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**PROFESSOR:** So we have organized three lectures. And the basic idea of the lectures are to cover some of the major current issues in nuclear arms control and nonproliferation.

So we have the first lecture today on India and Pakistan, which is one of the world's possible flash points, meaning that there's a path to a possible nuclear war, which I won't go into Vipin Narang will certainly spell out the case.

But in my view in trying to decide what to talk about, this was a golden opportunity because Vipin is here, and he's an expert on these issues. And I consider this, as I say, one of the possible flash points in the world, one of the possible conceivable paths.

No path is super likely, if you want to put it that way. But the effects of a nuclear exchange are catastrophic both for the people who get hit, obviously, because a nuclear weapon-- I don't have to tell you-- is incredibly destructive. In Hiroshima, something like 40% of the population was killed, more or less instantly, burns or blasts. And probably another 20%, 30% died within a year of radiation.

So in addition, people have realized that there are severe climate effects of a nuclear exchange. One of the things that happens with all the burning that goes on is that soot is emitted into the atmosphere. This is the opposite of global warming. This is global cooling. This is like a volcanic explosion.

And in about 1815, 1816, there was a volcanic explosion in Asia. And there was a winter without-- there was a summer-- excuse me-- there was a summer without crops in Europe. And there was actually starvation in Europe due to this explosion. It was a one time thing. The climate models, for even a limited nuclear war in Southeast Asia, show that this effect would probably last 5 to 10 years and be

global, from roughly 100 nuclear weapons.

So there are papers. I can give people references if they want. There is a paper in *Physics Today* a few years ago about this. But there are many papers on the subject. So one of the things I want to say-- so the second lecture will be on proliferation and uranium enrichment and the implications.

So these lectures will combine both technology and policy. And finally, the last lecture I will give-- and it's kind of an overview of where we stand on nuclear arms control and proliferation-- I'll try to fill in some of the gaps. I'll talk about the nonproliferation review that's coming up at the UN next spring. I'll talk about the outlook for arms control as I see it.

I want to talk a few minutes to the students because one of the things that's happened over the last few decades, since the collapse of the Soviet Union in about 1990, people stopped worrying about the bomb, so to speak. Before that, there was a lot of concern. Students were asked to duck under their desks and things like that to protect themselves, which, of course, was totally ridiculous.

A wooden desk wouldn't do you much good in a nuclear war as you can well imagine. It'll just probably knock you on the head with something. God knows what it would do.

But the issue has fallen off the table. And the thing that concerns people more on campus when-- if they think about global issues, is climate change and global warming. But this is an issue which has not gone away. If anything, the probability of a nuclear exchange is higher now than a decade ago unfortunately. And we have not solved these problems. And there are political and economic problems.

And I just want to say a few words about some of the intellectual problems that need to be solved. For example, on a technical basis, there are inspection issues. For example, how do you inspect whether or not a country is cheating on its nonproliferation obligations? How do you look for weapons production or enrichment production? These are very difficult issue, and they're very difficult

technical issues.

And then there are issues in which you have to combine technical issues with policy. For example, if we're going to go down to a very small number of weapons-- as you want to do for nuclear arms control-- then cheating with a small number-- particularly if you're going to go to 0-- cheating with a small number becomes a bigger issue.

So verification issues are very important, reinventing the bomb, if you really want to zero. So there are all kinds of intellectual issues that need to be worked out, both historical, technical, and political. And there are many opportunities for research in these areas, UROP, some theses. So I just want to point that out. And there are also positions in government and NGOs.

In the last semester, we had several major arms control negotiators in the US government, including Rose Gottemoeller who was the chief negotiator on the US side for the New START Treaty, said she was particularly excited to give a talk at MIT because we really needed a generation of technically trained people to go into nuclear arms control. And she made a special plea, so I want to pass that along.

So I'm going to get to today's lecture. Vipin Narang, he's a professor at the MIT political science department and the Security Studies program. He's got a BS and MS in chemical engineering. He's got a degree from Balliol College, where I spent a very happy semester at Oxford. And he's written extensively on nonproliferation and issues of arms control, deterrence, particularly with respect to Southeast Asia.

And he's got a book recently published on regional powers and international conflict. So Vipin?

**VIPIN NARANG:** Great. Thanks Aaron. Thanks for the kind introduction and for organizing this. So as Aaron said, I'm a professor at the political science department, and I work primarily on nuclear strategy and proliferation. And so what I thought I'd do today was talk about-- give an overview of nuclear proliferation and the consequences of proliferation in South Asia, between India and Pakistan, which is-- as Aaron

mentioned-- an active and ongoing conflict where the threat of conventional war is persistent.

And there are periodic militarized crises between India and Pakistan that put both countries at a risk of conventional conflict every now and then. And now that both sides, both states, have nuclear weapons, the question is what the likelihood of escalation to nuclear level is.

Just as a preview of my own thinking and writing on the subject, I think India and Pakistan have so far been lucky in that the conventional conflict is not yet escalated to the nuclear level. But that's not a foregone conclusion going forward. I'll talk a little bit about that.

And it's one of the regions where there is still active arms racing between India and Pakistan. And so I'll talk a little bit about that and what the dynamics have been with the nuclear strategies and what the effects on the relationship between India and Pakistan are.

If you have any questions at all during lecture, don't hesitate to stop me. I know there are diverse backgrounds here, people from different departments, undergraduates, graduate students. I'll go through some basic theoretical material first. If everybody's OK with that, we can move through that pretty quickly and talk about India and Pakistan.

So as I said, India and Pakistan are both in the process of building up their nuclear delivery systems and their nuclear arsenals. This is a picture of a Shaheen missile, which is a Pakistani long-- it's a medium range ballistic missile in the Pakistani inventory. And it's based off of a Chinese export missile, the M-class exports.

And both are actively testing short and long range cruise and ballistic missiles as their inventories are growing. And that is one of the concerns, I think, as we talk about South Asia. The basic puzzle though is-- does anyone know what these pictures are from.

So in November, November 26, 2008-- two weeks before my wife and I got married

in Delhi actually-- a group nominally a sponsored and based in Pakistan, the Lashkar-e-Taiba, orchestrated a pretty daring sea-launch attack against Bombay where about a dozen militants, led by the one survivor from the militant group Ajmal Kasab pictured here, sieged the Taj Hotel, the Oberoi Hotel, the Chabad House in Bombay and killed over 170 Indians and Westerners.

And the Indian government was faced with the decision about how to respond to this. This was the third provocation that the Indian government believe was sponsored by Pakistan since 1998, the year in which they tested nuclear weapons. And the question facing Indian leaders, how do we respond to a state that sponsors militant attacks against our metropolitan-- or metropolises, targets our hotels and our financial center, when they have nuclear weapons?

And the worry in the Indian government was that nuclear weapons had emboldened Pakistan to sponsor these groups who were perpetrating more daring and audacious attacks against India. And because Pakistan had nuclear weapons, India didn't have a conventional retaliatory option to punish Pakistan for these attacks. And so the Indian government, for a decade, has been trying to deal with what they believe is a policy paralysis about dealing with a Pakistan that is more willing to support militant organizations to attack India now that it has nuclear weapons.

So brief outline of the talk. I'll talk a little bit about basic deterrence theory. In political science and in economics, the core of nuclear strategy, both in the Cold War and now, is deterrence theory. So we'll talk a little bit about that. Hopefully, it's not too basic.

I don't need to talk about the basics of nuclear weapons to a physics audience. We'll go through it really briefly, and some of the choices states have to make and how they operationalize their arsenal, which are really important in the India and Pakistan context.

I'll talk about the causes of and the process of nuclearization in South Asia, how and why India and Pakistan acquired nuclear weapons. And then I'll close with the consequences and where we are today, focusing mostly on the period since 1990.

May 1998 is the break point in the India, Pakistan nuclear equation. That's when India, led by the then BJP government, tested nuclear weapons, followed three weeks later by the Pakistani government. I'll close with some conclusions.

So basic deterrence theory. The definition of deterrence, very simple-- this is a definition of deterrence. This is all inspired by guys like Tom Schelling, Herman Kahn, Albert Wohstetter. Anybody familiar with Cold War nuclear strategy, this will be familiar to you.

So basic deterrence theory, in any context, is trying to preserve the status quo by threatening unacceptable cost to an opponent or an adversary if they do  $x$ , some specified action. So if you do  $x$ , I will do  $y$ . And the idea is we preserve the status quo. And the idea is that  $y$ , the punishment that you impose on your adversary opponent, should be greater than the benefits of them achieving whatever their objective is,  $x$ , such that they are deterred from undertaking the action.

Tom Schelling used to love examples with children. So I have an 18-month-old son myself, and he's starting to understand things. And as children get older, deterrence by punishment example that Tom Schelling used was if your child does something bad, you punish them by sending to their room, denying them dinner, time out. So there's some punishment after the fact if they do  $x$ .

In another example is if you hit me, I will kill your mother. So there's a punitive aspect to the deterrence threat such that the punishment exceeds the benefit of whatever an adversary's objective would be.

So in the Cold War, the deterrence by denial threat was counterforce. We were going to disarm and target their own nuclear forces to make it impossible for them to carry out their first strike. So in a case where somebody's attacking me, a deterrence by denial threat would be instead of killing your mother, I cut your arm off so you can't attack me. And presumably, the cost of cutting your arm off, so you cannot achieve your objective in the first place, is sufficient to deter you from undertaking it.

So a good way to think about this deterrence by punishment is we will punish you with such severe cost, after you undertake the action, such that you'll have no incentive-- rational incentive to do so versus we will ratchet up the costs while you try to achieve the objective such that you won't be able to in the first place.

So I think it's an important distinction when we think about nuclear strategy even in the South Asia case. But in the Cold War, the distinction was counterforce versus countervalue. So for those familiar with Cold War nuclear strategy, when we threatened to target Soviet cities or their economic or industrial capacity, that was largely a deterrence by punishment strategy. So in the event that they launched a conventional or a first nuclear strike against us, we would retaliate against their cities.

The alternative was, and this was a big debate early in the Cold War, in a case of a conventional conflict, we would launch nuclear weapons at their nuclear weapons such that they would not have the ability to launch those weapons at the United States or its allies.

So the deterrence theory has several basic requirements. We call them the three C's. So you need to have the capability to impose the threat that you're promising. So if you're threatening to destroy an adversary's cities in the event they do something, you need to have the capability do that. So you need some explosive capability, but you also, most importantly, in the nuclear sense, need a delivery capability. You need to be able to hit their cities. And it needs to be transparent to the adversary.

It needs to be credible. And this term credibility and the concept of credibility is what dogged Cold War strategy and still dogs nuclear strategy today. Credibility is the hardest part of this. How could you threaten what was tantamount to mutual suicide and have it be credible by your adversary?

So in the event of-- so in the Cold War, a good example is if the Soviet Union took West Berlin, was it really credible that the United States would threaten to launch hundreds of nuclear weapons at Soviet cities? The Soviet Union probably didn't

think so.

So in a deterrence by punishment versus deterrence by denial trade off, which one do you think is more credible? So in the case where an attacker is coming at you, is it more credible to threaten to kill their mother in response or to cut off their arm?

What is an attacker more likely to believe?

It is disproportionate to threaten certain punitive action, and so it is often more credible-- and this is where the trade off between-- the debate early in the Cold War about deterrence by punishment versus deterrence by denial turned on the credibility differences between the two. That deterrence by denial seemed to be more credible. The adversary is more likely to believe that you would try to stop them from achieving their objectives than to kill millions of innocent civilians that had nothing to do with the fight in the first place after something had already happened.

And so the United States ended up threatening both. And part of it was that the size of the US arsenal made it possible to threaten both. But I think there were many strategists who believed that the deterrence by denial missions were still more credible to the adversary. But at the heart of deterrence is this issue of credibility.

And the third C is communication. The adversary needs to know that you have the capability and the credibility to threaten the punishment or deterrence by denial threat that you make. So you have to make a threat. IT has to be public. The adversary has to know what the threat is. The adversary needs to know what objective you are laying a red line down for and that you have the capability to inflict the punishment that you threaten.

So there's a huge amount of transparency that is required for deterrence to operate.

Has anyone seen *Dr. Strangelove*, the movie? What's the problem with the doomsday machine in *Dr. Strangelove*? There's a great line. What's the point of a doomsday machine if you don't tell anybody about it. The adversary needs to know that undertaking certain actions will result in some punishment for deterrence to



operate.

So nuclear weapons and-- deterrence, as a concept, pre-dated nuclear weapons. The concept of ratcheting up the cost to trying to deter an adversary predates nuclear weapons by centuries, since the dawn of warfare. But nuclear weapons fundamentally alter deterrence equations for several reasons. One, the explosive yields, and as Aaron mentioned, even the Hiroshima bomb, 20 kilotons could kill 100,000 people.

You could kill cities, entire cities, with a single warhead. But more than that, the missile age really changed how deterrence could operate because, prior to nuclear weapons, what was the most destructive military technology in States' inventory? Does anyone know? Before nuclear weapons in World War II, how did the United States and Allies and Germany attack?

**AUDIENCE:** Strategic bombing.

**VIPIN NARANG:** Strategic bombing and fire bombing, right? And the problem was that you had to send hundreds of airplanes and sorties into enemy territory to inflict that kind of damage. So your own pilots and air force was a risk.

Now, with the missile age, you can launch warheads at no risk to your pilots. The numbers that you were required to destroy entire cities were much smaller. So you could ratchet up the cost really quickly without incurring much cost yourself in the way the strategic bombing and fire bombing required of a state prior to the advent of the nuclear age. And one shouldn't underestimate the psychological impact of an adversary being able to destroy entire cities with a single warhead, from afar, at very low risk to itself.

So nuclear weapons ratchet up the ease of imposing punishment in ways that didn't exist prior to the nuclear age. So nuclear weapons fundamentally changed deterrence equations.

Is everyone familiar with the basics of uranium, plutonium nuclear weapons? So I don't need to go through enriched uranium. plutonium from reprocessing. Those

are basic fission weapons and boosted fission weapon.

So what is important, I think, is most regional powers are operating-- so India, Pakistan, South Africa when they had nuclear weapons. A little known fact, South Africa had nuclear weapons from 1979 to about 1991.

Most states start with fission weapons, move to boosted fission weapons. The advanced nuclear powers have fusion weapons. Most of the United States' nuclear inventory is composed of thermo-- these are thermonuclear weapons.

So when you think of the A-bomb, that's fission and boosted fission weapons. The H--bomb are fusion weapons. The United States has extremely advanced dial up, dial down yield nuclear weapons. But they're all thermonuclear weapons where there's a primary that ignites a fusion secondary.

But most regional powers are operating here. So North Korea, India, Pakistan. Israel is assumed to have boosted fission devices. But it's possible they have fusion weapons. It's unknown. They have never tested or acknowledged their nuclear forces. Well, Britain is basically an adjunct force of the United States. They lease their weapons from the United States for their tridents, so those are basically US weapons. The French have fusion weapons. But India and Pakistan are operating in boosted fission range.

I mean that's important. When you can get to megaton yields, you are talking about characteristically different weapons. The number that would be required to destroy an entire city are much lower once you have fusion weapons. But obviously, a fission or boosted fission device could do a lot of damage as well.

But once you have nuclear warheads, you're only halfway there in terms of operationalizing nuclear arsenal. I think this is often forgotten when we talk about the proliferation process. States need more than just nuclear weapons and warheads-- functional and reliable warheads-- to have a nuclear arsenal. They need delivery capabilities, right?

So the first question you have is, how many and what type of nuclear weapons do I

want to have? India and Pakistan are still answering this question. It is unclear how much is enough for India and Pakistan. It is unclear how much is enough for China. China has about-- it's estimated in the 200 to 400 thermonuclear weapon range arsenal size. But faced with US missile defenses, conventional counterforce capabilities, it's unclear how much is enough for China.

You need to be able to-- a big piece of answering this question is-- a big concept in the Cold War was secure second strike capability. So we were worried about-- the United States was worried about a bolt out of the blue first strike.

You would lose a number of weapons. You needed to have enough that would be able to survive that not only in terms of numbers, but in deployment modes, where they were based and how they were based, to be able to retaliate back with certainty against the Soviet Union such that it deterred the Soviet from trying to undertake what is known as the splendid first strike in the first place.

A splendid first strike being the ability to fully wipe out your nuclear arsenal. So secure second strike capability for states is when they achieve a level of numbers and deployment modes such that an adversary cannot be confident that it could fully disarm that state's nuclear arsenal.

Other question is, how do you deliver them? So most states start with aircraft. You've got aircraft. You rig them to carry nuclear weapons. But what's the problem with aircrafts as a nuclear delivery capability?

**AUDIENCE:** You have to get inside--

**VIPIN NARANG:** Yeah. You have to penetrate enemy defenses, right? You're not going to get there without a fight. And so it's not the ideal type of delivery capability. We have strategic bombers with huge complements of escort aircraft. They were not survivable. The advantage to aircraft is you can recall them. They're piloted so you can bring them back. The disadvantage is they still have to penetrate enemy air forces-- air defenses. Sorry.

So then the United States and most regional powers are attracted to ballistic missiles of various types. Ballistic missiles have the advantage that you can launch them from afar. They have different ranges, liquid fuel, solid fuel. It's not risky for the user. They can't be recalled though. But they're different basing modes, so you can have land-based ballistic missiles.

We have ICBM silos in Wyoming and North Dakota. You can have mobile ballistic missiles on land.

The United States moved quickly to sea-based ballistic missiles, SLBMs. Why? Why do you think sea-based is attractive, at least for the United States?

**AUDIENCE:** The enemy can't find them hopefully.

**VIPIN NARANG:** So in theory, if your subs are quiet enough, they are virtually 100% survivable because they're very difficult to track if your subs are quiet enough. And this was something-- there's an assumption that once a state acquires a sea-based capability, it has a survivable second strike force. That's true probably in the US case, but other states' SSBNs, the sea-based ballistic missile nuclear submarines, are not quiet as the United States is.

There is increasing evidence to show that we were pretty good at tracking Soviet SSBNs. We're pretty good at tracking subs during the Cold War. I don't know how much we track them now. I mean you have to assume-- Soviet SSBNs, as the later generations became quieter, and we're still pretty good at attracting them.

You can imagine first generation Chinese SSBNs, Indian SSBNs are going to be so loud. Some of them are not nuclear powered. They're diesel powered, which actually helps with the noise signature. But it is not necessarily the case that all states that acquire sea-based capabilities are going to have survivable second strike.

But this is the attraction of a sea-based force. A submarine-based nuclear force is more survivable than land-based force because land-based force, with all the [INAUDIBLE] out there now, you can track-- you know where launch sites might be,

where they may flush out land-based forces, so then you can target them.

Increasingly, some states led by the United States are attracted to cruise missiles as nuclear delivery capabilities, Tomahawks. We have a Tomahawk land and air-based nuclear version. The French have an air launched cruise missile, which is a mainstay of their nuclear force structure.

India and Pakistan are also looking at cruise missiles because they can-- what's the advantage of cruise missiles? What's the worry now with ballistic missiles?

**AUDIENCE:** They might shoot them down.

**VIPIN NARANG:** So missile defenses and the advent of missile defenses is starting to threaten the survivability of ballistic missiles, so one shift is to cruise missiles, which fly-- they have lower altitudes. They can be more easily controlled, so there's more recallability, I think, with cruise missiles than with ballistic missiles, but primarily to defeat missile defenses.

Third question is, how do you manage them? Some states put their nuclear forces under military control. Some states put them under very firm civilian control.

This is a question the United States wrestled with during the Cold War. Initially, the Department of Atomic Energy managed the nuclear pits in the United States. It was under very firm civilian control. And then as it became clear that the United States would have to delegate some actual nuclear forces to the Army in Western Europe for tactical nuclear weapons, the US arsenal came under military management, but still under civilian authority.

Other states like Pakistan are completely under military control, and we'll talk a little bit about that.

But fundamentally, the question that regional powers in particular have to face, in ways that the superpowers didn't as much as, is what are you trying to deter with nuclear weapons? Why are you attracting nuclear weapons, and what are you using them for in your larger strategic policy?

So some states need nuclear weapons just to deter nuclear use against them. States, like China for example, which have huge geographies, 3 million men under arms, defense in depth strategy aren't really facing conventional threats on land the way that the US and Soviet Union were facing off in Western Europe. So China and India both primarily have nuclear weapons to deter nuclear use against them.

So you are worried about a nuclear armed adversary. You don't want your adversary to have nuclear weapons and you not have the ability to retaliate. You're really using nuclear weapons to deter nuclear use against you. You can then rely on what we call an assured retaliation strategy. You just need to be able survive what might be a first strike against you and retaliate with nuclear weapons against your adversaries population centers. This is your classic deterrence by punishment strategy.

Nuclear weapons don't need to be on high alert. Retaliation doesn't need to be immediate. It just needs to be certain, and you don't need tactical nuclear weapons because you're not using nuclear weapons on conventional forces that might be attacking you. So this allows for much more centralized, recessed management if that's your aim.

If your aim is to deter conventional aggression-- this was the US and NATO during the Cold War. We had conventional inferiority in Europe. In order to offset the conventional capability of the Warsaw Pact and the Soviet Union, the United States needed nuclear weapons-- the threat of tactical nuclear weapons to offset that differential. And we needed to threaten to use nuclear weapons first.

If Warsaw Pact nuclear conventional forces came crashing in a Western Europe, the United States very explicitly threatened to use tactical nuclear weapons against advancing Warsaw Pact forces.

Unlike in the assured retaliation case, you can say, look, I have a no first use policy. I won't use nuclear weapons unless you use them against me, primarily strategic weapons, compared to here you have a very forward, aggressive tactical nuclear

weapons capability where you have to threaten to use nuclear weapons first right because you're trying to deter conventional attacks against you.

And it looks like a denial and punishment mission at the same time. And now regional powers are faced with the same question. Now, can anyone guess where India falls?

Did I say it already? Yeah. Assured retaliation. They have conventional superiority against Pakistan. They're not really worried about China invading India and marching all the way to Delhi. They're primarily trying to deter nuclear use against its own cities.

Where does Pakistan fall? What is Pakistan worried about?

So Pakistan is primarily worried about Indian conventional superiority. And having been at the receiving end of dismemberment from India in 1971, which I'll talk about, Pakistan has operationalized a posture that is very aggressive, very oriented towards battlefield nuclear weapons against any conventional forces that might cross the international border. And so they have a first use-- I call it asymmetric escalation doctrine.

They threaten to escalate a conventional conflict to the nuclear very quickly because-- or earlier than India would-- before any other nuclear weapons are used because they're worried about Indian conventional superiority against it.

Pakistan actually started its nuclear program before India tested the so-called PNE in 1974 because on the heels of the 1974-- I'll talk about this, actually, right now.

So India security environment, historically, so it has the 1962 war with China in which its conventional performance shocked even the Indian army and the Indian leadership.

The Chinese performed so much better than the Indians in the '62 war, and India decisively lost the '62 war. Two years later, China tested its nuclear weapons. So the Indian military program gets its motivation, initially, from its experiences in '62

and '64 with China. And to avoid nuclear coercion in the future against China, India hedges under the Nehru years and then the subsequent leadership under Indira Gandhi.

It does also have these persistent wars with Pakistan. But it has conventional superiority, and there was really never any talk about needing nuclear weapons to deter the Pakistanis. So India had a civilian nuclear program. It got a CANDU reactor Canada. Some of the heavy waters was supplied by the United States, and 54 reprocessing facilities in '64.

And then in 1974, Indira Gandhi authorizes what's known at the time-- under the Atoms for Peace program, there was a category known as a Peaceful Nuclear Explosion, which was-- I mean there are legitimate uses, it was believed at the time, for nuclear. Like, if you needed to clear large swaths of land for dams for example.

And India had some potential uses for this, but it didn't really fool-- I mean a peaceful nuclear explosion is still a nuclear explosion. It wasn't, however, a warhead. I mean this thing was a rickety-- I think was it was eight meters in diameter device. I mean it was a hulking, unstable, rickety fission device that they tested in 1974-- it wasn't suitable for a military program.

It wasn't miniaturized. It didn't have-- it was even suitable for delivery by aircraft. You'd have to throw it out the back of a cargo plane.

I mean it still gave them, certainly, the physics of being able to sustain fission and have spherical compression. All of that was-- and it was a plutonium device, so it wasn't trivial. But it wasn't a nuclear weapon in the sense of the way that we think of. So a lot of work was still yet to be done after 1974, but it demonstrated that Indian scientists had the ability to at least design rudimentary nuclear weapons.

There are several explanations for why it tested in '74, as a general security environment-- I talked about China-- persistent wars with Pakistan. They had just won the 1970 war with Pakistan-- 1971 war with Pakistan, which split Pakistan in two. I'll talk about that. That was the real motivation for the Pakistani program. But



the real explanation is a combination of domestic politics and the power of the scientists in India.

So Indira Gandhi was facing a potential series of losses in state governments. She wanted a big win. There were several very prominent Indian physicists and engineers who promised a big boost in her electoral fortunes if she tested a nuclear weapon, and they really wanted to test a nuclear weapon because they had been working on it. Scientists like to test the things that they work on.

And they had been doing this persistently for several years. And she then found her opportunity in 1974 when, right before a series of state elections, she authorized the test. Empirically, the test didn't actually help her that much electorally, but there was a belief that it might. And so that was some of the motivations for the test.

From 1974 until about 1989, for about 15 years, India's nuclear program went into effective dormancy. There was no high level authorization from Indira Gandhi, or her son who later became prime minister after her assassination in 1984, for the militarization of the program.

So India's scientists worked on some of the-- did some of the theoretical work for miniaturization, getting India in a place where if it had to militarize a program, it could. But there was no actual physical work done on that after 1974.

Pakistan faced a somewhat different security environment. So where as India lost the '62 war and then faced China's nuclear test-- but never really faced the threat of a massive conventional invasion from China, really wanting nuclear weapons to deter the Chinese nuclear threat, not the Chinese conventional threat-- Pakistan was really scarred by the 1971 war.

So the 1971 war was the war in which East Pakistan was birthed into Bangladesh. So there was a refugee crisis the West Pakistan and East-- so Pakistan at birth, in 1947, was split non-contiguous with India in the middle. You had East and West Pakistan.

West Pakistan was dominated by Punjab. East Pakistan was dominated by

Bangladeshis-- Bengalis. Sorry. Later Bangladeshis. Bengalis. So there was ethnic tension between Punjabis and Bengalis. The Punjabis dominated the politics of Pakistan. Bengalis felt like they were second class citizens in Pakistan. That created political tension. And there was an uprising in 1971.

India intervened on behalf of the Bengalis to split East Pakistan off of a West Pakistan. Now, if you're India, this is a huge strategic victory, right? You had two flanks of Pakistan surrounding you, and you were able to make them two independent countries with the benefit that you helped birth Bangladesh from Pakistan. So it's not like they would be allies against you in a conflict.

So strategically this worked out pretty well for India. But for West Pakistan, now present day Pakistan, this was a pretty scary moment. Your east wing is amputated, and it was at the hands of the Indians. So as early as 1965, when it became clear that India might look at nuclear weapons because of China, Zulfikar Ali Bhutto, who was the prime minister that ended up authorizing the program through the 1970s, said "we will eat grass or leaves or even go hungry, but we will get a bomb of our own." It's one of his famous quotes.

Remember, this was said as early as 1965. But after the 1971 war-- in January 1972, so right after 1971 war, Bhutto authorizes the nuclear weapons program with express intent of a militarized nuclear weapons program to deter Indian conventional power. So it wasn't because of the Indian PNE, which was 1974. Pakistan's nuclear weapons program predates India's 1974 test.

The real motivation was the 1971 war. Pakistan could not suffer the conventional defeat at the hands of the Indians again. And so Pakistan's nuclear program was triggered. For a state that was essentially desperate for nuclear weapons, Pakistan tried all possible avenues. So you had the uranium pathway, which was led by AQ Khan. Everyone's familiar with AQ Khan? Yes we Khan? Horrible, horrible joke. I apologize.

So he essentially stole the URENCO designs. URENCO is a European consortium. He stole it from the Netherlands. He worked at URENCO. From the inside, he stole

the blueprints for what ended up being the P1. And then he modified it later to be P2 designs. So he stole the URENCO centrifuge designs from URENCO itself where he was an employee. He went back to Bhutto and said, look, I can deliver a nuclear weapons program.

And they set up cascades of the P1s at Kahuta, which Pakistan would deny through the 1980s, was a uranium enrichment facility. The then president, General Zia, referred to it as a goat shed repeatedly in interactions with the United States.

The problem was what happened in 1979? *Charlie Wilson's War*, anyone?

**AUDIENCE:** Iran.

**VIPIN NARANG:** Well, also Iran. OK, that's true. You had the Iran Hostage Crisis and the revolution in Iran. But you also had what else, December 1979?

**AUDIENCE:** Soviet invasion.

**VIPIN NARANG:** Yes, Christmas invasion. So the Soviets invade Afghanistan. And all of a sudden, Pakistan is America's-- one of the most useful countries in the world for the United States because the United States decides to supply the mujahideen in Afghanistan to fight the Soviets. How do you get supplies to the mujahideen? You have to route them through Pakistan. That's when the relationship between Pakistan and the United States flourished because we really had no option.

History doesn't repeat itself, but it rhymes. We did the exact same thing in the 2000s. And when we were at war in Afghanistan, we needed the ground lines of communication through Pakistan. And the relationship between the ISI and the CIA in the 1980s, because of the US role in Afghanistan, became-- what's the right word for it-- blossomed. But there was always tension in that relationship.

But due to US nonproliferation legislation in Congress, the United States would have been obligated to sanction Pakistan and cut off all aid if Pakistan were to assemble a nuclear weapon. Remember, Pakistan and India never signed the Nuclear Nonproliferation Treaty.

US legislation required that a state that was not a member of the Non-Proliferation Treaty found with nuclear weapons-- or who had nuclear weapons, would face immediate sanctions cut off of US aid. But that threatened US operations in Afghanistan, so that couldn't happen. So there was a lot of tension between the nonproliferation hawks at the state department and the executive.

So the Reagan administration went to great lengths to play fast and loose on where Pakistan was with its nuclear program. Everybody knew that Pakistan had a nuclear weapons program. But the wording of the language of the legislation required-- and it later embodied in what was known as the Solarz Amendment that the US presence certify that Pakistan doesn't have nuclear weapons.

So as long as the executive-- and the executive defined nuclear weapons as the assembly of a nuclear weapon. So as long as Pakistan did not cross that line, the executive could certify that Pakistan was a non-nuclear weapon state. And therefore, the aid and the relationship between the US and Pakistan could continue.

**AUDIENCE:** When you say Pakistan, is this so east and west are actually separate countries?

**VIPIN NARANG:** So Bangladesh, at this point, is an independent country after 1970-- so this is west-- this is Pakistan, Pakistan, present day Pakistan. And this is with Zia. Zia is the president general. He executed Bhutto in 1979 I think also, '77 or '79. And he's the present of Pakistan during the 1980s.

And we'll get through the-- there's a slow march to nuclearization So '83, there's some Chinese assistance to the Pakistani nuclear program. In fact, on precedent, I think, in the annals of proliferation, China transferred-- is now, I think, out in declassified documents, the United States believes, and I think Pakistan has admitted, that they received 50 kilograms of HEU from Pakistan. That's effectively two bombs worth of HEU.

Assuming 25 kilograms a per bomb-- two bombs worth of HEU from China plus the design for uranium core warhead, known as CHIC-4 design. It was the fourth test in the Chinese test series. So that's 1983.

By 1986, the US is essentially convinced that Pakistan is a nuclear capable state. But remember, it had it certified as a non-nuclear weapons state. So they were two screwdriver turns away, you could certify them as a non-nuclear weapons state. And the executive continued to do that.

In March 1987, Zia complicates all of this when he claims that Pakistan has the capability to make a bomb in *Time* magazine. So all of the nonproliferation hawks go nuts.

Here, you have the president of Pakistan saying to *Time* magazine that Pakistan-- he literally said, you could write Pakistan has the capability to make a bomb, and they did. And it was then that congressman Stephen Solarz passed the Solarz amendment where the president had to actually certify Pakistan not a nuclear weapon state. But the language he put in there made it easier for the president to be able to say that and not be lying because the language is basically nuclear device.

So if the device wasn't assembled, the executive could legitimately claim that Pakistan did not have a nuclear weapon. Even though it had the pit over there, the explosive package over here, the assembly over here, but it would all be on three sides of the room. But you could certify that it wasn't assembled, so it wasn't a nuclear weapon.

And so by 1988, the nonproliferation hawks had given up, and Solarz quipped that it had a Saturday night special capability. It may not be elegant, but it'll do the job. And one of the advantages to the Pakistani nuclear weapons program was, given the fact that they had a tested design from the Chinese, they conducted a series of cold tests in the 1980s. But they didn't have to necessarily conduct a hot test to know that their weapons would work, unlike the Indians who were indigenously designing their plutonium devices.

So by the late 1980s, Pakistan is a nuclear weapons capable state. In fact, the War in Afghanistan ends around 1989, 1990. President George H W Bush is president.

And as soon as the US stops-- as soon as the Cold War collapse-- sorry-- the Soviet Union collapses, President H W Bush refuse to certify Pakistan as a non-nuclear weapon states anymore.

**AUDIENCE:** You talk a out cold test. What constitutes a cold test?

**VIPIN NARANG:** A cold test is without the fissile material. So you--

**AUDIENCE:** Do they really know that it works?

**VIPIN NARANG:** Especially in this case, it's a spherical compression. So they wanted to, as they were testing the explosive charges, make sure they get a uniform compression wave. Because they weren't using-- it's a uranium device, but they weren't designing contact devices. It was still an implosion. It was a uranium implosion device. And so you could do a cold test without the fissile material to make sure that you had a uniform compression.

So you can do a sufficient number of tests without the fissile material. And since the design itself was tested in a hot test, I think the Pakistanis were quite confident that once they had enough fissile material in the design, it would work.

So in this period, remember, India is in dormancy. But there's a-- in response to Zia's claim in *Time* magazine and several other statements, India brings its program out of dormancy in response, actually, to Pakistan's program. So there's a narrative-- the conventional wisdom is that India's nuclear program beget Pakistan's nuclear program. But it's the other way around.

So Pakistan's program is triggered by Indian conventional power. India has this rudimentary nuclear hedging program in the 1970s. It was only when Pakistan claimed publicly that it had a nuclear weapons capability that India brings its program out of dormancy. So it was only in 1988, 1989-- it was actually winter of 1989. Then Prime Minister Rajiv Gandhi orders work on weaponization, miniaturization, production line, all the things you need to have a military program.

And India only is starting then, at that point, racing to develop delivery capability. So

they had indigenous missiles, the Agni and the Prithvi missile. And so India was playing from behind in this period. So it would take India another four or five years before they would have a militarized program that they could test.

Once they reached that point, there were several aborted tests. 1995, Prime Minister Rao of the Congress Party, he is on the brink of tests. And the US Ambassador, Frank Wisner goes to Prime Minister Rao and says, we know you're about to test. Don't do it. The weight of American sanctions will kill you, and Rao backs off.

A couple months later, the BJP, which is the opposition party-- the main opposition party at the time, when's office for the first time. They're in office for only 13 days, so they have to pull back from the test that they were planning to conduct. When they return to power in May 1998, the BJP, in its manifesto, says it's going to test nuclear weapons. Yet the CIA claims it was caught off guard when they came back to power after they had ordered tests in 1996.

Everyone claims that the CIA was caught off guard by the May 1998 test. But the BJP had said it publicly that if they came into office, they were going to test nuclear weapons again. And they did take steps to camouflage the activity in the test sites. But as soon as they come back to office, two months after they win office in a permanent majority, they test nuclear weapons. It was five fission devices.

They cited everything under the sun, but primarily, China's the reason for testing nuclear weapons. And then the question was, how does India, now that they overly tested nuclear weapons, operationalize its nuclear capabilities? As I mentioned before, India has an assured retaliation posture. So it tested nuclear weapons in 1998, and then the question is, how do we manage these things?

India very quickly decided to have a no first use policy. And they were going to have a very assertive management of their nuclear forces and rely on an assured retaliation capability, so no tactical nuclear weapons, just strategic weapons. The capability is under civilian custody, and the aim of their doctrine is to deter nuclear use against Indian population centers. So it's a deterrent by punishment strategy.

And they have long range ballistic missiles. They had some aircraft capability, but they're primarily moving a missile capability now. And they have very recessed posture, very few weapons on alert. Most of the arsenal is actually disassembled during peace time. Some subset is at higher states of readiness, but it's primarily-- it would take several steps up the alert ladder before India is in a position to use nuclear weapons. So they're not on hair trigger alert as American and Soviet weapons were.

Pakistan, on the other hand-- so it tests shortly after India. They have moved away from uranium enrichment to plutonium. For the physicists here, what's the advantage of plutonium?

Plutonium weapons.

**AUDIENCE:** [INAUDIBLE]

**VIPIN NARANG:** Right. So the yield-to-weight ratio is much better. So if you want battlefield nuclear weapons or higher yield strategic weapons, and you have payload constraints-- you're trading off range for payload, so a plutonium gets you much better yield-to-weight ratios. So it is about 4 to 1 advantage. And once they had the uranium devices, they're worried-- Pakistan was always worried that India would attack its nuclear facilities.

Once it acquired basic nuclear weapons capability through the uranium pathway, now it doesn't fear that as much. And so most of the plutonium production is out in the open and with Chinese help. So there are series of Chinese reactors and reprocessing facilities that are coming on line. And Pakistan is shifting to plutonium production, primarily for its battlefield nuclear weapons capability.

It's delivery capabilities were initially bought from China and North Korea, so there were missiles for uranium enrichment capability trade that Pakistan had with China-- sorry-- with North Korea. So it got the No-Dong missiles from North Korea. In exchange, North Korea got some basis for its uranium enrichment capability that it now has. And China also sold Pakistan some MX-4 missiles, which are the Shaheen



and Gaznavi missiles for Pakistan.

**AUDIENCE:** What's the motivation for China to sell and give this aid to Pakistan?

**VIPIN NARANG:** Well, so if you're China, what's the advantage of having Pakistan be nuclear and-- who's in the middle? Look at thee-- They can sandwich India, right? So the enemy of my enemy is my friend.

**AUDIENCE:** I mean it seems China had their own nuclear weapons, so anything from Pakistan would be trivial. Pakistan's a little unstable. You never quite know if the government collapses, what might happen to those weapons.

**VIPIN NARANG:** No, I mean these are all reasonable questions. And I think they're raised of the Chinese a lot. Like that you provide a state a nuclear capability or assist them, but you don't want to take responsibility if there's a fracture in the state and nuclear weapons fall into extremist hands. And the Chinese will always-- you go to some of these Track IIs and China has always washed their hands of it.

But you can think from a strategic perspective why it makes sense for them to have India focused on Pakistan, and this is one way to do. And I think that's the Chinese motivation. So Pakistan, because it is trying to deter Indian conventional power, has an explicit first use doctrine. And this has evolved in the past 15, 16 years.

First of all, it's credible because all of Pakistan's nuclear weapons are under military custody. Unlike India where the civilian custody and control of nuclear weapons, Pakistan is a de facto praetorian state. The Army is a dominant decision making body. And so all the nuclear weapons program, from cradle to grave, is under army management.

So they control the nuclear weapons program. There's been a shift to battlefield nuclear weapons. There's a capability known as the NASR missile. If anyone's been following this, it's a 60 kilometer, short range nuclear weapon system that will be fielded at the rear edge of battle that would target Indian forces if they cross the international border. They have a series of cruise missiles, which are also designed to be battlefield nuclear weapons, the Ra'ad and the Babur.

And they have an explicitly deterrence by denial mission. They're trying to deter Indian conventional attacks across the international border.

So there are some-- any questions about where we are in terms of how India and Pakistan think about nuclear weapons in their force postures? Yeah?

**AUDIENCE:** Around that time was India suggesting at all that that they were interested in traditional war with Pakistan?

**VIPIN NARANG:** So this is an excellent question. Why would Pakistan-- I'll skip through some of this because the crux of the problem now is India doesn't have any territorial designs on Pakistan. Why would India want to dismember Pakistani further? It prefers a stable Pakistan. It has no territorial ambitions in Pakistan. There are some-- Kashmir is a disputed-- there's a dispute over Kashmir.

But frankly, the line of control on both sides is effectively the de facto border. There won't be much territorial revision over Kashmir. And certainly, if you're worried about a conventional attack across the international border, how do you get there?

I'll get to that in one second after very quickly talking about, in the nuclear sense, what the difference is between South Asian the Cold War. So both sides now have nuclear weapons. Some of the key differences between India, Pakistan, and the United States and the Soviet Union are, one, rudimentary capabilities still, organizational command and control is not as mature in either country as in the Cold War, especially in the later years the Cold War obviously.

But the other big difference is they border each other. So the flight times between India and Pakistan is on the order of a couple minutes. The US and Soviet Union was 30 minutes. So you had a half hour to figure what was going on.

In India and Pakistan, you have two minutes-- if you had any early warning-- and early warning systems are very rudimentary-- if you had any early warning, or indication that the other side is launching a potential nuclear strike, you have two minutes before that thing is going to hit. So your reaction times have to be much

quicker.

The other big difference is-- I'm going to skip through this here. The other big difference is, as you mentioned, why would India be interested in conventional attacks against Pakistan? Well, it wouldn't be ab-- it wouldn't be the first to initiate conflict. The Indian problem right now is it is facing a Pakistan that is more aggressively emboldened to launch militant attacks in India using organization-- proxy organization sponsored by the state-- or believed to be sponsored by the state, like Lushkar-e-Taiba, Jaish-e-Mohammed.

And the strategy has changed since Pakistan tested nuclear weapons. Prior to 1998, Pakistan-- there was a strategy, coined by Zia and General Aslam Baig, known as bleeding India by 1,000 cuts. So there's a strategy of cutting India at the periphery. In the line of control in Jammu Kashmir in the mountains, you couldn't have a real conventional battle, but you could have terrorist infiltration. There would be some attacks and just small cuts.

But the strategy has shifted since 1998, it seems. The frequency of over infiltration by regular forces in the Kargil War in 1999 and then multiple attacks on Indian metropolitan cities with these Pakistan-based militant organizations. It leads to a condition where India wouldn't be starting a war, but it would be retaliating.

So India's mainstay threat prior to nuclearization was if you try the strategy of bleeding us by a thousand cuts, we're going to punish you where it hurts. We're going to destroy your army. If you're an army led state, an army controlled state, we'll cross the international border, and we will attrit your army. And that will punish Pakistan. So that was the deterrence by punishment strategy India had at the conventional level prior to nuclearization.

But post-nuclearization now Pakistan is doing what? It threatens-- well, it's going to stand and fight for a while. But in extreme, it threatens tactical nuclear use on Indian forces if India tries to retaliate across the international border. And so that's the scenario that India finds itself now. And that's the scenario in which India would think about conventional conflict with Pakistan. It's not for territorial ambition or any

territorial gains. It would be for retaliation after a provocation.

So there are a couple examples. The first is the Kargil War. Does anyone remember this, May 1999? So this was a year after they tested nuclear weapons. General Pervez Musharraf, who ended up being president during the first phase of the Afghan war in 2000-- this was right before September-- two years before September 11.

Nawaz Sharif-- man history does repeat itself. Nawaz Sharif was then the prime minister. He is again the prime minister today by the way. He claims he had no knowledge of this operation. But then General Pervez Musharraf, who was the chief of army staff, orchestrated an operation where un-uniformed regular Pakistan forces, known as the Northern Light Infantry-- the Northern Light Infantry, infiltrated into several sectors in to Indian held Kashmir, into Indian territory.

And India responded with trying to dislodge the Pakistani forces. Previously, this exact operation had been attempted in 1965. India launched air strikes across the line of control and opened a second front across the international border.

This time the BJP responded very differently. Because of Pakistan's nuclearization, the BJP was much more restrained and sustained heavier losses because the threat of escalating the conflict deterred the BJP from the same kind of response that it had in 1965-- that India had. So it refused to allow air operations across the line of control.

So Indian aircraft could not cross the line of control in hot pursuit of Pakistani infiltrators. And most importantly, they did not threaten to open up the second front. The place where India's conventional advantage really comes to bear is on the international border, here. So most of the fighting was here. This was where the infiltration was. But India has a huge advantage in this plane sector, which is the international border.

So any time there has been a previous provocation, India has always mobilized forces here and threatened to open up a second front where it can really bring its

conventional power to bear on Pakistan. This time, the BJP refused to threaten to open-- it did not mobilize any of its mainstay conventional forces on the international border and didn't threaten to open up a second front. And so it took Indian forces a lot longer, and they sustained much heavier losses in the Kargil War, because they had to expel Pakistani forces symmetrically.

So they didn't have the virtue of air power hitting behind Pakistani lines. And there wasn't any ability to take pressure off of this front by opening up a second front in the international border.

So already you can see India's response is restrained because Pakistan was a nuclear power. So shortly after September 11 here, two months later-- three months later, there was an attack on the Indian parliament.

So you had about half a dozen gunman break through the barriers of the Indian Parliament house. I mean imagine an attack on Congress here. It would be the equivalent. So you had Jaish-e-Mohammed and Lushkar-e-Taiba joint attack on the Indian parliament in Delhi. Never heard of before that they-- these militant groups, which are nominally supported by the Pakistani state, would attack the Indian capital.

So you had this attack in December. The BJP is furious. Imagine what the United States would do if a militant organization attacked the US Congress. So you can imagine the outrage in India at the time. So the BJP contemplates limited war here across the line of control, so destroying terrorist camps across the line of control.

Under a lot of pressure from the US government because remember what's happened? We were mobilizing for war on Afghanistan at this point. We need Pakistan. The United States needs General Musharraf to not be distracted by a conventional war with India. Can you imagine how that would have affected the US war in Afghanistan if India and Pakistan got into a conventional war at the time. So a lot of pressure on both sides to not go to war.

So Deputy Secretary of State at the time, Dick Armitage, gets on the phone. He's on

the phone, he said, twice a day with the BJP urging them to show restraint. And India backs off actually for a while. But then there's a secondary attack in a small town called Kaluchack in Jammu, which is an army town. And the Jaish militants killed 36 Indian army families. And so the BJP, at this point-- this is the second peak of the crisis.

And so the BJP says enough is enough. So they mobilize India's three-- they call them the three Strike Corps. These are the main offensive components of the Indian army. 800,000 forces in total. And they're mobilized in their assembly boxes, which are much larger than shown here, 60 kilometer breadth, in these three positions, poised for attacks across the international border.

So this is where the threat of war becomes real for South Asia. SO the BJP, you don't mobilize these forces just as a bluff. And so there's a real concern that the BJP would authorize attacks. And at this point, Pakistan engages in some serious nuclear signal. They test three nuclear capable missiles, without the warheads of course. President Musharraf makes very explicit nuclear threats to the Indians that if they cross the international border that Pakistan may have no option but to use nuclear weapons.

The US and the United Kingdom evacuate their nonessential personnel from India. I mean it was very serious at this point.

After these nuclear threats, and again, a lot of pressure from the United States on India, Prime Minister Vajpayee orders, several months later, the Strike Corps back to their peacetime cantonments, which are in the interior of India.

And later on, he said, look, I don't think that a risk of nuclear war was high, but I didn't want to be responsible for starting one. And so there was a real palpable threat that if India engaged in this kind of conventional operation against Pakistan and defeated the Pakistan army, that there's a real risk that nuclear weapons would be used.

The third instance was the Bombay attack in 2008 that we already talked about at

the beginning. So here, this was even more audacious, in some ways, than the parliament attack. This wasn't a ragtag group of six guys in a car. This was a dozen well-trained, heavily armed militants coming by sea from Karachi, quarterbacked-- it now turns out-- by retired ISI handlers.

The United States picked up signals intelligence and intercepts between handlers in Pakistan who were former ISI officers quarterbacking the operation as they attacked Bombay. And it killed 170 civilians. So the media tends to downplay the number of Westerners that were deliberately targeted by the militant-- by the LeT militants. And India was justifiably outraged at this attack.

But the government was again paralyzed. So this time it's the Congress government not the BJP government that's making decisions. And it doesn't mobilize forces this time. The prime minister, Mahmud Hussein, said he did not want a repeat of 2001, 2002. We don't want to mobilize forces and not do anything. So what do we do? And here we have the paralysis that the Indian policy community faces is any serious conventional retaliation risks nuclear escalation.

I think this is where India finds itself. And this is from a cabinet meeting. So this is a report from the cabinet meeting where the prime minister and the defense minister, foreign minister, finance minister, home minister are meeting. And the conclusion was, when the dust settled, all the principles agreed that the unpredictability on the Pakistan side and the fear that its decision-makers could offer a disproportionate response, including the nuclear option, stymied any possible chance of military action on India's behalf after-- 26/11 is their-- is what they call the Bombay attacks. It happened on the 26th of November.

So there's real paralysis now about how do you deter-- see nuclear weapons can't deter militant attacks against the Indian state. But you lost your conventional option to punish Pakistan, which was how you tried to deter it in the first place. And Pakistan has successfully deterred Indian a conventional power by lowering the nuclear threshold, taking a play right out of the NATO playbook, threatening early nuclear use if Indian forces threaten to cross the international border.

So now, after nuclearization 1998, what we have is more frequent and intense crises triggered by Pakistan. There's a belief that they're emboldened by the shield of early nuclear use, knowing that India can't really retaliate with ground power.

We can get into-- we have some time for questions. We can get into why India hasn't tried to develop an air strike option. That gets into the politics of the Indian military-- the service rivalries that India has. The Air Force has always refused to think about options that don't involve the army mobilizing because the belief is that Pakistan would retaliate on the ground. And so the Air Force doesn't believe that standalone air options are possible without a ground option being mobilized.

**AUDIENCE:** So what is Pakistan trying to achieve with these attacks?

**VIPIN NARANG:** So this is an interesting strategic question. What does Pakistan hope-- so if your Pakistan, you're facing a conventional-- you're facing massive conventional inferiority, which is only growing because the size and growth rates of the two countries are so disproportionate that India's gap is just going-- it's going to be a yawning gap at this point. So going forward, how do you slow India down?

So there's one theory out there, which is these periodic attacks on India's financial and political hubs create these periodic crises to get foreign investors skittish. So you get periodic slowdowns being triggered by this, and you can slow down India's economic growth potential if you make it risky to invest in India. So that's one theory out there.

The other theory is Pakistan has always had crazies that is trained to attack. Good crazies kill Indians. Bad crazies kill Pakistanis. And so they need-- there's a safety valve theory. And they've always had a safety valve. Before it was Kashmir. Now, Kashmir is locked down because Indian army knows how to prevent infiltration at Kashmir. For a while, it was Afghanistan.

US military has to be asked, why are these guys speaking Punjabi in Afghanistan? Because these are the Punjabi trained militants, the LeT, that have gone now to Afghanistan to fight, and they're killing Americans. And now if you can turn them



against the Indian state, great.

As long as they're not killing Pakistanis, they are good militants. And so there's one theory out there that the Pakistan state still views these militant groups as strategic assets of the states to perpetually attack and bleed India by 1,000 cuts.

And if you can't get in through Kashmir, if you could infiltrate by sea to Bombay, great. If you can hit Delhi, great. Before nuclear weapons, hitting Bombay or Delhi really risked serious conventional retaliation. But now that you have nuclear weapons and operational nuclear capability and tactical nuclear weapons to deter that conventional retaliation, those kinds of audacious attacks are more possible.

And so these are the two kind of theories out there, and they're not mutually exclusive.

**AUDIENCE:** What [INAUDIBLE] in Afghanistan. What are they called the thieves, the rebels, or whatever-- they were fighting [INAUDIBLE] in Afghanistan?

**VIPIN NARANG:** I mean I think that there are people here who can say more about this who had firsthand experience with this. But there are a lot of reports that you had Punjabi speaking. I mean most of the Afghan mujahideen are Pashto speaking. There's a Haqqani network. A lot of these networks predate 9/11.

And they were supported, funded, and there are strong relationships between the ISI and some of the mujahideen groups in Afghanistan that ended up being the Taliban-- remember the only two states that recognized the Taliban were Pakistan, Saudi Arabia. So the networks that Pakistan had in Afghanistan were very strong. And they had these other groups also, so if they needed militants to go help fight what ended up being the Americans as well as Karzai's ANA, it would be the LeT and the Jaish-e-Mohammeds.

So there were reports of Punjabi speaking militants, well-trained Punjabi speaking militants, fighting in Afghanistan alongside Pashto speaking Haqqani network militants. So that was a safety valve for a while. And now, I think this is why Pakistan may have an incentive for a fight to continue in Afghanistan for a while so it has

someplace to send its crazies. It's a safety valve for a while. And they're worried about Indian influence in Afghanistan so that there would be-- those militants would be boxed into Pakistan.

On the one hand, Pakistan faces-- there was this awful school attack recently. There's a real terrorist problem in Pakistan also. So bad militants kill Pakistanis. Good militants kill Indians and Americans. Steph?

**AUDIENCE:** I was going to ask that question as to whether [INAUDIBLE] are all bad. But initially, that comes out maybe to supporting the militants out there. Do you think that that is-- that initial rhetoric is going to stick? Or do you think they will then go back to what they've always done which is we're going to support whoever destabilizes people we don't like?

**VIPIN NARANG:** So I think the evidence suggests the latter. I mean it is remarkable that the LeT-- so after 2001, 2000, the LeT was nominally banned. But they just renamed themselves to Jamaat-ud-Dawa. And Hafiz Saeed who is the head of the LeT lives openly, not out in the tribal areas. He lives outside Lahore in a town called Muridke. Everybody knows where they are. They're openly fund-raising.

He goes on TV calling for the death of Indians openly. And the fact that he-- it's an open question whether it's active support or passive support. But at least the evidence suggest-- the evidence suggests at least passive support. He is allowed to freely operate. He is allowed to freely raise funds. The organization exists.

It could be shut down very easily. It's in the heart of Pakistan. It's like 30 kilometers from the Indian border. The Indians could hit it. But they have refrained from doing so. But the network is allowed to recruit and operate openly.

And we're not talking about like the Northwest Front, the Khyber Pakhtunkhwa, the tribal areas. This is the heartland of Pakistan. And so it offends credibility to think that it's not-- there isn't some state policy to allow certain groups to operate to some extent while thinking you could target the rest. But there's also that suggests these guys were different hats on different days.

But the sectarian groups, I think, are allowed to operate. Those are the ones that-- the other good militants seem to be those that kill Shia. As long as they don't kill Sunni, it's fine. So some of those groups have been very, very fierce and are allowed to operate still. In the Haqqani network and the LeT, as long as they're not killing Sunnis in Punjab, it seems like the Pakistani state is willing to tolerate their existence.

And so that's an active state policy. And this is different from the Cold War. We didn't have-- I don't think the United States and the Soviet Union had to deal with that kind of proxy level militancy where you have two strategic assets. You have the militant organizations to try and weaken the other state plus nuclear weapons to deter the retaliation. So that combination is, I think, what makes it particularly dangerous, which is what I conclude here.

So you have-- India is extremely frustrated. And I think the worry in the United States is that if there's another mass casualty terrorist attack in India, how will the BJP-- now you have a new prime minister who is, by all accounts, a little more aggressive than his predecessors, a little more hawkish. And right now, the stability in South Asia is predicated on Indian restraint following one of these mass casualty terrorist attacks.

So if there's another Bombay, how will the BJP respond? We can talk-- if anybody has heard of Cold Start, we talk about that. You guys can all email me if anyone ever wants to get into some of the weeds. But the basic idea is India has conventional superiority. It has not used it yet. There's some belief that Pakistan's nuclear threat is a bluff and that India could execute certain conventional objectives below the nuclear threshold.

Maybe, maybe not. It's pretty risky. Particularly, we talk about tactical nuclear weapons that would, at least at some point, be devolved to the brigadier level maybe. And so you'll have-- it's not just one nuclear threshold, but nine. And so you have to worry about one of them deciding that this is the end, and they use nuclear weapons. I think the Pakistani strategy is actually quite rational. It's deterring with

the rational threatened that we might use tactical nuclear weapons, but also through a madman mechanism.

We're going to develop nuclear weapons, and hey, one of our brigadiers might use them if you come. And that reinforces the rational deterrent threat as well. And so, so far, both in Kargil-- sorry. In three instances, Kargil, Parakram, and Bombay, India has relatively restrained its conventional retaliation and its response. And so far, that has taken India and Pakistan off the escalatory highway.

But it's no guarantee that that'll continue going forward. I think the emotions in India are running very high vis-a-vis Pakistan. Particularly, there's increased shelling across the line of control in the past several months. And if there's a significant attack in a major city that involves the death of many Indian civilians, there'll be a lot of pressure on Prime Minister Modi to do something about it.

And then all bets are off because you'll have nuclear weapons potentially mixed with conventional conflict, and that would be the escalation ladder. I think that's something that we're likely-- it's this element of terrorist attack mass casualty terrorist attacks that didn't exist in the Cold War, that makes South Asia quite different, I think, from the US and Soviet balance. And so it's that combination of proxy forces and the arms race that, I think, makes it particularly unstable.

So I'm going to stop there. We are almost out of time, but I'm happy to take questions for a while if anybody has any further thoughts or anything. Yeah?

**AUDIENCE:** Does Pakistan have strategic weapons aimed at Indian cities or--

**VIPIN NARANG:** It does. Yeah.

**AUDIENCE:** --weapon also reach [INAUDIBLE].

**VIPIN NARANG:** Yeah. So this gets into a concept known as escalation dominance. Pakistan also has strategic weapons that put most of India's matrices in reach. The idea being that that deters Indian retaliation for tactical nuclear-- so Pakistan views tactical nuclear use as a war terminating strategy because of the strategic weapons. So the

idea is if any conventional forces attack, Pakistan stands and fights conventionally. Fine. They start losing. They use tactical nuclear weapons on Indian forces.

But now I have a secure second strike capability also if I'm Pakistan. So India has no incentive to use its strategic nuclear weapons against Pakistani cities because nuclear use on your forces operating on Pakistani soil, that's already happened. Am I willing to risk Delhi and Bombay for retaliating. Probably not.

Now absent the strategic capabilities, you're right. Then, India could easily retaliate, and there would be no reciprocation from Pakistan. But Pakistan is trying to establish what it calls escalation dominance so that it could use tactical nuclear weapons, and that would be the end of it. So India would have no incentive to retaliate with strategic nuclear weapons against Pakistan.

There is some belief that India's looking at lower order use options. India has no tactical nuclear weapons itself. But there are some capabilities that could be used for softer targets than just cities. And it may be that India tries to develop tit-for-tat capabilities. And then that's basically your escalation ladder as well. In the back?

**AUDIENCE:** So if India is so paralyzed and Pakistan realizes this, why hasn't Pakistan increase the frequency of attack?

**VIPIN NARANG:** I think part of it is you can't do it too often. You do it too often, and then the core world opinion-- I think there's a limit to how often you can do it. But once every two, three years is not nothing. And there's always chatter. There have been several instances where the Indian home ministry claims-- now, I don't know how good the evidence is-- that they've disrupted several attacks by LeT on Indians-- on India.

But every several years, I think that's not nothing. And they also choose relatively strategic moments to do it. So if you look at the timing of the attack on the parliament, two months after 9/11, just as the Pakistani US relationship is growing again. Maybe there's a belief you can get away with it because the US is going to protect you.

The Bombay attack was just as then President Musharraf was-- there was

discussion of concluding a back channel final agreement over Kashmir. And the LeT and the India-focused militants acted as veto players, as spoilers. And so there was a comp-- something known as the composite dialogue ongoing between India and Pakistan in 2008 where literally everybody knew what the final solution peace deal between India and Pakistan would like.

And President Musharraf was very serious about it. This was spoilers within Pakistan vetoing that deal and disrupting the dialogue. So India had no option but to terminate the composite dialogue after Bombay. And it hasn't really restarted. And so those strategic moments, I think, are chosen by Pakistani militants to attack India. Yes, sir? So what's the story-- I've heard bits and pieces about Khan. How did he evolve? Where did he come from? What was--

**VIPIN NARANG:** Yes, so that's a whole other-- AQ Khan, he stole the designs. He provided the uranium enrichment capability to Pakistan. He orchestrated a network of global suppliers for the components for the centrifuges, which he then leveraged for both state policy. So he used that network to get North Korea its centrifuge capability.

But whether, with complicit state support or acting on his own, he also decided to make some money by moonlighting, maybe, with Iran and Libya. And there's believed to be a fourth customer. Don't know who that is.

But there's a big debate also in the Pakistan nuclear community about how influential AQ Khan really was. I mean they're moving to the plutonium designs anyway. PAEC, which is the Pakistan Atomic Energy Commission. They're responsible for plutonium production pathway. They're competing for designs and for ownership of the Pakistani program.

So in Pakistan, he still-- he claims to be the father of the Pakistani bomb. That's up for dispute. But some of the proliferation activities, it is unclear whether they were state sponsored or whether there was some state complicity, and he just acted on his own or whether he acted completely on his own.

**AUDIENCE:** But he served this thing, I mean is it true? I mean did he have this business that

basically sells nuclear technology to anyone who will pay the money?

**VIPIN NARANG:** I mean, like I said-- I mean he-- there was a catalog. You could get a brochure for-- yeah. And so it is true that there was-- he definitely had really significant dealings with Iran, which is interesting because Iran and Pakistan aren't natural allies-- are the ones who made Shia, Sunni-- they're not natural. Iran has also been involved with the Balochistan insurgency in Pakistan.

So that he would sell centrifuges to Iran seems a little puzzling. May be it was for-- seems like personal gain would be a very strong explanation. There's some evidence that he approached Iraq in the late 1980s to see if they're interested in uranium enrichment. Saddam Hussein thought it was a trap, so he passed on it. But, yeah, I mean there's no question that there was-- this is a big nonproliferation failure.

**AUDIENCE:** I can't remember if I read about it on [INAUDIBLE] media or [INAUDIBLE], but I remember reading about this. And what they said was that he was doing it for personal gain.

**VIPIN NARANG:** Yeah, there's no question he made a lot of money from it. But you would have to leverage some assets from Pakistan military to do some of this stuff. There's no way that they didn't-- some people didn't know about unless they were in on the take, which is entirely possible. I mean I find it hard-- certainly the North Korean deal, I mean they flew Pakistani C-17, so it was military transport that took the first centrifuge cascade over to North Korea. So that was definitely state to state.

Some of the other stuff is just really murky as to the level of state complicity. Were there people in the Pakistan government who knew he was doing it. I'd probably-- it would be hard for me to believe that they didn't. But it may not have been state policy. Yes, sir? Last question, I think, then we got to--

So I think that the influence of the US support is, perhaps, understated. If we ignored Pakistan, didn't like them anymore, and the entire international community turned on them, it might be devastating for them, especially economic sanctions

[INAUDIBLE].

**VIPIN NARANG:** So we imposed sanctions after 1998. But then after September 11, we needed Pakistan.

**AUDIENCE:** How long will we need them? [INAUDIBLE]

**VIPIN NARANG:** There are a couple good books on this out recently. I'm not a Pakistan expert. And this gets into very like-- the empirical evidence for this is-- we don't know. But Pakistan could be very vulnerable. I mean I think a nontrivial proportion of their revenue comes from US and international aid. But on the other hand, given the militancy problem, I think most countries prefer a stable Pakistan to an unstable Pakistan.

And heavy sanctions could really disrupt the fabric of that state. And say so it's a very thin line you walk. And part of it is, I think the opportunity that the United States had was in the 1980s. And there was a belief in the Reagan administration that it was one or the other. It was either we needed to Pakistan against the Sovs or it's the nuclear program. But we couldn't deal with both at the same time.

The United states wasn't happy. It wasn't like the US was happy about the Pakistani nuclear program. But it is certainly true that the executive was willing to look the other way and tolerate certain movement up to a point, probably on the belief that it was inevitable. There's nothing much you can do about it. I'm not sure if that's true. I actually think that there were a lot of leverage points we-- the United States could have had in the 1980s and didn't take advantage of them.

But that's also-- an administration fighting this war may not believe it has the bandwidth to deal with both. And I think that's where they ended up. But if there was ever a point, it was probably in the 1980s to stop Pakistan from becoming a nuclear state in the first place. But now that they are, it's really hard to see what we can do. Aaron, yeah?

**AUDIENCE:** There is an overall question here, which is tough. I mean it's a very unstable situation between India and Pakistan. And you either keep going from them leading



the way it has been going, or you take a big step. And the big step is either you're going to do something war-like or peace-like. And there is a peace-like thing which never seems to surface, which is, look, if you can't solve this by war-like steps, then you have to solve it by eliminating the political tension. And that doesn't seem to be possible in India. India is this world power, and why don't they stand up-- what's your analysis? Why don't they stand up and say, we're not going to solve this militarily so we better--

**VIPIN NARANG:** I think there was a real golden opportunity in 2008. I think Manmohan Singh and then foreign secretary Shivshankar Menon who's going to be at MIT actually in February at the Center for National Studies with us, he can give more insight on this. But I believe India was ready to do that in 2008. And Musharraf was ready to do this in 2008.

Certain elements of the Pakistani security services and their proxy forces and the LeT were not. And so it was just politically untenable, after the Bombay attack, for the Indian political leadership. And so the spoilers-- the spoilers spoiled.

**AUDIENCE:** They spoiled it, but the point is that that was the point to stand up, and probably again because you're in a bind.

**VIPIN NARANG:** But I mean the politics of it was just too-- I mean there's just no way that that government could have survived if it continued with a composite dialogue. And it was also a case where there were facing-- elections were the next year. There was no way that the composite dialogue could have continued after bombing. No country could do that. No political leadership could.

It's just unfortunate-- the unfortunate nature of politics. And I think the LeT knew that. You perpetrate this attack, and you will kill the composite dialogue and the back channel talk. And that's exactly what happened. It may be-- it's interesting because sometimes you need a Nixon and China moment, and Modi who is hawkish in the BJP, he has the credibility to get the right on his side. He's protect on his right flank, which often tends to be the spoiler in India. So he has an opportunity, I think.

And I wouldn't be surprised if there's some movement toward it in the administration provided there are no other attacks. So I think you're right. All the pieces-- everybody knows what the final deal looks like.

There's one hiccup about whether it's sequential or simultaneous demilitarization of the Siachen [INAUDIBLE] or like minor things. I mean those are solvable. But everything else, the line of control becomes a de facto national border. Everything else gets adjudicated. And maybe-- Modi has five years, so it's possible. If anyone in India can do it, I think it has to be somebody from the right.

The question is whether there's a willing partner--

[INTERPOSING VOICES]

**VIPIN NARANG:** --willing partners on Pakistan. Exactly. OK, I think we're over time. So we should-- I gotta pick up my kid from daycare, so thank you guys. Thanks!