

---

---

# **NUCLEAR SOUTH ASIA**

A GUIDE TO INDIA, PAKISTAN, AND THE BOMB

---

---

**CHAPTER 3 GUIDE  
NUCLEAR POLICIES AND POSTURES**

# CONTENTS

<b>ABOUT NUCLEAR LEARNING .....</b>	<b>3</b>
<b>LEARNING OBJECTIVES .....</b>	<b>3</b>
<b>KEY TERMS .....</b>	<b>4</b>
<b>CONTENT OVERVIEW.....</b>	<b>7</b>
BACKGROUND: “NUCLEAR POLICY AND POSTURE” .....	7
3.1: “NUCLEAR DOCTRINES AND POSTURES IN SOUTH ASIA” .....	7
3.2: “SOURCES OF DOCTRINE AND POSTURE IN SOUTH ASIA” .....	8
3.3: “THE NUCLEAR FUEL CYCLE” .....	9
3.4: “NUCLEAR WARHEADS” .....	9
3.5: “STRATEGIC DELIVERY VEHICLES” .....	10
3.6: “ASSESSING NUCLEAR ARSENALS” .....	10
3.7: “NUCLEAR SUBSTITUTION” .....	11
BACKGROUND: “NUCLEAR COMMAND-AND-CONTROL (C&C)” .....	11
3.8: “NUCLEAR COMMAND AND CONTROL (C&C) IN SOUTH ASIA” .....	11
3.9: “DETERRENCE STABILITY IN SOUTH ASIA” .....	12
3.10: “DETERRENCE CREDIBILITY IN SOUTH ASIA” .....	13
3.11: “INDIA’S ‘COLD START’ DOCTRINE” .....	14
3.12: “TACTICAL NUCLEAR WEAPONS (TNWs) IN SOUTH ASIA” .....	15
<b>RECOMMENDED READINGS .....</b>	<b>16</b>
<b>DISCUSSION QUESTIONS.....</b>	<b>19</b>

## **ABOUT NUCLEAR LEARNING**

*Nuclear Learning* is an online initiative produced by the [Stimson Center's South Asia Program](#) to sharpen strategic analysts' understanding of nuclear programs, doctrines, and postures in South Asia and beyond. *Nuclear Learning* pursues this mission by making diverse viewpoints accessible via open online courses, nurturing vibrant communities of "nuclear learners" on social media, and providing opportunities for students to engage with experts in the field.

The first *Nuclear Learning* course—"Nuclear South Asia: A Guide to India, Pakistan, and the Bomb"—is available for free at [www.nuclearlearning.org](http://www.nuclearlearning.org). "Nuclear South Asia" is the most comprehensive collection of perspectives on India and Pakistan's nuclear trajectories available online. It includes 8.5 hours of video content and features lectures from more than 80 leading scholars and practitioners, including former senior diplomats and military officers. In addition to lectures, the course includes quizzes, recommended readings, and a pass/fail final exam.

Upon completing "Nuclear South Asia," students will be able to:

- Understand the factors motivating India and Pakistan's nuclear programs, doctrines, and postures;
- Assess the impact of emerging policies and capabilities on deterrence stability;
- Describe India and Pakistan's positions vis-à-vis the Nuclear Non-Proliferation Treaty (NPT) and other elements of the global nuclear order;
- Analyze crisis episodes, management challenges, and confidence-building efforts on the Subcontinent; and
- Propose innovative solutions to reduce nuclear competition and dangers in South Asia.

Students have the option of earning a Stimson-issued certificate, an important credential for academic and professional advancement. To earn a certificate, students must watch the video lessons, complete the quizzes and surveys, and pass a final exam.

Due to high demand, a second *Nuclear Learning* course on conventional and nuclear deterrence in Southern Asia is under development for release in 2019.

## **LEARNING OBJECTIVES**

In this chapter, students will learn about the nuclear doctrines and postures of both India and Pakistan, in addition to the history and sources of these postures. By the end of this chapter, students will understand the fundamentals behind the technology of nuclear weapons, including the nuclear fuel cycle, types of nuclear warheads, strategic delivery vehicles, and tactical nuclear weapons. Students will also learn about the command-and-control structures in place in India and Pakistan and methods for assessing countries' nuclear arsenals. Finally, students will gain the knowledge necessary to engage in current debates about nuclear developments in South Asia, such as the Cold Start Doctrine and tactical nuclear weapons.

## **KEY TERMS**

Below is a list of definitions of the key terms from this chapter.

**Cold Start Doctrine:** The Indian Army's limited war doctrine, which calls for the reorganization of its large strike corps into smaller integrated battle groups to facilitate the rapid mobilization of forces along the India-Pakistan border for a conventional retaliatory strike on Pakistan.<sup>1</sup> Under Cold Start, the Indian Army would make shallow incursions into Pakistani territory and use captured territory as leverage to compel Pakistan to cease its support to anti-India militants.<sup>2</sup> Proponents of Cold Start insist that it could be implemented without triggering Pakistan's nuclear thresholds, though Pakistan vows to respond with the use of tactical nuclear weapons under its doctrine of full-spectrum deterrence.<sup>3</sup>

**Counterforce Targeting:** The threat to use nuclear weapons to destroy military targets. Counterforce targeting requires many nuclear weapons of varied ranges, including weapons with high accuracy, to strike military targets.<sup>4</sup> By engaging in counterforce targeting, national leaders seek to underscore the risks to an adversary of crossing the nuclear threshold, as well as a belief that once this threshold is crossed, nuclear weapons have military utility.

**Countervalue Targeting:** The threat to use nuclear weapons to destroy cities. Leaders in states that rely on countervalue targeting believe that nuclear weapons have political, but not military, value.<sup>5</sup>

**Credible Minimum Deterrence:** The posture of maintaining nuclear weapons at the minimal level necessary to deter nuclear threats against oneself.<sup>6</sup> Whereas some observers emphasize the "minimum" aspect, others emphasize the "credible" aspect.<sup>7</sup> The "minimum" camp tends to view credible minimum deterrence as implying a commitment to a small nuclear arsenal and the avoidance of arms racing.<sup>8</sup> The "credible" camp holds that states should pursue whichever capabilities make deterrence credible regardless of their effect on arsenal size or competitive dynamics.

**Deterrence Optimism:** The belief that nuclear weapons can increase stability and peace between nuclear powers.<sup>9</sup>

---

<sup>1</sup> Walter C. Ladwig III, "A Cold Start for Hot Wars?," *International Security* 32, no. 2 (Winter 2007): 158–90.

<sup>2</sup> George Perkovich and Toby Dalton, *Not War, Not Peace?: Motivating Pakistan to Prevent Cross-Border Terrorism* (New Delhi: Oxford University Press, 2016).

<sup>3</sup> Naeem Salik, "Pakistan's Nuclear Force Structure in 2025," Carnegie Endowment for International Peace, June 30, 2016, <https://carnegieendowment.org/2016/06/30/pakistan-s-nuclear-force-structure-in-2025-pub-63912>.

<sup>4</sup> Michael Krepon, Travis Wheeler, and Shane Mason, eds., *The Lure and Pitfalls of MIRVs: From the First to the Second Nuclear Age* (Washington, DC: Stimson Center, 2016), [https://www.stimson.org/sites/default/files/file-attachments/Lure\\_and\\_Pitfalls\\_of\\_MIRVs.pdf](https://www.stimson.org/sites/default/files/file-attachments/Lure_and_Pitfalls_of_MIRVs.pdf).

<sup>5</sup> Hans M. Kristensen, Robert S. Norris, and Ivan Oelrich, "From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons," Occasional Paper (Washington, DC: Federation of American Scientists and the Natural Resources Defense Council, April 2009).

<sup>6</sup> Rajesh Rajagopalan, "India's Nuclear Doctrine Debate," Carnegie Endowment for International Peace, June 30, 2016, <http://carnegieendowment.org/2016/06/30/india-s-nuclear-doctrine-debate-pub-63950>.

<sup>7</sup> Vipin Narang, "Five Myths about India's Nuclear Posture," *The Washington Quarterly* 36, no. 3 (August 2013): 143–57.

<sup>8</sup> Nishant Rajeev, "A Holistic Approach to India's Nuclear Doctrine," *The Diplomat*, May 24, 2017, <https://thediplomat.com/2017/05/a-holistic-approach-to-indias-nuclear-doctrine/>.

<sup>9</sup> Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: An Enduring Debate* (New York: W.W. Norton & Company, 2013).

**Deterrence Pessimism:** The doubt of nuclear weapons' ability to increase stability and peace between nuclear powers.<sup>10</sup>

**Deterrence Stability:** A stable environment in relations between states where the prospect of mutually assured destruction deters conflict between nuclear-armed adversaries.<sup>11</sup> The mutual attainment of secure second-strike capabilities between adversaries has arguably had a revolutionary effect on international relations, reducing the likelihood of highly destructive, direct war.<sup>12</sup>

**Dual-Capable Missile:** A missile that can carry either nuclear or conventional warheads.

**Full-Spectrum Deterrence (FSD):** Pakistan's nuclear doctrine, which was adopted to deter India not only from strategic use of nuclear weapons, but conventional war against Pakistan.<sup>13</sup> FSD is a "kind of deterrence by denial, more akin to flexible response or graduated response doctrines" and therefore requires a "larger arsenal size and a greater variety of both warheads and delivery systems" for countervalue and counterforce targeting.<sup>14</sup>

**International Atomic Energy Agency (IAEA):** An international regulatory body established in 1957 as part of the United Nations family to promote the safe, secure, and peaceful use of nuclear technologies.<sup>15</sup>

**Multiple Independently Targetable Re-entry Vehicle (MIRV):** A missile that carries multiple warheads, each of which can be directed to a different target.<sup>16</sup>

**No First Use (NFU):** A policy whereby a nuclear power pledges to only use nuclear weapons in retaliation and that it will not be the first user of nuclear weapons in a conflict.<sup>17</sup>

**Nuclear Command and Control (C&C):** The interlocking series of institutional arrangements, operational procedures, and technical mechanisms that could provide leaders with the means to manage and employ nuclear forces as well as prevent their unauthorized or accidental use.<sup>18</sup>

**Nuclear Fuel Cycle:** The infrastructure and chemistry that allow a country to turn uranium into energy and/or nuclear weapons.<sup>19</sup>

---

<sup>10</sup> Ibid.

<sup>11</sup> Michael Krepon and Julia Thompson, eds., *Deterrence Stability and Escalation Control in South Asia* (Washington, DC: Stimson Center, 2013), [http://www.stimson.org/images/uploads/research-pdfs/Deterrence\\_Stability\\_Dec\\_2013\\_web.pdf](http://www.stimson.org/images/uploads/research-pdfs/Deterrence_Stability_Dec_2013_web.pdf).

<sup>12</sup> Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, NY: Cornell University Press, 1989).

<sup>13</sup> "A Conversation with Gen. Khalid Kidwai," Carnegie International Nuclear Policy Conference, moderated by Peter Lavoy, March 23, 2015, <https://carnegieendowment.org/files/03-230315carnegieKIDWAI.pdf>.

<sup>14</sup> Salik, "Pakistan's Nuclear Force Structure in 2025."

<sup>15</sup> "History," International Atomic Energy Agency, accessed May 7, 2018, <https://www.iaea.org/about/overview/history>.

<sup>16</sup> Krepon, Wheeler, and Mason, *The Lure and Pitfalls of MIRVs: From the First to the Second Nuclear Age*.

<sup>17</sup> Rajagopalan, "India's Nuclear Doctrine Debate."

<sup>18</sup> Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security* 17, no. 3 (Winter 1992/93): 160–87.

<sup>19</sup> "The Nuclear Fuel Cycle," International Atomic Energy Agency, August 2011, <https://www.iaea.org/sites/default/files/nfc0811.pdf>.

**Nuclear Policy:** How leaders in states that possess nuclear weapons view the utility of these weapons and the plausible conditions under which their use might be envisioned.<sup>20</sup>

**Nuclear Substitution:** The idea that nuclear weapons, especially second-strike capabilities, decrease a state's need for pursuing upgrades in conventional forces.<sup>21</sup>

**Nuclear Taboo:** The non-use of nuclear weapons since World War II due to their normative status as prohibited weapons.<sup>22</sup>

**Nuclear Triad:** The ability to employ nuclear weapons by land-, air-, and sea-based delivery systems.<sup>23</sup>

**Tactical Nuclear Weapons:** Low-yield, short-range nuclear devices used on the battlefield rather than against a strategic target, such as a city.<sup>24</sup>

**Technological Determinism:** In the nuclear-weapons context, the development of more advanced weapons capabilities without regard to political motivations or strategic consequences.<sup>25</sup>

---

<sup>20</sup> "Backgrounder: Nuclear Policy and Posture," *Nuclear South Asia: A Guide to India, Pakistan, and the Bomb*, accessed May 7, 2018, <https://www.nuclearlearning.org/courses/take/nuclear-south-asia/texts/1245471-backgrounder-nuclear-policy-and-posture>.

<sup>21</sup> Ahsan I. Butt, "Do Nuclear Weapons Affect the Guns-Butter Trade-off? Evidence on Nuclear Substitution from Pakistan and Beyond," *Conflict, Security & Development* 15, no. 3 (May 27, 2015): 229–57.

<sup>22</sup> Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons Since 1945* (New York: Cambridge University Press, 2007).

<sup>23</sup> "Fact Sheet: The Nuclear Triad," Center for Arms Control and Non-Proliferation, July 28, 2017, <https://armscontrolcenter.org/factsheet-the-nuclear-triad/>.

<sup>24</sup> Nikolai Sokov, "Tactical Nuclear Weapons (TNW)," Nuclear Threat Initiative, May 1, 2002, <http://www.nti.org/analysis/articles/tactical-nuclear-weapons/>.

<sup>25</sup> Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014).

## **CONTENT OVERVIEW**

In this section, we provide an overview of all the lectures and supplemental materials in Chapter 3 of *Nuclear South Asia* on [www.nuclearlearning.org](http://www.nuclearlearning.org).

### **BACKGROUNDER: “NUCLEAR POLICY AND POSTURE”**

This course webpage provides an introductory question-and-answer reading for the following topics:

- What is nuclear policy?
- Do nuclear weapons have political utility?
- Do nuclear weapons have military utility?
- What is countervalue targeting?
- What is counterforce targeting?
- What are the primary components of nuclear policy?
- What postures might regional nuclear powers adopt?

### **3.1: “NUCLEAR DOCTRINES AND POSTURES IN SOUTH ASIA”**

Run Time: 11:25

Lecturers: Reshmi Kazi (Institute for Defense Studies and Analysis), Shyam Saran (former Foreign Secretary of India), S. Paul Kapur (U.S. Naval Postgraduate School), Vipin Narang (Massachusetts Institute of Technology), Naeem Salik (Centre for International Strategic Studies), Zamir Akram (former Pakistani ambassador), Hasan Askari Rizvi (Punjab University), and Sadia Tasleem (Quaid-i-Azam University)

Key Points:

- On India’s nuclear doctrine:
  - According to Reshmi Kazi and Shyam Saran, the key tenets of India’s nuclear doctrine are credible minimal deterrence and adherence to a no first use policy (NFU). This is a retaliation-only doctrine, which requires a nuclear triad.
  - According to S. Paul Kapur, India’s NFU policy is an essential element of its doctrine, but includes some caveats. This is a “binary” type of doctrine, meaning that it will not use nuclear weapons first, but if it does, it will do so in a massive way. This doctrine is reflective of U.S. policy in the 1950s and makes it difficult to accommodate graduated responses to attacks.
  - According to Vipin Narang, India’s doctrine can be described as “assured retaliation” against potential nuclear use by China and Pakistan. It emphasizes sea-based capabilities in order to preserve a second-strike capability.
- On Pakistan’s nuclear doctrine:
  - According to Naeem Salik, Pakistan’s doctrine also includes credible minimal deterrence, which calls for a capability to destroy the bear minimum number of targets that the other side would find unacceptable.
  - According to Zamir Akram, the key tenet of Pakistan’s nuclear doctrine is deterrence against India’s larger conventional and nuclear capabilities, and the potential of deterring an Indian conventional attack with nuclear forces.
  - According to Hasan Askari Rizvi and S. Paul Kapur, Pakistan does not have an NFU policy because of the disparity between Indian and Pakistani capabilities. Threat of first use is critical to Pakistan’s security to deter an Indian conventional attack, although this makes the likelihood of Pakistani nuclear use increase.

- Vipin Narang describes Pakistani doctrine as “asymmetric escalation,” or the threat of using nuclear forces against Indian conventional attacks.
- According to Sadia Tasleem, the legacy of Cold War thinking and Pakistan’s threat perception deeply affect how Pakistan responds to its national security challenges.

### **3.2: “SOURCES OF DOCTRINE AND POSTURE IN SOUTH ASIA”**

Run Time: 14:54

Lecturers: Sameer Lalwani (Stimson Center), Rajeswari Rajagopalan (Observer Research Foundation), S. Paul Kapur (U.S. Naval Postgraduate School), Syed Azmat Hassan (former Pakistani ambassador), Michael Krepon (Stimson Center), Ashley Tellis (Carnegie Endowment), Rasul Baksh Rais (Lahore University of Management Sciences), Scott Sagan (Stanford University), Vipin Narang (Massachusetts Institute of Technology), Dave Smith (U.S. Army), and Riaz Khan (former Pakistani Foreign Secretary)

Key Points:

- According to Sameer Lalwani, international relations scholars have suggested number of variables that serve as a state’s source of nuclear posture, including: the state’s security environment, strategic culture, domestic politics, technological determinism, civil-military relations, and financial constraints.
- On India and Pakistan’s security environments:
  - According to Rajeswari Rajagopalan, factors that push India towards its posture include the triangular dynamics between India, China, and Pakistan.
  - S. Paul Kapur argues that security concerns drive India’s posture, especially the lessons drawn from its 1964 encounter with (and loss to) China. He also argues that India was motivated by interest groups including its strategic enclave and scientific community.
  - According to Syed Azmat Hassan, Pakistan views nuclear weapons as a deterrent to India, which has larger conventional forces. In this sense, it views nuclear weapons as an “insurance policy.”
  - According to S. Paul Kapur, Pakistan is acutely aware of its weakness vis-à-vis India and views nuclear weapons as an equalizer.
- On India and Pakistan’s strategic culture:
  - Michael Krepon states that the hallmarks of Indian strategic culture include civilian control over the military and a relaxed view of nuclear weapons as political instruments.
  - According to Ashley Tellis, the main components of Indian strategic culture include a long history of civilization, aspirations for a prominent place in the world, and the struggle against its colonial legacy. As such, Indians see nuclear weapons as a limited but necessary capability to protect its independence.
  - According to Rasul Baksh Rais, the main elements of Pakistani strategic culture include the idea that an Islamic Pakistan must be defended at all costs against India and that Pakistan must establish its identity as a regional power. Nuclear weapons thus give Pakistan confidence as a state and contribute to its identity.
- On India and Pakistan’s civil-military relations:
  - According to Scott Sagan, bureaucracies everywhere tend to like nuclear weapons. South Asian states with nuclear weapons tend to seek autonomy and larger arsenals.
  - According to Vipin Narang, India has had firm civilian control over the military since independence, which may minimize the risk of accidents or unauthorized use.

- Rajeswari Rajagopalan argues that India's nuclear policy is largely driven by its scientific community. The government overwhelmingly approves Department of Development and Research (DODR) programs.
- According to Dave Smith, Pakistan's army plays an enormous role in its nuclear policy and is considered the senior partner in civil-military relations.
- Riaz Khan describes how Pakistan's Foreign Office collaborates with its Strategic Plans Division (SPD) on nuclear doctrine and nuclear regulations.

### **3.3: "THE NUCLEAR FUEL CYCLE"**

Run Time: 2:26

Lecturer: Toby Dalton (Carnegie Endowment)

Key Points:

- Toby Dalton defines the nuclear fuel cycle as the infrastructure and chemistry that allow a country to turn uranium into energy or nuclear weapons.
- Both India and Pakistan have a limited amount of uranium mining and concentration, which is fed into their weapons programs.
  - In Pakistan, this was typically done through uranium enrichment. In India, domestic uranium is converted into nuclear fuel and run through so-called "research reactors."
- Neither state has large amounts of uranium, so both seek foreign support for their nuclear power enterprises. Pakistan has received reactors (and fuel) from China, and India also seeks foreign support.
- According to Toby Dalton, both India and Pakistan's imported uranium and fuel are protected under IAEA safeguards and thus not eligible to be put through reprocessing. Any plutonium generated from that could also not be used in their weapons programs.

### **3.4: "NUCLEAR WARHEADS"**

Run Time: 3:51

Lecturers: Pervez Hoodbhoy (Forman Christian College) and Toby Dalton (Carnegie Endowment)

Key Points:

- According to Pervez Hoodbhoy, Pakistan used highly enriched uranium for its first atomic bomb tested in 1998. Now, Pakistan has parallel tracks for plutonium-based, uranium-based, and composite (both uranium and plutonium) warheads.
- According to Toby Dalton, India began with so-called research reactors under the "Atoms for Peace" program (see Lesson 2.2) to produce plutonium. It also increasingly developed a highly enriched uranium capability dedicated to fueling submarines. Moreover, there is speculation that these may be used for a thermonuclear weapons program.
- According to Toby Dalton, both India and Pakistan are producing plutonium and uranium, which can be used for their nuclear weapons programs.
- Pervez Hoodbhoy explains that there are two types of fission bombs: uranium-based and plutonium-based. They function in the same way, whereby a heavy element splits into multiple nuclei, releasing a large amount of energy. In contrast, the hydrogen bomb (fusion) functions by fusing two hydrogen atoms. This releases an exponentially larger amount of energy compared to a fission bomb, but requires a significantly more difficult development process.

### 3.5: “STRATEGIC DELIVERY VEHICLES”

Run Time: 10:18

Lecturers: Travis Wheeler (Stimson Center) and Michael Krepon (Stimson Center)

#### Key Points:

- Ballistic missiles can be characterized by range, fuel, and basing mode. The U.S. government has four categories of missiles: intercontinental ballistic missiles (ICBM, 5,500km+ range), medium-range ballistic missiles (IRBM, 3,000-5,500 km range), medium-range ballistic missiles (MRBM, 1,000-3,000 km range), and short-range ballistic missiles (SRBM, <1,000km range).
- Ballistic missiles may be fueled with liquid or solid propellant. Liquid propellant is more energetic but more vulnerable to counterforce strikes because it must be stored separately from the missile; solid propellant, in contrast, is more stable and survivable.
- Ballistic missiles may be stored in silos or on rails or roads. India and Pakistan both use road and rail basing for their missiles. This type of basing is harder to locate and target.
- Both India and Pakistan began developing ballistic missiles and nuclear delivery systems before crossing the nuclear threshold in 1998.
- According to Michael Krepon, when countries begin nuclear programs they tend to use ballistic missiles as their launch vehicles. Over time, they diversify their means of delivering nuclear weapons, including via cruise missile. One reason a country might use a cruise missile is the concern that its adversary will employ defenses against ballistic missiles
- In later stages of nuclear competition, states may use put multiple warheads on one missile, called MIRVing.
  - The United States and the Soviet Union developed lots of MIRVs during the Cold War.
  - China has flight tested MIRVs and India has the capacity to do so. If India flight tests them, Pakistan may follow.
- According to Michael Krepon, India has produced 540 kg of weapons-grade plutonium for 135-180 nuclear warheads and experts estimate its stockpile to contain around 110-120 warheads. This compares to Pakistan’s estimated stockpile of 110-130 warheads. Both Pakistan and India are working on building a nuclear triad.
- India’s land-based missiles include the Prithvi-II, Agni-I, Agni-II, Agni-III, Agni-IV, and Agni-V.
- Pakistan’s land-based missiles include the Abdali (Hatf-II), Ghaznavi (Hatf-III), Ghaury (Hatf-V), Shaheen-I (Hatf-IV), Shaheen-II (Hatf-VI), Nasr (Hatf-IX), and Shaheen-III.

### 3.6: “ASSESSING NUCLEAR ARSENALS”

Run Time: 4:22

Lecturer: Zia Mian (Princeton University)

#### Key Points:

- Nuclear weapons states spend large amounts of money on nuclear weapons. According to Zia Mian, an important question is: to what extent are nuclear weapons cost sustainable, especially for poorer developing countries? Nuclear weapons budgets tend to be a fraction of overall military costs, even in developing countries.
- According to Zia Mian, the issue is the price that the people of these countries are forced to pay for their governments’ military ambitions. He adds that nuclear weapons programs are fundamentally undemocratic because people are never asked how much their country should be spending on nuclear weapons.

- Estimating the number of weapons a country possesses or is able to make is challenging. One way is to consider the total amount of usable material that a country has produced and the rate at which it produces it.
- Zia Mian states that another way to calculate a country's nuclear stockpile is to consider how much of their usable material is actually fabricated into nuclear weapons. This includes questions regarding their capacity to fabricate nuclear weapons material, their capacity to store components, and their delivery systems.

### **3.7: "NUCLEAR SUBSTITUTION"**

Run Time: 5:40

Lecturer: Ahsan Butt (George Mason University)

Key Points:

- Ahsan Butt defines nuclear substitution as the idea that nuclear weapons, especially second-strike capabilities, decrease countries' need for conventional forces. This is because nuclear weapons are so powerful that they guarantee the territorial integrity of any state that has them.
- Nuclear substitution shifts the offense-defense balance because of nuclear weapons are as defense-dominant.
- According to Ahsan Butt, conventional weapons still remain attractive for states with nuclear weapons because of the desire to change territorial status quos and the inability of nuclear weapons to deter certain threats, like terrorism and small-scale assaults.
- He argues that nuclear substitution has not occurred in Pakistan because of its dispute with India over Kashmir, nor in India because Indian strategists viewed nuclear and conventional expenses as additive, thus denying the logic of nuclear substitution.
  - Moreover, India underwent major military modernization in the 1980s and faces security threats not compatible with nuclear substitution.

### **BACKGROUNDER: "NUCLEAR COMMAND-AND-CONTROL (C&C)"**

This course webpage provides an introductory question-and-answer reading for the following topics:

- What is nuclear command-and-control?
- What are the primary components of command-and-control?
- What is the always/never dilemma?
- What are negative and positive control?
- How do states attempt to address the always/never dilemma?

### **3.8: "NUCLEAR COMMAND AND CONTROL (C&C) IN SOUTH ASIA"**

Run Time: 11:24

Lecturers: Reshmi Kazi (Institute for Defense Studies and Analysis), Ashley Tellis (Carnegie Endowment), Vipin Narang (Massachusetts Institute of Technology), Zamir Akram (Former Pakistani ambassador), Feroz Khan (Pakistani Army), Naeem Salik (Centre for International Strategic Studies), Michael Krepon (Stimson Center), Neil Joeck (University of California-Berkeley), Jaganath Sankaran (Center for International and Security Studies at Maryland), and Scott Sagan (Stanford University)

Key Points:

- According to Reshmi Kazi, the defining aspects of Indian command and control (C&C) are civilian control and an elaborate structure. At the apex of this structure is the Political Council headed by the Prime Minister and cabinet members, and then the Executive Council which is headed by the NSA and chiefs of the armed services.

- Ashley Tellis argues that the two main factors influencing Indian C&C are the desire to make certain nuclear weapons never go off unless deliberately intended and that civilian authorities maintain full control over nuclear decisions and policy.
- Vipin Narang mentions that the scientific component of India's C&C is the Department of Atomic Energy, which develops its fissile materials, and the Defence Research and Development Organisation, which works on development capabilities. All of these are interfaced through a Strategic Force Command, a tri-service command that serves as a coordinator between scientists and military users of nuclear weapons.
  - The ultimate node of this structure is the prime minister's office, where the national security advisor is responsible for decisions regarding movement of Indian alert levels and nuclear-related activities.
- According to Zamir Akram, the Pakistani prime minister chairs the National Command Authority (NCA) with the three military service chiefs and four ministers: those of defense, foreign affairs, interior, and finance. They have the exclusive authority to decide on nuclear use.
- Feroz Khan describes how the Pakistani president absolved himself from being the head of the NCA after the 18<sup>th</sup> Amendment to the country's constitution in 2010.
  - The Pakistani prime minister is also the chair of the Development Committee and Employment Committee; the former is a military-scientific body, while the latter is a military-political body.
- According to Naeem Salik, there was increased skepticism regarding the safety of Pakistan's nuclear weapons, particularly after 9/11. As such, Pakistan has paid extra attention to its C&C, which has rapidly evolved over the past decade.
- According to Michael Krepon, C&C challenges depend on a country's nuclear posture. For example, a country with a first use posture (such as Pakistan) would want to move nuclear assets around during a crisis, but this in turn increases crisis management issues.
- According to Neil Joeck, India's decision-making structure largely marginalizes the military whereas in Pakistan, it is army-dominated.
- The vulnerability-invulnerability paradox, as described by Scott Sagan, is that the Pakistani military understands the threat of terrorists and protects its nuclear assets on bases as a consequence. However, this consolidation makes them vulnerable to an Indian attack. In a crisis, there may be an incentive to move nuclear weapons around, which then increases their vulnerability to a terrorist seizure.
- Michael Krepon argues that the best way to reduce C&C risks in a crisis situation is to simply not have crises, and the best method of preventing them is to constrain those who would otherwise spark crises.

### **3.9: "DETERRENCE STABILITY IN SOUTH ASIA"**

Run Time: 11:15

Lecturers: Charles Glaser (George Washington University), Nina Tannenwald (Brown University), Michael Krepon (Stimson Center), Toby Dalton (Carnegie Endowment), Christopher Clary (University at Albany), and Scott Sagan (Stanford University)

Key Points:

- According to Charles Glaser, arms races are often thought of as an action-reaction process in which states build up as a response to their adversaries building, although they can also build up in anticipation of their rivals doing so. Arms races in the nuclear context can be competition over development, employment, size of arsenals, and/or modernization.

- Arms races can strain political relations between states, increasing the likelihood of war, and are also dangerous when states build out of sync with one another.
- According to Nina Tannenwald, the nuclear taboo is a de facto non-use norm regarding nuclear weapons. It combines strategic self-interest with moral concern.
  - Factors that weaken the taboo are when nuclear weapons are made more usable, such as when technological development makes them smaller, they seem more ethical to use, or the distinction between them and conventional weapons is reduced.
- According to Michael Krepon, nuclear weapons are supposed to be “weapons of peace,” but the concept of deterrence by means of extreme danger is inherently unstable. In South Asia, deterrence stability is not present; stability does not grow with the size of nuclear stockpiles, but when relations between adversaries improve.
- According to Toby Dalton, different beliefs regarding the deterrence capabilities of nuclear weapons differ in India and Pakistan. Nuclear strategists in South Asia tend to be deterrence optimists, whereas thinkers in D.C. tend to be deterrence pessimists
- Christopher Clary argues that one main driver of instability in South Asia is the inherent asymmetry in size between India and Pakistan, which pushes Pakistan towards asymmetric strategies. These strategies include supporting militant groups that target India and using nuclear weapons to deter conventional forces.
  - India, on the other hand, is trying to deter both Pakistan and China. So, India’s steps to secure itself against China make Pakistan feel insecure.
- According to Scott Sagan, Pakistani doctrine calls for a limited use of nuclear weapons if India carries out a conventional attack inside Pakistan. Indian doctrine maintains that a single use of nuclear weapons on Indian troops would call for massive retaliation. Both countries believe the other is bluffing about its inclination to use nuclear weapons, which decreases stability.

### **3.10: “DETERRENCE CREDIBILITY IN SOUTH ASIA”**

Run Time: 8:05

Lecturers: Michael Krepon (Stimson Center), Francis Gavin (Massachusetts Institute of Technology), Vipin Narang (Massachusetts Institute of Technology), Shyam Saran (former Indian Foreign Secretary), and Manoj Joshi (Observer Research Foundation)

Key Points:

- According to Michael Krepon, a country’s nuclear doctrine sometimes does not reflect its actual strategy. For example, during the Cold War, the Soviet Union professed a no first use (NFU) doctrine, but was later found to have a first use posture in mind.
  - In South Asia, India adheres to a NFU doctrine. As in the Cold War, this has believability because India enjoys conventional advantages over its main adversary Pakistan.
- According to Francis Gavin, one challenge in nuclear decision-making is the tension between rhetorical and actual military strategy: on the one hand, state leaders need to say things to their adversaries, allies, and domestic audiences for credibility. On the other hand, these obligations and a nation’s nuclear posture may be in tension with one another.
- Vipin Narang acknowledges that India’s 2003 official nuclear doctrine followed the concept of credible minimum deterrence, but points out that the deterrence requirements for China and Pakistan differ: what is considered credible towards China might not be minimal to Pakistan, and what is considered credible to Pakistan will not be minimal towards China.

- According to Scott Sagan, threat credibility exists in the eye of the beholder; it only matters if the adversary believes the threat is credible. However, lower-level strike options tend to be more credible.
- According to Shyam Saran, the concept of a graduated response is infeasible, meaning that no matter the level at which a military exchange occurs, it will advance towards the strategic level. Thus, India believes that it must avoid a nuclear exchange at any level.
- According to Manoj Joshi, massive retaliation has a connotation within deterrence literature that makes the concept less credible. Moreover, under a posture of massive retaliation, an adversary may calculate that if it will inevitably face such massive retaliation for any level of attack, it may as well begin a war with a massive attack itself.

### **3.11: “INDIA’S ‘COLD START’ DOCTRINE”**

Run Time: 8:30

Lecturers: Jaganath Sankaran (Center for International and Security Studies at Maryland), Gurmeet Kanwal (Indian Army), Moeed Yusuf (U.S. Institute of Peace), Walter Ladwig (King’s College London), Riaz Khan (former Pakistani Foreign Secretary), Zamir Akram (former Pakistani ambassador), Dave Smith (U.S. Army), and Ashley Tellis (Carnegie Endowment)

Key Points:

- According to Jaganath Sankaran, the idea of Cold Start is to break up the Indian army into smaller pieces, which can be put closer to the Pakistani border in order to respond to a Pakistani attack. However, there is not proof that this type of operationalization has occurred yet.
- According to Moeed Yusuf, Cold Start is a mechanism whereby some Indian forces can mobilize quickly to counter Pakistan’s short lines of communication. This is designed to punish Pakistan in a “shallow” way via minor incursions into Pakistani territory.
- Walter Ladwig states that Cold Start is an approach designed to deal with the fact that India is caught in between Pakistan’s nuclear arsenal on the one hand, and its support for terrorist groups on the other. As a result, it tries to create space under the nuclear umbrella to use conventional forces to deter or punish the Pakistani army.
- According to Gurmeet Kanwal, Cold Start is an answer to two questions: After an attack, how can India mobilize before the international community calls halt to any military actions? And, how can India respond without violating Pakistan’s low nuclear red line?
- Riaz Khan argues that Cold Start can be considered a dangerous doctrine because if India takes such aggressive action on Pakistani soil, Pakistan would need to react to remove the occupation from its territory.
- According to Zamir Akram, Pakistan has developed the tactical nuclear weapons systems in order to deter the use of Cold Start.
- According to Dave Smith, Pakistan believes that India has spent a lot of time and effort operationalizing Cold Start. However, from a U.S. viewpoint, the reality of Cold Start is less clear.
  - Walter Ladwig believes that Cold Start still remains in the conceptual realm.
- According to Ashley Tellis, the question of whether Cold Start is supported by Indian leaders is difficult to answer because it implicates the question of how India does its military planning. While no country can be expected to give up options for offensive military capabilities, a future India-Pakistan dialogue should address what provocations might cause such an offensive operation.

### 3.12: "TACTICAL NUCLEAR WEAPONS (TNWs) IN SOUTH ASIA"

Run Time: 8:09

Lecturers: Sameer Lalwani (Stimson Center), Hasan Askari Rizvi (Punjab University), Jaganath Sankaran (Center for International and Security Studies at Maryland), Dave Smith (U.S. Army), Christopher Clary (University at Albany), Siegfried Hecker (Los Alamos National Laboratory), Rasul Baksh Rais (Lahore University of Management Sciences), and Gurmeet Kanwal (Indian Army)

#### Key Points:

- Sameer Lalwani defines a tactical nuclear weapon (TNW) as a low-yield nuclear device used on the battlefield on a tactical, rather than strategic, target. The most common form of TNWs are short-range missiles.
  - Countries tend to develop TNWs to deter adversaries that enjoys conventional advantages, but TNWs pose many operational and control challenges.
- According to Hasan Askari Rizvi, in response to Cold Start, Pakistan began miniaturizing its nuclear weapons.
- Jaganath Sankaran believes that Pakistan will not use TNWs as a first response, but only if they believe they have no other option against the Indian army.
- According to Dave Smith, Pakistan has TNWs because it perceives that only such weapons can offset the conventional military imbalance with India.
- According to Christopher Clary, Pakistan's first use of TNWs would likely kill Indian soldiers, and maybe Pakistani civilians, on Pakistani territory. There is a huge escalatory step from killing Indian soldiers to India using its nuclear weapons against Pakistani cities. So, the goal of TNW is to invalidate the credibility of India's stated doctrine of massive retaliation.
  - In addition, TNWs are designed to prevent outsiders from being able to apply coercive pressure to shape Pakistan's policy choices.
- According to Siegfried Hecker, TNWs are more dangerous than regular nuclear weapons, raising concerns from both a security and nuclear safety standpoint. Developers have struggled to create a "one-point safe" nuclear weapon, which means that the missile would not explode in the event of damage or insult.
- According to Christopher Clary, TNWs ensure that for Pakistan, any small-scale conflict will escalate into a nuclear conflict. The risk of TNWs is thus not only in targeting India, but in the event of any crisis in Pakistan. In any crisis, the U.S. will likely place heavy pressure on India to cease its activities, which is an important byproduct for Pakistan.
- Gurmeet Kanwal argues that the term TNWs is insufficient because their use would have strategic implications. Instead, he proposes using the term "battlefield use of nuclear weapons."

## **RECOMMENDED READINGS**

For greater depth, we encourage students to peruse these recommended readings:

Ahsan I. Butt, "Do Nuclear Weapons Affect the Guns-Butter Trade-Off? Evidence on Nuclear Substitution from Pakistan and Beyond," *Conflict, Security & Development* 15, no. 3 (2015): 229-257.

<http://www.belfercenter.org/publication/do-nuclear-weapons-affect-guns-butter-trade-evidence-nuclear-substitution-pakistan-and>.

Christopher Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis, and War* (New Delhi: Institute for Defence Studies and Analyses, 2010).

[https://idsa.in/system/files/OP\\_PakistansNuclearSecurity.pdf](https://idsa.in/system/files/OP_PakistansNuclearSecurity.pdf).

Toby Dalton and Jaclyn Tandler, *Understanding the Arms "Race" in South Asia* (Washington, DC: Carnegie Endowment for International Peace, September 2012).

<http://carnegieendowment.org/2012/09/13/understanding-arms-race-in-south-asia-pub-49361>.

Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security* 17, no. 3 (Winter 1992/93): 160-187. <https://www.jstor.org/stable/2539133>.

Charles L. Glaser, "The Causes and Consequences of Arms Races," *Annual Review of Political Science* 3 (2000): 251-276. <https://iscs.elliott.gwu.edu/sites/iscs.elliott.gwu.edu/files/downloads/glaser-causesarmsraces-2000.pdf>.

Charles L. Glaser, *Rational Theory of International Politics: The Logic of Competition and Cooperation* (Princeton, Princeton University Press, 2010).

[https://books.google.com/books?id=EmX3\\_AKJBGwC](https://books.google.com/books?id=EmX3_AKJBGwC).

Charles L. Glaser, "When Are Arms Races Dangerous?" *International Security* 28, no. 4 (Spring 2004): 44-84. <https://www.belfercenter.org/sites/default/files/legacy/files/glaser.pdf>.

Feroz H. Khan, Ryan Jacobs, and Emily Burke, eds., *Nuclear Learning: The Next Decade in South Asia* (Monterrey: Naval Postgraduate School, 2014).

[https://my.nps.edu/documents/104111744/106151936/Nuclear+Learning+in+South+Asia\\_June+2014.pdf/db169d3c-6c10-4289-b65d-a348ffc9480f](https://my.nps.edu/documents/104111744/106151936/Nuclear+Learning+in+South+Asia_June+2014.pdf/db169d3c-6c10-4289-b65d-a348ffc9480f).

Khalid Kidwai, *A Conversation with Gen. Khalid Kidwai* (Washington, DC: Carnegie Endowment for International Peace, March 2015), Event Transcript.

<http://carnegieendowment.org/2015/03/23/conversation-with-gen.-khalid-kidwai-pub-58885/>.

Verghese Koithara, *Managing India's Nuclear Forces* (Washington, DC: Brookings Institution Press, 2012). <https://books.google.com/books?id=5yNC-nWHqAQC>.

Michael Krepon and Julia Thompson, eds., *Deterrence Stability and Escalation Control in South Asia* (Washington, DC: Stimson Center, 2013). [https://www.stimson.org/sites/default/files/file-attachments/Deterrence\\_Stability\\_Dec\\_2013\\_web\\_1.pdf](https://www.stimson.org/sites/default/files/file-attachments/Deterrence_Stability_Dec_2013_web_1.pdf).

- Michael Krepon, Joshua T. White, Julia Thompson, and Shane Mason, eds., *Deterrence Instability & Nuclear Weapons in South Asia* (Washington, DC: Stimson Center, 2015).  
[https://www.stimson.org/sites/default/files/file-attachments/Deterrence\\_Instability\\_WEB.pdf](https://www.stimson.org/sites/default/files/file-attachments/Deterrence_Instability_WEB.pdf).
- Walter C. Ladwig III, "A Cold Start for Hot Wars? The Indian Army's New Limited War Doctrine," *International Security* 32, no. 3 (2007): 158-190.  
[https://www.belfercenter.org/sites/default/files/legacy/files/IS3203\\_pp158-190.pdf](https://www.belfercenter.org/sites/default/files/legacy/files/IS3203_pp158-190.pdf).
- Peter R. Lavoy, *Pakistan's Nuclear Posture: Security and Survivability* (Arlington: Nonproliferation Policy Education Center, 2007).  
[https://calhoun.nps.edu/bitstream/handle/10945/25434/PAKISTANS\\_NUCLEAR\\_POSTURE\\_Security\\_and\\_Survivability.pdf](https://calhoun.nps.edu/bitstream/handle/10945/25434/PAKISTANS_NUCLEAR_POSTURE_Security_and_Survivability.pdf).
- Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton: Princeton University Press, 2014).  
<https://books.google.com/books?id=o46rAgAAQBAJ>.
- Vipin Narang, "Five Myths about India's Nuclear Posture," *The Washington Quarterly* 36, no. 3 (Summer 2013): 143-157. [https://csis-prod.s3.amazonaws.com/s3fs-public/legacy\\_files/files/publication/TWQ\\_13Summer\\_Narang.pdf](https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/TWQ_13Summer_Narang.pdf).
- Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security* 34, no. 3 (Winter 2009-2010): 38-78.  
[https://apps.cndls.georgetown.edu/courses/rudolph/g238/files/IS-34.3-2010-narang-Posturing-for-Peace\\_-Pakistans-Nuclear-Postures-and-South-Asian-Stability.pdf](https://apps.cndls.georgetown.edu/courses/rudolph/g238/files/IS-34.3-2010-narang-Posturing-for-Peace_-Pakistans-Nuclear-Postures-and-South-Asian-Stability.pdf).
- Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca: Cornell University Press, 1984). <https://books.google.com/books?id=jvt1BAAAQBAJ>.
- Scott D. Sagan, ed., *Inside Nuclear South Asia* (Palo Alto: Stanford University Press, 2009).  
<https://books.google.com/books?id=26mh1Aij8AoC>.
- Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton: Princeton University Press, 1995). <https://books.google.com/books?id=9eE9DwAAQBAJ>.
- Jaganath Sankaran, "Pakistan's Battlefield Nuclear Policy: A Risky Solution to an Exaggerated Threat," *International Security* 39, no. 3 (January 2015): 118-151.  
<https://www.belfercenter.org/publication/pakistans-battlefield-nuclear-policy-risky-solution-exaggerated-threat>.
- George K. Tanham, *Indian Strategic Thought: An Interpretive Essay* (Santa Monica: RAND Corporation, 1992). <https://www.rand.org/content/dam/rand/pubs/reports/2007/r4207.pdf>.
- Nina Tannenwald, "The Nuclear Taboo: The United States and the Normative Basis of Nuclear Non-Use," *International Security* 53, no. 3 (Summer 1999): 433-468.  
<https://www.jstor.org/stable/2601286>.

Ashley J. Tellis, *India's Emerging Nuclear Posture: Between Recessed Deterrent and Emerging Arsenal* (Arlington: RAND Corporation, 2001).  
[https://www.rand.org/pubs/monograph\\_reports/mr1127.html](https://www.rand.org/pubs/monograph_reports/mr1127.html).

Ashley J. Tellis, et al., *Regional Voices on the Challenges of Nuclear Deterrence Stability in Southern Asia* (Washington, DC: Carnegie Endowment for International Peace, June 2016).  
<http://carnegieendowment.org/specialprojects/regionalvoicesonthechallengesofnucleardeterrencestabilityinsouthernasia>.

## **DISCUSSION QUESTIONS**

Below is a sample list of discussion questions to get students thinking and talking about the issues from this chapter in class.

1. What are some ways a country could increase its deterrence credibility, and what factors between India and Pakistan (and China) make deterrence credibility particularly difficult on the Subcontinent?
2. What are factors that increase deterrence stability, and factors that decrease deterrence stability? Which factors are especially important in South Asia?
3. How could a conventional imbalance between adversarial states effect the development of their nuclear weapons programs?
4. What are ways in which a country's command and control structure influences its nuclear posture?
5. Does the Cold Start Doctrine increase or decrease stability in South Asia? Why or why not?
6. Is the term "tactical nuclear weapons" a misnomer? Why or why not?
7. Are nuclear weapons programs inherently undemocratic? Why or why not?
8. What is the concept of "nuclear substitution," and how applicable is it to South Asia and other nuclear-armed states?
9. Why might a state choose to use liquid or solid fuel for its nuclear weapons and store them either in silos, on railways, or on roads?