMOs) of Pakistan and India might be helpful in routine clarification that peacetime military operations are non-threatening, and this could help prevent an inadvertent crisis.[29] This confidence-building measure, however, is not designed to diffuse an unfolding crisis that has already been triggered.

Missile Operations

Among the operational conditions that may cause instability during missile force operations are the following:

- **Scarcity of Timely Intelligence.** Missile movement during crises is a potential source of anxiety to the opponent, and therefore could contribute to escalation. The command system requires timely and accurate information about changing military dispositions on the other side. At present this capacity is limited. India and Pakistan rely on Remotely Piloted Vehicles (RPVs), human, and electronic intelligence. India also possesses a limited satellite imagery capability.[30] In the absence of complete intelligence, there is a significant probability that an adversary would misinterpret passive dispersal and initiate deployment, starting an action and reaction sequence.

- **The Dilemma of Control.** Wide and flexible dispersal of strategic assets is within the capability of both countries but if exercised this option could give rise to a problem of control. Dispersal of missiles

[29] By common agreement, both DGMOs talk for approximately thirty minutes every Tuesday at a pre-designated time.
[30] The Indian Remote System (IRS) of satellites has achieved progressively improved resolution. See "IRS Series," *Jane's Space Directory* (updated December 23, 2003).

during a crisis is understandable to assure their survivability. In dispersal, the foremost problem facing the command authority could be retaining centralized control. Assertive negative control over dispersed missiles is desirable for stability but could undermine assurance that the missile system operators would respond rapidly, if so ordered.[31] Pre-delegation, which weakens central control but increases assured capability under attack to respond at the unit level, would increase the risk of inadvertent or premature actions.[32] The command system would thus be under extreme stress if dispersal or deployment takes place. The principal decision-making problem is how to make an optimum trade-off between battle effectiveness and safety. The evolving command system in South Asia will have to find an answer to this problem, which was not easily solved in the Cold War.

- **Harsh Geophysical Conditions.** Both countries have sufficient territorial space and variety of terrain for dispersal, camouflage, and concealment. India has vast depth, and the geophysical asymmetry with Pakistan is very obvious. However, the road and railway network is not well developed in either country. Conditions for armored and infantry mobility are harsh and compounded by heat and dust. Missile deployment is logistically challenging. Strategic missile types encompass both liquid- and solid-fueled technologies, each having its own unique problems of handling and safety in movement. The assortment of missiles available with varied ranges could further compound the safety issues of mating them with the warhead – both conventional and nuclear. Tribal, communal, and sectarian problems are endemic, posing extraordinary safety and security problems in outlying areas.

Nuclear Weapon Considerations

The deployment of nuclear weapons forces a paradigm shift in security management. At least six major considerations would play into decisions by both India and Pakistan to undertake frequent or continuous deployment. These are:

- **Political and Technical Control.** National political control is an imperative, yet continuous deployment would pose major control challenges, some highlighted above. If deployment were undertaken, it would be to minimize the vulnerability as the result

[31] This concept is discussed in Peter Feaver, "Command and Control in Emerging Nuclear Nations," *International Security* 17, no. 3 (Winter 1992-1993), pp.160-187.
[32] See Barry Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell University Press, 1999).

of a looming threat. If such a threat were serious enough to prompt deployment, the strategic tendency would be to deploy all rather than leave non-deployed assets at risk. In either case, the command and control requirements are the same. As Michael Quinlan has pointed out, "[nuclear] requirements do not…decrease proportionally with size; it is not to be supposed that a small nuclear force does not need sophisticated control – indeed, small size may entail a potential vulnerability that heightens demands."[33]

Dispersal could involve different configurations ranging from the integration of prepared nuclear weapons with their delivery means to separated nuclear weapon components moving independently from delivery systems. Pressure on the command system to pre-delegate release authority would rise as a crisis spirals. The authority to launch nuclear weapons could be centrally controlled by incorporating permissive action links (PALs) in weapons. A PAL is a coded switch that blocks the arming of the weapon until a positive signal has been transmitted by the strategic command. PALs require the entry of a code in order to open circuits that arm the weapon.[34] Even if PALs were available, the decision to delegate authority and release warheads to military units in the field would be an extremely excruciating one for top leaders in both India and Pakistan.[35]

- **Communication Problems.** National command and control depends upon several redundant layers of communication to ensure effective assertive control over dispersed units. The absence of assured redundancy and secure communication would remain a prime concern. In wars, defeating electronic jamming, and – in the event of outbreak of a nuclear war – overcoming the effects of electromagnetic pulse (EMP) would be crucial features of command and control, as well as deterrence stability.

- **Need for Physical Security.** Almost any level of deployment would increase the importance of physical control by the command system of the nuclear weapons. This would be a profound concern in the event that the nuclear command and control and early warning systems in South Asia lack PAL technology and other sophisticated features. The chances of nuclear weapons being stolen or hijacked have been greatly exaggerated in the western

[33]Michael Quinlan, "How Robust is India-Pakistan Deterrence?" *Survival* 42, no. 4 (Winter 2000-2001), p. 148.
[34] See Thomas Cochran, William Arkin and Milton Hoenig, *US Nuclear Forces and Capabilities* (Cambridge, Massachusetts: Ballinger Publishing Company, 1984).
[35] Paul Bracken has defined two levels of control. He refers to political control for statecraft and strategy and provincial control for efficient use of the armed forces. See *Managing Nuclear Operations*, op. cit., pp. 354-356.

press. This possibility is exceedingly remote due to multiple tiers of security. But in a deployed or dispersed mode, the concerns about safety and security would certainly multiply.

LOOKING AHEAD

An unfolding crisis in South Asia always has a larger political context. Almost all crises stem from the existing poor state of relations compounded by lack of communication. Every crisis has a triggering event, and mutual perceptions of the underlying causes of that event are invariably disparate. Mutual distrust and an extremely low level of understanding of nuclear dangers and each other's doctrine and intentions make the odds of misperceptions very high. Under these circumstances, the deployment of ballistic missiles can be very disturbing. In the last twenty years, several military mobilizations have taken place. These mobilizations of the armed forces did not lead to the outbreak of war, implying to some that nuclear deterrence has worked. But no one can count on this pattern to recur repeatedly without resort to war.

Additional concern arises from concepts of limited war and escalation dominance. Such reasoning in South Asia is foolhardy because the weaker side could resort to counters by unconventional means, including guerilla warfare, stalemating the conventional war, and finally playing aggressively with nuclear brinksmanship, if not contemplating actual nuclear use. Under these circumstances, flight-testing seems unlikely to convey the same degree of resolve as do ballistic missile moves. The use of ballistic missiles in combat would have far greater psychological impact than the use of aircraft or other weapons. Missiles as escalatory weapons could be employed in three possible ways. In each case the reaction of the adversary could be unpredictable. One possibility would be to move warheads closer to the staging site as a means of political signaling. A second possibility would be the use of short-range, conventionally-armed ballistic missiles in the event of hostilities. A third possibility would be the use of nuclear-armed ballistic missiles.

Stephen Cimbala has written about nuclear weapons as tools of provocation and deterrence. He uses the carrot-and-stick analogy, that "both pre-nuclear and nuclear threat making depend for their success on the ability of political leaders and military planners to make specific and limited threats, backed by implicit or explicit reassurances against further crisis deterioration or military escalation."[36] In South Asia, however, neither India nor Pakistan offers much in the way of carrots when they wave their sticks. They often engage in saber rattling, test firing of missiles, and mobilizing troops to underline threatening statements and harsh rhetoric, without offering positive measures that could be pursued for de-escalation. Their threats are general, rather than specific or limited. Neither side provides reassurance against escalation. Missiles as instruments for signaling

[36]Stephen Cimbala, *Military Persuasion: Deterrence and Provocation in Crisis and War* (University Park, PA: The Pennsylvania State University Press, 1994), p. 2.

could convey stronger messages than desired and could be misread. Reciprocal actions and counter moves could spiral the crisis.

STEPS TO REDUCE INSTABILITY

The following concepts, both short- and long-term, could help prevent future escalation if the leadership on both sides wanted to implement them.

Short-term Measures

- **Refrain from Large-Scale Mobilizations.** The deeper sources of instability lie in the realm of politics and unresolved conflicts over coveted assets and disparate values. Both countries need to work towards a commitment that large-scale mobilization of their conventional forces should never again take place. However, in the absence of a formal regime-based arrangement to prohibit such mobilization, a process of peace and security building, if initiated sincerely, could allow temperatures to be reduced. This in turn could enable far-sighted leaders on both sides to build firebreaks against "triggering events."

- **Place Constraints on Flight Tests.** Both countries could refrain from carrying out any ballistic missile flight tests during periods of crises. Beyond providing prior notifications, on which there already is a preliminary understanding, the sides could formally agree that ballistic missile flight tests would be suspended during crises. It would be difficult to define exactly what would constitute a period of crisis, but efforts to agree on criteria would themselves be productive and possibly facilitate more detailed confidence-building measures regulating ballistic missile flight-testing.

- **No Mating of Warheads and Delivery Systems.** India and Pakistan could conclude an agreement not to mate delivery systems and warheads in peacetime, in contrast to US/Soviet practices.

- **No Pre-delegation.** Both countries could agree not to pre-delegate authority to field commanders in normal times.

Long-term Measures

- **Leadership Role.** National leaders must maintain absolute control over the status of nuclear weapons and ballistic missiles. The President, the Prime Minister, and senior leaders must be fully informed by custodians of even passive moves of missiles and/or

nuclear weapons. During crises, missiles would only move after the explicit authorization of the NCA.

- **Communication.** National leaders need to inform allies, major powers, and the adversary about the nature of missile moves contemplated or underway. To the extent possible, greater clarity needs to be provided when missiles moves are of a defensive nature.

- **Central Crisis Centers.** In addition to existing communication channels, Nuclear Risk Reduction Centers could be established in each capital and conveniently located for easy access by top leaders.[37]

- **Arms Control Agreements.** Several conceptual options are available for arms control measures intended to reduce the destabilizing effects of strategic missiles. First, it would be wise to ban flight tests of ballistic missiles with ranges of 150 km or less. Second, it would be wise to create geographic non-deployment zones for mobile missiles in border regions. A third approach would be to eliminate missiles with a range of 150 km or less, because they are perceived to have both conventional and nuclear missions. This ambiguity lowers the nuclear threshold. Fourth, India and Pakistan could designate certain types of missiles as having only conventional missions and armament.

CONCLUSION

Nuclear-weapon states bear a great responsibility, not only to their own people but also to the rest of the world. India and Pakistan have demonstrated their possession of nuclear weapons and their means of delivery. In the past decade, ballistic missiles have become a mainstay of their forces. The direction of technology development is likely to increase range and accuracy and make warheads lighter and more efficient. As the inventories grow and as technology evolves, there will be greater pressures to test missiles and/or nuclear weapons.

Ballistic missiles entail a high degree of risk that is not matched by other delivery means. In the 1999 Kargil crisis, the United States used Pakistan's missile moves as a lever to compel Pakistan to withdraw forces abruptly from a local conflict. In the 2001-2002 compound crisis, both protagonists sent deterrence signals with missile tests. These signals upped the ante and brought the region to a heightened state of alert and tension that had a palpable nuclear escalatory potential.

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[37] See Robert Einhorn, "Nuclear Risk Reduction Centers in South Asia," CSIS Working Group Report (Washington DC: Center for Strategic & International Studies, 2004).

As responsible nuclear neighbors, India and Pakistan need to carefully evaluate the impact of their growing ballistic missile capabilities and their missile management practices. There is an inevitable tension between ambiguity and transparency in nuclear force posturing. This problem is more acute in the case of mobile ballistic missiles that are being moved during heightened alert conditions. Misperceptions in this regard could deepen a crisis and lead to dangerous gamesmanship.

Some destabilizing ballistic missile moves need to be addressed by both India and Pakistan through structured arms control talks. In addition, both countries would be wise to consider establishing a ballistic missile restraint regime in the region. Restraint measures could improve national and regional security, while retaining the deterrent value of nuclear arsenals.