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# Game theory, Strategies and the convoluted triangle - India, Pakistan, Kashmir

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**Abstract:** Using the lens of game theory, the paper attempts to describe the ways in which it can enhance our understanding of international relations and real-world events. The author argues that the inherent instability in the game of Kashmir is due to contrasting approaches towards the game by India and Pakistan, that is, infinite versus finite respectively. To exhibit the games being played and their nature, the incidents and statements by the Prime Ministers of both the nation's post-Pulwama incident were scrutinized and decrypted using game theory. The analysis revealed that Pakistan plays the game of Mutual distrust, Chicken and Bullying while India plays the timing games. Further, both the nations play deterrence games, however, their approaches differ – classical versus perfect. Also, the frequent defection of Pakistan from mutual cooperation point in iterated prisoners dilemma inflicts dynamics between the games – shifting it to mutual distrust and to chicken resulting in tensions. Therefore, the author asserts that from a game theoretic perspective, the stability can be achieved in the long run only by complementing table talks with strict policies against Pakistan sponsored cross border terrorism. These games have been found to fit the observed story of relations between India and Pakistan, with the recent involvement of China. It also briefly discusses the role of clandestine services in strategy determination in modern information warfare.

**Keywords:** Game theory; International relations; Counter-terrorism policy; India; Pakistan; Kashmir

## 1. Introduction

The divorced couple, India and Pakistan<sup>1</sup>, have always been in a love-hate relationship since 1947. But their love for Kashmir has been consistent. With time they have only become more possessive about Kashmir and have even fought several

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<sup>1</sup> Since partition Pakistan's army and their intelligence service, the Inter State Intelligence (ISI), have been a major force driving the nation (Winchell 2003), which continues even today. ISI favours radical Islamic extremism and supports militants (Winchell 2003), supported by Pakistan's army. Critics say that ISI has become a state within a state (Wikipedia 2019). Therefore, in the entirety of the article by "Pakistan" the author implies the Pakistan's army and ISI.

battles over its custody. Therefore, amidst the re-escalating tensions between these two nations, the study aims to apply the established games of game theory to the Kashmir situation and the relations between India and Pakistan. It is step towards finding the needle of truth in the haystack of disinformation. The analysis shows the effect of timescale on the games being played. Using these games, it comments on the importance of austerity in the nation's counter-terrorism policies. Additionally, it scrutinizes the statements of the Prime Minister's of India and Pakistan ex-post Pulwama incident along with some other major incidents. It complements these statements with game theory to decrypt them and exhibit the possible set of strategies hidden in those lines. With this, the paper aims to describe the ways in which game theory can enhance our understanding of the international relations and real-world events.

A strategy is a complete algorithm for playing the game, telling a player what to do for every possible situation throughout the game. The game theory basically helps to model strategic behavior by the agents who understand that their actions affect the actions of other agents. Today game theory is applied in a wide range of areas like military strategy, international relations, political science, history, sports, crime, theology, business, trade and everyday life. Although still, much work needs to be done before a ready to go model could be applied in decision making, but its importance and applicability can be best understood by the following paragraph.

*"It should be emphasized at the outset that we are not seeking a magic formula to solve difficult planning situations. Such a result is far in the future, if it can be deduced at all. Neither do we offer hope of simplifying the decision process. If anything, considering an estimate from the game theory point of view requires a higher degree of analysis and logical thought than does the present standard planning doctrine. But it is hoped an understanding of what game theory is and the type of reasoning behind it will aid the Commander in marshalling his own abilities to the maximum when faced with a difficult planning situation."* (Beebee 1957)

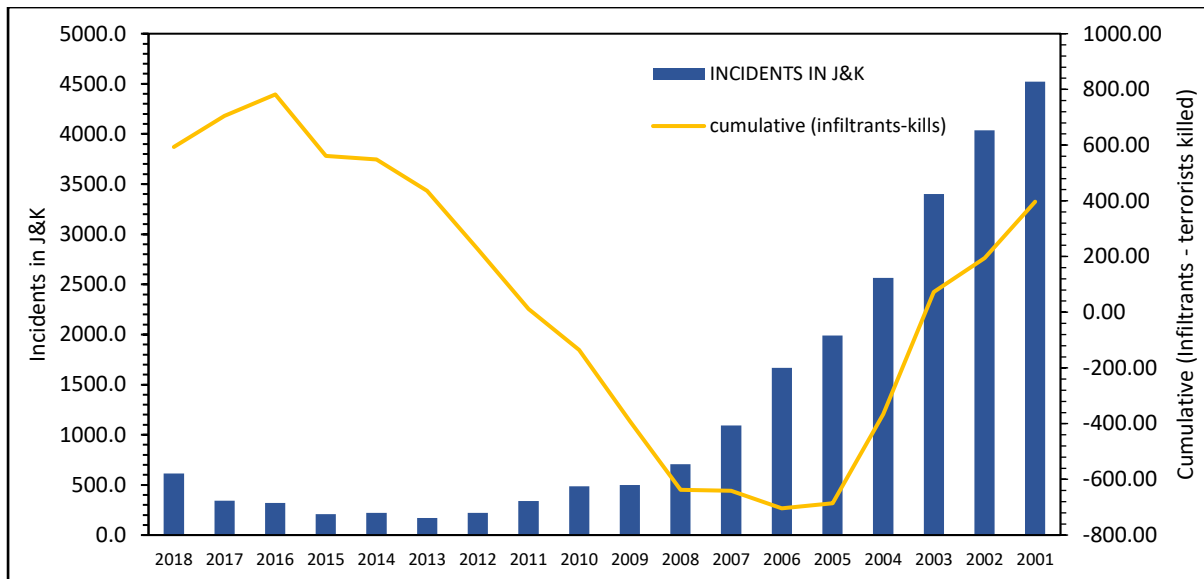
## 2. The Kashmir Issue

Pakistan first tried the conventional game of war (*signal*) to occupy Kashmir in 1947-49, 1965 but was massively outgunned and outnumbered by India (Bahl 2007) and lost all the wars. It also attacked pre-emptively in 1971 and was defeated in 13 days. Pakistan attempted again in 1999 but suffered defeat. Having lost all the wars, Pakistan then transferred into the sub-conventional (*cheap talk*) warfare game i.e. harbouring militant groups to spread terror activities in Kashmir. Signals are always costly and affect the payoffs directly. On the other hand, cheap talks are relatively costless. Therefore this costless and higher yielding version of communication technique has been adopted by nation states acting on behalf of Pakistan (Asthana 2010).

Pakistan not only supports these groups but *“what makes it unique and worthy of attention is the dominance of these tools and the near exclusivism of their use in its relations with India. (Chellaney 2002)”* The first Jihadist group started in 1980 in Pakistan and by 2002, Pakistan had become home for 24 militant groups – with LeT and JeM being amongst the largest (Z. Hussain 2007). These groups are responsible for the 2001 attacks on J&K legislative assembly, 2001 Indian parliament, 2008 Mumbai attacks, 2008 Delhi blasts, 2008 Ahmedabad and Bangalore blasts, 2016 Pathankot airbase, 2016 Uri army base attacks and 2019 Pulwama attacks on Central Reserve Police Force. LeT is one of the deadliest terrorist groups in the world with over 100 attacks worldwide since 2004. This region is the laboratory for these terrorist organizations, who experiment their acts here before exporting it to the rest of the world. *“Several incidents reaffirm this contention. The 1985 blowing up of an Air India commercial carrier Kanishka by a Canadian based extremist group that killed all 329 passengers on board; the 1993 multiple bomb attacks on a high-rise building in Bombay to disrupt India’s financial market that killed more than 250 people; and the 1999 hijacking of an Indian Airlines plane that was diverted Kandahar are all events that can be compared to similar attacks in the United States, such as the bombing of a Pan Am Airways flight in 1988; the World Trade Center bombing in 1993;*

and September 11 suicide hijacking that included similar use of box cutters and terrorist knowledge of cockpit system. (Chellaney 2002).” Despite this “it has become a political force within Pakistan, a proxy fighting force for the Pakistani Army. (John P. Dickerson 2011).” Using militants as their proxy is an integral part of the Pakistan army’s strategy (Sumit Ganguly 2010). “These militant organizations were not clandestine nor had they sprouted surreptitiously. Their growth, if not actually sponsored, had certainly been look upon with the favour by the state. (Z. Hussain 2007)” These insurgent groups have substantial freedom to operate in Pakistan. Not only this they have been supported to construct various types of explosives. These are made within small hidden compounds, to big IED factories. (Jones 2007). These IED’s are then provided to insurgents which have been found in all the terrorist activities in Kashmir in recent times. There is unanimity amongst US, NATO, UN and Afghan officials that Pakistan’s army and ISI train and support these insurgents in all the ways. (Gallis 2007). What started as a support for the *mujahedeen*’s aimed to occupy Kashmir, has been extended to several other groups whose objective is to destabilize India (Schofield 2008). Therefore through the porous 700 km Line of Control between India and Pakistan in the Himalayan mountain ranges, ISI conducts its covert military operations and sends insurgents with arms and ammunition to the Indian territory to spread terror.

The qualitative analysis was conducted to investigate the role of insurgency behind the rising number of incidents in J&K. The data for the number of incidents in J&K, the number of infiltrations into J&K and the number of terrorists killed in J&K were collected from the following sources. (Rawat 2019), (List of terrorist incidents in India 2019), (www.satp.org 2019). Figure 1 shows the incidents in J&K from 2001-2018 vs a cumulative number of infiltrants entered minus terrorists killed. The later has been considered as the net number of infiltrants entering J&K.



**Figure 1.** Incidents in J&K from 2001-2018 vs cumulative number of infiltrants entered minus terrorists killed

Figure 1 shows a relationship between cross border insurgency and the incidents in J&K. Post-2001-02, the cumulative insurgency was declining, which turned negative after 2003. Despite denials, the extremist groups were functioning not only in Kashmir but around the world (including alleged involvement in the 1993 bombing of the world trade centre) (Schofield 2008). Thereafter the pressures from USA post 9/11 attacks forced them to “banned” certain terrorist groups. However, they were simply asked to reduce its public visibility and restrict their activities to a “controlled Jihad” in Kashmir (Z. Hussain 2007). Meanwhile, the counter-terrorism operations continued in Kashmir from the Indian side due to which a number of terrorists being killed was more than the insurgents entering in J&K. This sharp declination of cumulative insurgency might have been the reason behind the fall of terror incidents being in J&K. With passing time and easing international tension of 9/11 post-2008, cumulative insurgency started to increase and turned positive again in 2011. The rise was driven by the revival of militants supported strongly by backers in Pakistan (Evans 2000). This might explain the rise in the number of incidents in J&K again. Therefore, the conducted qualitative analysis and the literature suggests that cross border insurgency of terrorists supported and nurtured by ISI and Pakistan

army does create nuisance in the Indian territory of Kashmir, frequently in other parts of the nation and is an issue of national security.

### **3. Pulwama attacks - verbal exchanges and the beginning of games**

On 14<sup>th</sup> February 2019, a convoy carrying security personnel's was attacked by a suicide bomber in Pulwama district of Jammu and Kashmir. This attack resulted in 40 Central Reserve Police Force's (CRPF) martyrs and several injured. The Pakistan based militant group JeM took the responsibility of the attack. JeM is headed by Masood Azhar, who has been listed as one of the most wanted terrorist by India. He was captured by Indian authorities in 1994 in Srinagar and sentenced for terrorist activities in India. However, in December 1999, Indian Airlines flight IC814 carrying 190 souls on board was hijacked and after 7 days of crisis on 31<sup>st</sup> December 1999, Masood Azhar was released as per the ransom. Sources revealed that the hijackers were taking instructions from Pakistani intelligence officials present at the airport (Z. Hussain 2007). It is also supported by the fact that the very next day he was seen in Pakistan: *"It was late in the evening on 7<sup>th</sup> January 2000 when Azhar resurfaced at Al-Rasheedia mosque in Karachi's central district (Z. Hussain 2007)."* *"There was no effort from the government to detain Azhar or even to stop him from making an inflammatory speech (Z. Hussain 2007)."* It is believed that Azhar still lives freely in Pakistan.

Not only this, during the interviews, ex-President of Pakistan also agreed that Pakistan does support and send insurgents in India. However, he calls them freedom fighters, fighting for freedom of Kashmir and restraints from calling them *"terrorists"*. (Musharraf, Exclusive: Pervez Musharraf on Aaj Tak 2014) (Musharraf, Aaj Tak 2019) (Musharraf, Exclusive Interview Of Pervez Musharraf With Aajtak After The Uri Attacks 2016) (Musharraf, Pervez Musharraf Interview | I am LeT's Biggest Supporter: Pervez Musharraf | CNN-News18 2017). With a resurging number of attacks on Indian military forces in the recent past, major ones being – 2016 Pompore attacks, 2016 Baramulla attacks, 2016 Uri attacks, 2016 Nagora attacks, 2016 Pathankot attack,

2018 Sunjuwan attack and then the Pulwama attacks, India, having already been crossed the tolerance limit has been poked again and again.

Thus India announced that a hard counter-terrorist response shall be taken. The Prime Minister of India Mr Modi said, "*the time for talks are now over*" (ETOnline 2019 ). In response, the PM of Pakistan Mr. Imran Khan denied Pakistan's involvement. Further, Mr Khan showed Pakistan's willingness towards any investigation and readiness to cooperate. He also said that India's precondition for the dialogue has always been to talk first about terrorism, and they are even ready to talk about it. Additionally he said that if India attacks Pakistan, then they will retaliate strongly because they will have no other choice. (Imran Khan's address in response to to Indian allegations on Pulwama Attack 2019). Afterwards, within a couple of days, Pakistan's foreign minister wrote to the UN Security Council blaming India of being belligerent and threatening the regional security (S. Hussain 2019). These statements have been mentioned here because each of these lines reveals the strategies and games being played by these nations against each other and at the international stage which will be discussed.

#### **4. Games and Game theory**

Broadly speaking, there are two types of games – finite games and infinite games. Finite games are the games with agreed-upon rules and boundaries and end with a winner and a loser. Therefore the players involved in such games see the short term and immediate implications since they play with the objective to win. On the other hand, infinite games have no end. The players or rules might change but the game shall go on. So the players involved in such games play with the objective to continue the game. They look at the long term objectives. Since the game is infinite, the only way a player can win is if the other players lose the strength to continue to play. These games though might sound simple but have kept several world leaders and nations in its trap, one example being the nations of India and Pakistan.



A game is stable if a finite player plays against a finite player or an infinite player plays against an infinite player. However, the problem arises when a finite player plays against an infinite player. This is one of the destabilizing reason behind the game between India and Pakistan over Kashmir.

The game theory has now been used to model this strategic situation between India and Pakistan over the Kashmir issue. To construct a game basically three things are required – set of players, set of strategies for each player and their respective payoffs.

### 5. India vs Pakistan, the long past – Iterated Prisoner’s Dilemma

Looking at the long run, these nations seem to be playing the game of Prisoner’s dilemma. Basically, both the countries have a set of strategy i.e. whether to attack the other country or not. If both the countries attack each other, both of them pay the heavy price of war. If one attacks while the other chooses to remain peaceful, then the aggressive country wins the war and implicates heavy losses on the losing side. The best scenario, however, would be when both countries choose peace i.e. not attack the other, in which case no one will suffer any losses. The following payoff matrix depicts the same story for the two players i.e. India and Pakistan.

**Table 1.** Payoff matrix for India vs. Pakistan’s prisoner’s dilemma

		PAKISTAN	
		Attack	Don’t attack
INDIA	Attack	-10,-10	5,-20
	Don’t attack	-20,5	0,0

The stable solution of a game can be found by finding its Nash equilibrium (NE). *“Nash equilibrium is a concept of game theory where the optimal outcome of a game is one where no player has an incentive to deviate from his chosen strategy after considering an opponent’s choice. Overall, an individual can receive no incremental benefit from changing*

*actions, assuming other players remain constant in their strategies (Wikipedia 2019)."* The Nash equilibrium of this game is *(Attack, Attack)*. This is also coherent with our observation of the Kashmir region, which has always been in a tensed situation.

Another interesting point to note is that in Prisoner's dilemma, the Nash equilibrium is not the pareto optimal solution. Pareto optimal solution is the one which is a win-win for both. At this solution point it is not possible for any player to be better off without making the other player worse off. Therefore, the nations can cooperate and choose not to attack each other to reach the pareto optimal solution i.e. *(Not attack, Not attack)*. Appropriate binding agreements (various accords and UN resolutions) can ensure peace in the region by making them stick to the mutual cooperation point. Indeed, such agreements had been signed by both the nations from time to time to ensure peace by keeping them at *(Not attack, Not attack)*. So it seems appropriate to study their long-run relationship through Iterated Prisoner's dilemma.

## **6. Finite vs Infinite Players for Kashmir – Pakistan vs India**

However, we know that if a player is playing a finite game then it will have intentions to betray in the subsequent round since it would provide that nation with a greater payoff (*here Kashmir*). Pakistan's frequent betrayal from mutual cooperation point (*No attack*) is evidence that it indeed is playing a finite game. Further, the finite objectives of Pakistan's game are best described below:

*"Pakistan aims to revise the status quo. It sees India as an existential threat to its survival and perceives itself to be India's genuine peer competitor. Pakistan continues to use force, as well as jihadi terrorism to achieve its strategic objectives of weakening India and securing political concessions"* (Tellis 2017).

Studies have shown that fear and greed are most often the motives behind defection (Coombs 1973) (John Orbell 1991) (C. A. al. 1990). The similar nature of Pakistan's objectives, therefore, is the reason behind its frequent defection.

On the other hand, India has a long term objective of becoming a superpower, thus its playing as an infinite player. India has rejected any compromise regarding Kashmir since it is an integral part of India, however being an infinite player India is content with the status quo. It is even content to have the current Line of Control, (which is inside the Indian territory) to be recognized as the international border (Tellis 2017) (Ganguly, The Kashmir question: Retrospect and prospect 2003).

Thus, it can be now understood from the game theory's framework, the underlying reason behind the instability regarding the Kashmir issue. Both the countries, however, have not realized that their internal model of operation in the game over Kashmir is different. Therefore, the problem is lack of common knowledge. Each time when the status quo is maintained post the deviations of Pakistan, India binds to the agreement in order to remain at the pareto optimal point and keep the game going. However, for Pakistan, a newer game starts with the short term objective to disturb India in a newer way. Therefore sooner or later it deviates from the mutual cooperation point.

## **7. Should India take strong action? – Folk theorem**

*“If a society is tolerant without limit, its ability to be tolerant is eventually seized or destroyed by the intolerant – Paradox of tolerance”*

So as an infinite player what can be done to sustain the game at the mutual cooperation point. Pakistan always deviates being a finite player, so what should India do to restrain Pakistan at the mutual cooperation point, a win-win for both. The answer lies with the folk theorem.

*“Folk theorem says that, in the infinitely repeated version of the game, provided players are sufficiently patient, there is a Nash equilibrium such that both players cooperate on the equilibrium path. (Wikipedia 2019)”*

Therefore by designing a proper punishment strategy, it is possible to sustain at the co-operating point i.e. (*Not Attack, Not Attack*).

To make Pakistan realize that this is an infinite game and it should refrain from deviating, India needs a strong punishment strategy. The extension of the network of the cross border insurgents into the cities of India where the acts of terror have claimed several innocent lives is dangerous and uncalled for. It should now be understood that asking Pakistan to bring terrorists to justice for what they had done is not raising any accusations against them, but is instead an extending hand for cooperation.

Till now India had not been following any punishment strategy, or one might say that it had followed a softer tit for tat strategy with forgiveness or tit for two tats i.e. if you attack twice then other player will attack back. In other words, India, by using this strategy has already given the benefit of doubt in certain activities to Pakistan. Despite Pakistan having trained the homegrown and Afghan terrorists to create trouble in India as a part of what they call "*a war of a thousand cuts*" (C.W. Dugger 2000), India never retaliated harshly or took strong action.

So, according to the payoff matrix of iterated prisoners dilemma being played between these nations Table 1, Pakistan's expected payoff today by deviating when India follows tit for two tat strategy is:

$$= 5 + 5\delta - 10\delta^2 + 0 \dots \infty$$

where  $\delta$  is the future discount factor. The payoff has been obtained on the basis of India's belief's to be playing an infinite game and expecting that Pakistan would respect the peace settlement post the punishment (tit for two tat). Therefore, the game starts from the mutual cooperation point of (*No attack, attack*), after which Pakistan deviates and gets the payoff of 5 in the 1<sup>st</sup> period and 2<sup>nd</sup> period (1 period into the future, thus discounted by  $\delta$ ). Then punishment strategy brings the game to the Nash equilibrium where Pakistan gets the payoff of -10 (3<sup>rd</sup> period so discounted by  $\delta^2$ ).

Thereafter they would sign the peace-settlement and go back to the point of co-operation with payoff 0.

Rather than following the soft punishment strategy of strategic restraint, India should adopt a grim trigger strategy (harsh and maximal punishment for a single defection). Under that scenario, Pakistan's expected payoff today by deviating would be:

$$= 5 - 10\delta - 10\delta^2 - 10\delta^3 - 10\delta^4 - \dots$$

$$= 5 - \frac{10\delta}{1 - \delta}$$

Under the chosen grim trigger strategy, India has decided that will punish Pakistan for long enough if it deviates. Therefore, Pakistan gets the payoff of 5 in the 1<sup>st</sup> period when it deviates, then the punishment strategy triggers and takes the game to the Nash equilibrium where Pakistan will get the payoff of -10 in each subsequent round (thus discounted by  $\delta$ ). However, unlike the case of soft punishment, the game now remains at Nash equilibrium rather than settling down.

Therefore, Pakistan would choose not to deviate if the expected payoff from non-deviating > payoff from deviating. Thus,

Under soft punishment strategy:

$$= 0 > 5 + 5\delta - 10\delta^2$$

which implies  $\delta > 1$  which is not possible since  $\delta \leq 1$

Under harsh punishment strategy:

$$= 0 > 5 - \frac{10\delta}{1 - \delta}$$

which implies  $\delta > \frac{1}{3}$ .

$\delta$  is the discounting factor which measures how much people care about the future period as compared to today. Higher the value of the discount factor implies that future periods are as valuable as today.

It can be clearly observed that under the soft punishment strategy Pakistan will always be better off by betraying and deviating away from the co-operation point, which is what has been happening from the past.

However, with austere measures, if Pakistan cares about its future enough (i.e. if for people future period values at least 33% of today or  $\delta > 0.33$ ) then it will not deviate and would be better-off by co-operating. **It does not suggest engaging in war, however, what it infers is to have a strict stance against the entities involved in preparation, implementation and operation of terrorist activities.**

Even UN Security Council's resolution of 2011 have authorized "*all necessary means to protect civilians and civilian populations, except forced occupation.*" Classical deterrence theorists prescribe coercive bargaining stances based on increasing war costs. Studies, however, have shown the incoherence of classical deterrence theory with observations. Perfect deterrence theory, on the other hand, is more consistent and applicable to wider range of strategic interactions. And this theory suggests that conditional cooperative policies based on reciprocity are more efficacious. Unconditional cooperative stances that are patently one-sided are invitations to exploitations (Zagare 2004). It seems like finally that India has realized this and has tilted from its usual follow-up of classical deterrence towards perfect deterrence suggestions.

## **8. Role of counter-terrorism policy channel, Role of "New India" –**

### **Bayesian Games**

The declaration of a player's (nation's) doctrine or foreign policy is a way to communicate with all the other players (nations) by revealing one's own strategies and preferences (and therefore payoffs). This shapes the beliefs of other nations and

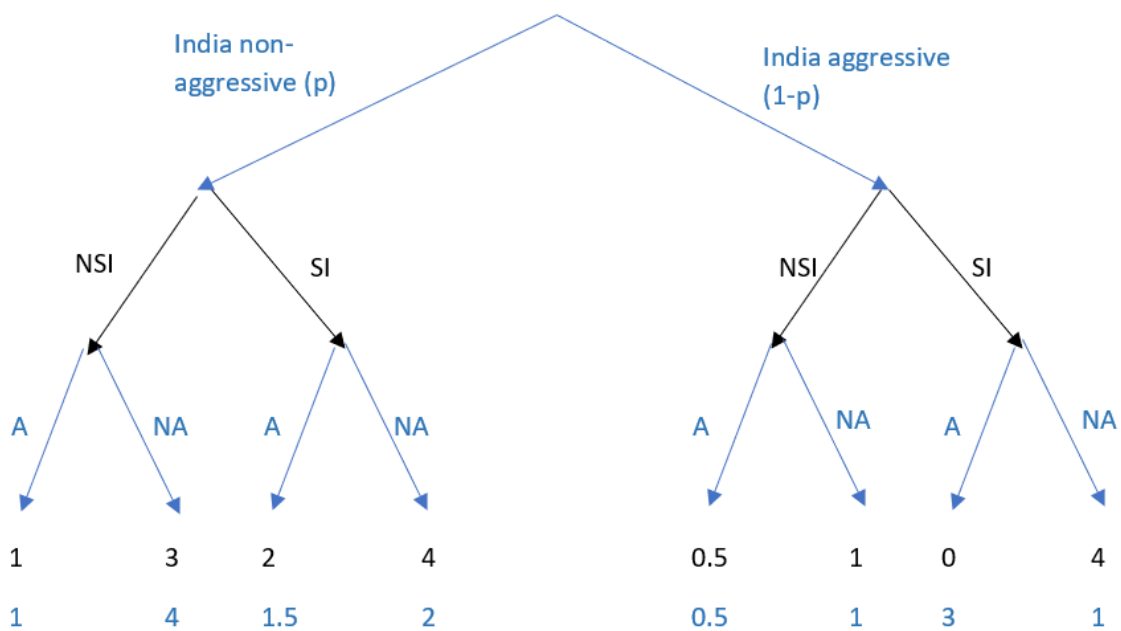
thus enables them to form their own set of strategies against other players. After all the players form their strategies against each other and reveal them (declaring their foreign policies), then the players (nations) may decide their point of operation. By cooperating with each other they may sustain at the pareto optimal point, thus win-win for both of the players (nations). Because players (nations) know each other's strategies and payoffs, so in the absence of formal binding agreements, both the players (nations) are rendered to mutually cooperate since the other player (nation) would then know the way to punish (be stringent) the opposite player. This reduces the risk of any one of them to deviate.

Therefore it can be now understood that a nation's ability to achieve its objective depends on the actions of other nations' states, and the outcomes depend upon the strategic interaction amongst these nations (Stephen J Majeski 1995). However, declaration of doctrine by the nation is a necessary but not a sufficient condition for smooth functioning. Along with declaration, adhering to the declared policy is equally important or otherwise, the declared policy would be considered a sham. Non-adherence to their own declared policy instigates feelings of distrust, creates suspicions about opponents' cooperation in the future and therefore brings back the component of uncertainty. And in the condition of uncertainty, each nation has to make choices independently without knowledge of the choice of other nations. Decision making in such an environment can be understood through Bayesian games. The Bayesian game between India-Pakistan related to the insurgency in Kashmir has been described in the following paragraph.

Suppose, Pakistan while deciding to support insurgents to infiltrate into Kashmir is uncertain about India's response. It assumes that India will remain amicable with probability  $p$ , with probability  $1-p$  it would turn aggressive and conduct counter-terrorist attacks. Based on its experiences, interactions with India and Indian counter-

terrorism policies Pakistan will have a belief, which it would translate appropriately into the numerical value for  $p$ .

Now, Pakistan has the following strategies - to support the insurgents (SI) or not support the insurgents (NSI). While India's strategies will be - harsh response or attack (A) or soft response or not attack (NA). The difference between harsh and soft response has been incorporated by the payoffs in the described game Figure 2.



**Figure 2.** Bayesian game: India vs Pakistan

Finding an optimal strategy for India is straightforward to derive. If India is non-aggressive, then it will choose a soft response (NA) irrespective of whether Pakistan sends or does not send insurgents. However, if India is aggressive then it will respond softly (NA) if Pakistan does not send insurgents but will give a brutal response if Pakistan sends insurgents. Pakistan's decision to send insurgents given this behavior of India then depends on its expected payoff. Remember we assume that both nations act rationally. Therefore,

The expected payoff of Pakistan for NSI:



$$= 3p + (1 - p)$$

$$= 2p + 1$$

The expected payoff of Pakistan for SI:

$$= 4p + 0(1 - p) \rightarrow 4p$$

For Pakistan to not send insurgents, expected payoff from NSI > expected payoff from SI, Or

$$2p + 1 > 4p \rightarrow p < 0.5$$

It has been argued that the counter-terrorism measures of India lack appropriate response. *"There is no doctrine and most responses are knee-jerk (Asthana 2010)."* Some have even said that India's responses have been ludicrously shy and episodic (Asthana 2010). *"Avoiding a hard line approach to counterterrorism responses, India has never used artillery or other heavy weapons against the terrorists that would lead to disproportionate use of force and collateral damage"* (Kiran 2008). Even the UN 2007 review faults India for being soft in counterterrorism policy. Due to this Pakistan's numerically assigned value to  $p$  is much higher ( $p > 0.5$ ).

Note that the numerical value of  $p$  depends on Pakistan's expectations of India's response. The recent declarations of *"New India"* aims at harsh counter-terrorism response. But as discussed earlier, a mere declaration of policy might not have enough impact on the beliefs of other players (nations). They might only consider it as a rhetoric. Therefore, a harsh action against counter-terrorism was very much required. This would then make other players (nations) alter the numerical value to  $p$ , which would subsequently make insurgents and their sponsor's think twice before acting. In the game described, when a player's (nations) expectations about India's hard response for supporting illicit activities in India is high enough to make a numerical value of  $p < 0.5$ , then the player will not act against India. A befitting reply

post the terrorist attack in Pulwama might aid India in achieving this objective and be beneficial to India and the region in the long run. The policies of austere operations and no compromises against terrorism by nations like the United States, United Kingdom and Israel are based on the same rationale.

## 9. Solution can be found with talks? - Optional Prisoner's Dilemma

India's statement of "*no more talks*" suggests that the negotiations between these nations can be modelled by the Optional Prisoner's Dilemma game (OPD). The players have the following strategy choices – talk and cooperate by executing the terms of talk, or talk and show cooperation but do not act on the decided terms. Alongside there exists another option to abstain from any talks and negotiations, which thereby makes it an extension of prisoner's dilemma. Every negotiation starts from this form of the game. Its payoff matrix has been shown below Table 2.

**Table 2.** Payoff matrix for India vs. Pakistan optional prisoner's dilemma. Following condition must hold for payoffs:  $T > R > L > P > S$

		PAKISTAN		
		Talk but no-cooperate	Talk and cooperate	No talks
INDIA	Talk but no-cooperate	P,P	T,S	L,L
	Talk and cooperate	S,T	R,R	L,L
	No talks	L,L	L,L	L,L

India's counter-terrorism approach had always been political, trying to find a solution through talks and had never been of military nature until 2019. Game theory gives us an insight into what caused India to change its strategy this time.

As already discussed, talks, negotiations and mutual cooperation is a win-win situation for both the players, but India exercised restraint from any talks this time. While playing the Iterated Prisoners Dilemma, communication would be beneficial

only if it allows coordination and development of mutual trust with subsequent rounds. If the players (nations) had cooperated with one another in past, then communication reduces the risk of any one of them defecting. Thus the equilibrium can be sustained at the mutual cooperation point. However, promise making can be used to deceive the other player to cooperate so that they can take its advantage. Such activities inject more fear and distrust in the other players. Studies have shown that fear is a major reason for defection but at the same time greed is small but a persistent factor. (Majeski, Conflict and cooperation in international relations 1995).

Similar nature of “*talks and cooperation*” from Pakistan has forced India to change its strategy and not engage in any further negotiations for the time being. Pakistan’s behavior in the past has been of negligence towards any critical action against terrorism and the so-called “*cooperation*” after table talks over decades have made India believe that Pakistan would continue to be reluctant. India has realized that they have been at the (*talk and cooperate, talk but no-cooperate*) point and have been getting lower the payoff of  $S \ll R$ . Therefore, India has decided to abstain from talks and receive a payoff of  $L$ , far better than  $S$ .

However, Pakistan’s stance of so-called “*cooperation*” and “*action*” is not surprising. For instance, as (Popovic 2015) discusses, post 2001 attacks on the Indian Parliament, the United States had put pressure on Pakistan to take serious action against JeM. Consequently, Pakistan put Azhar (head of JeM) in the house arrest but refused to hand them over to India. Further on January 2002, JeM along with LeT and three other organizations were banned. In the subsequent speech, President of Pakistan Musharraf said, “*No party in future will be allowed to be identified with words like Jaish, Lashkar or Sipah*” (Popovic 2015). Further, he promised that Pakistani territory shall not be used for cross border terrorism. Looks like Pakistan did “*cooperate*” and Mr Musharraf adhered to his words. So all the banned groups were suggested to operate under new names. Lashkar-e-Taiba (LeT) became Pashban-e-Ahl-e-Hadith and Jaish-e-Mohammad (JeM) became Khuddam-ul-Islam (Popovic 2015). Also since

the ban was not applied to Pakistan occupied Kashmir, the authorities (ISI) helped some groups to shift their infrastructures there (Z. Hussain 2007). Within months the financial and intelligence support to JeM was reinitiated and Azhar was released (Popovic 2015). JeM has been continually active in Pakistan for the last two decades. India says to have provided all the information regarding training camps in Pakistan and POK (Pakistan occupied Kashmir) to Pakistan from time to time. Pakistan, however, has denied their existence.

So, no matter how genuine the cooperation offer from the current Prime Minister of Pakistan be, Pakistan's nature to hunt with the hound and run with the hare have raised suspicions that Pakistan will remain at *talk and cooperate* point in the game.

If another player (nation) had been defecting mainly because of fear, then talks would lead to a reduction in defection and an increase in cooperation. However, (Majeski, Conflict and cooperation in international relations 1995) have concluded that if defection is due to greed then talks "*simply might not have a positive effect.*" Post 1971 war, in Shimla agreement India agreed and released 90,000 prisoners of war and gave back more than 13,000 km<sup>2</sup> of land that Indian army had seized in Pakistan as good gesture looking at the fragile stability in Pakistan (Lieven 2012) (Olsen 2011). But Pakistan attacked back in 1999. Thus, the tendency to defect and continue the sub-conventional war by Pakistan after decades of negotiation attempts shows its greed for Kashmir.

## **10. Terrorism and talks cannot go hand in hand - Security Dilemma**

*"The Security Dilemma is the notion that in a context of uncertainty and bounded rationality perceived external threats (real or imagined) generate feelings of insecurity in those states that believe themselves to be the targets of such threats, thereby leading those states to adopt measures to increase their power and capability to counteract those threats (alliance creation, arms build-ups, and so on)" (John Baylis 2013)*

Pakistan is one of the most prolific sponsors of terror (Riedel 2008). The Pakistani army and its intelligence agency, the Inter Service Intelligence Directorate (ISI) have created several terrorist organizations which flourish in Pakistan (Riedel 2008). *“Pakistan’s army believes these surrogates are critical to its sixty-year old campaign against India and to securing Pakistan’s influence in Afghanistan (Riedel 2008).”* Therefore in the world under anarchy (or weak international institutions controlled by few members according to their own agenda), India has to be ready to act on a go-it-alone basis. As already mentioned even when India contends with the status quo, its neighbour cannot be trusted. Therefore for self-defence, over the time India has enhanced its military capabilities. This, however, creates more fear amongst Pakistan’s army that India might plan some action in the future and thus they in turn increase their military power. In this way these countries have fallen into the spiral trap. Functionalist theorists believe that communication through proper signalling is necessary in order to avoid the war. Continued insurgency and terrorist attacks clear’s that political talks have failed as their role of signalling. India’s operations in 2016 surgical strikes and 2019 strikes have only targeted terror camps and have not to lead to any civilian casualties. Therefore, with such military use in counter-terrorist operations, India’s only intention is to send its intentions loud and clear.

*“The international community’s routine call for continuous India-Pakistan dialogue is not only misguided but also counterproductive. This entreaty, which often follows major Pakistani-supported terrorist attacks in India, fails to recognize that the security competition between the two nations is not actually driven by discrete, negotiable differences. Rather, the discord is rooted in long-standing ideological, territorial, and power-political antagonisms that are fuelled by Pakistan’s irredentism, its army’s desire to subvert India’s ascendancy as a great power and exact revenge for past Indian military victories, and its aspirations to be treated on par with India despite their huge differences in capabilities, achievements, and prospects (Tellis 2017).”*

The location of Pakistan is of strategic importance to India. Spreading across Northwestern mountain ranges of India from where all the invasions have taken place on Indian sub-continent in the history, Pakistan acts as a shield. It is therefore in the best interest of India to support Pakistan to be strong and stable (Yamin 2012). However, it would not be possible unless Pakistan acts against its homegrown terrorism. It is for this reason that India has always had the precondition of discussing terrorism before starting any other dialogue, as was mentioned by Prime Minister of Pakistan in the speech on 19th February 2019. The long term solution lies in the diplomacy and effective talks amongst these nations, but the path to these diplomatic solutions pass through the security issues which needs to be resolved first. Analysis of international relations has shown that if security is achieved, cooperation follows automatically (Clackson 2011).

## **11.India-Pakistan-China – modified Dollar Auction Game**

America needed Pakistan during the war in Afghanistan and took full advantage of them. Pakistan was mentioned as *“America’s most allied ally in Asia (Yamin 2012).”* But post 9/11 attacks and recalling of troops from Afghanistan, America changed its relationship status with Pakistan and has put pressure to act against terrorism uprising in its territory. Therefore, *“The public and private media in Pakistan present the military logic. Most private media outlets go far as to find a joint US-Indian-Israeli hand in every terrorist attack that takes place inside Pakistan (Siddiq 2011).”* As America tilted away, China slipped in. China is an emerging power and views India as a strong challenger. Thus it uses Pakistan *“to counter Indian power in the region while Islamabad has gained access to civilian and military resources to balance Indian might in the sub-continent (Pant 2012).”* Through the Dollar Auction Game (Shubik 1971), this strategy of China can be understood.

In this game, an auctioneer auctions off a 1\$ bill. For simplicity, it is assumed that there are only two bidders. Both the bidders bid in multiples of say 5 cents and the

highest bidder will win the game but both the bidders will have to pay their bids. The winner earns 1\$, while the second bidder would lose its amount. Suppose bidder 1 starts the game by bidding 5 cents, bidder 2 then raises the bid to 10 cents. If A would raise the bid to 15 cents and wins then it would earn a profit of 85 cents, thus it will raise the bid. This continues. (Shubik 1971) discusses two critical points of the game. First is when one of the bidders bids 50 cents. If the other bidder bids anything more than this, the auctioneer is profited surely. The second point comes when one of the bidder bids 1\$. The other bidder is motivated to bid higher in order to reduce its loss of investment. Thus the bidders fall into the trap of bidding, implying the paradox, of 1\$ being sold for considerably more than its value. Not only this, a bidder may use commitment strategy to get profited by claiming to bid the maximum amount (i.e. 1\$) if anyone else bids any amount higher than its bid. It, therefore, may be profited with 95 cents, conditional that opponent believes its bidder's deterrence.

Before applying this game to India-Pakistan-China scenario, it requires little modification. Under this scenario, China clearly is the auctioneer. Although the auctioneer in general is the owner of the object being auctioned, in this situation China is considered an auctioneer despite not being the owner of Kashmir, since it holds more power over India and Pakistan and is a key player in deciding the fate of the region. For instance, post Pulwama attacks, three members of United Nations Security Council (France, United Kingdom and United States) moved a proposal to sanction JeM leader Masood Azhar as a global terrorist. But the veto-wielding permanent member China blocked this move again in 2019, as it also blocked previous attempts in 2009, 2016 and 2017. The auction is for Kashmir. The bidders in this game are India and Pakistan. The bid value is the actions of bidders i.e. insurgency in Kashmir for Pakistan and counter-terrorism operations for India. The main modification in this game is that here the auctioneer supports one bidder (i.e. Pakistan) to raise its bid for it to win the auction. The evidences mentioned in the following paragraph will clarify it further.

China has stated it would be Pakistan's "*all-weather strategic partner* (Pant 2012)." China is also the largest defence supplier to Pakistan which includes advanced combat aircraft. It is helping Pakistan to build submarines and launch satellites. Pakistan's nuclear program is the extension of the Chinese one. China has denied supporting any nation to develop nuclear weapons (Pant 2012). But Abdul Qadeer Khan, father of Pakistan's nuclear program has acknowledged China's support. In February 2004 Abdul Qadeer Khan admitted selling nuclear technology to Libya, North Korea and Iran (Z. Hussain 2007).

It is known that post first critical point auctioneers profit is ensured. By supporting one bidder to raise its bid, knowing that the second bidder (India) is obdurate to give up Kashmir (the auction), China is ensuring its profit. India and Pakistan need to realize that with raising escalations both of these nations would not gain anything, but China (the auctioneer) on the other hand will definitely be the winner. Further, in the light of the recent heated exchanges between the Prime Ministers of India and Pakistan, Pakistan's Prime Minister made the following statement "*With the weapons you have and the weapons we have, can we afford miscalculation? Shouldn't we think that if this escalates, what will it lead to?*" It seems that Pakistan is using the commitment strategy to ensure its profitability. The question is will India believe the deterrence of its opponent?

In this bidding game, India loses the most by diverting its time and resources, which otherwise could be utilized for prosperity. But this is what China aims at, "*to scuttle Indian ambitions* (Pant 2012)." Pakistan had been exploited and disposed of by the United States, but the obtuse is failing again to comprehend China intentions.

## **12. India vs Pakistan, escalating tensions – Game of Chicken**

The escalation of the issue can be understood through the game of Chicken. This game is played after the nations attain (*war,war*) condition through the mutual disinterest game (discussed later). This game is played in the near vicinity of the war



as opposed to mutual disinterest game, which captures the relationship of nations in the long term.

Both the nations have two strategies, that is, to act and mobilize into the region or not to act and refrain from mobilizing. The payoff matrix is shown below.

**Table 3.** Payoff matrix for India vs. Pakistan Chicken game. Condition:  $a > b > c > 0$

		PAKISTAN	
		Mobilize	Refrain
INDIA	Mobilize	0,0	a,c
	Refrain	c,a	b,b

The following game has 3 Nash equilibrium, 2 in pure strategies and 1 in mixed strategy. The Nash equilibrium in pure strategy is *(Mobilize, Refrain)* and *(Refrain, Mobilize)* i.e. if one country mobilizes then the other should refrain. This would be the optimal strategy. However, it can be realized that the pure strategy equilibrium isn't realistic. In reality, the game is played in the mixed strategy, which is reported as "*an element of surprise*". A mixed strategy is a very powerful tool and is the randomization over pure strategies. The mixed equilibrium depicts certain chance of mobilization by each country, therefore realistically a positive probability of war. Therefore, each nation remains insecure about the opponent's movement. Each nation then marks some probability  $p$  to an event that another nation will mobilize. The Nash equilibrium probability for mobilization based on indifference between their two pure strategies yields:

$$p = \frac{a - b}{a - b + c}$$

Deception is as old as the art of war. The randomized strategy suggests that countries should keep conjecturing about the other's move on aggression while also consider attack as a viable option. The same is also be realized from the statements of

Prime Minister of both the nations. Although maintaining this delicate balance is difficult and dangerous. It can be done only if the threat of attack is credible enough and at the same time be costly. The use of mixed strategies over its pure strategies in a repetitive game gives a bigger payoff than by using a single strategy (Z. Hussain 2007).

### **13.Role of Intelligence Services – Randomization, Minimax and**

#### **Maximin**

*“Simply put, intelligence is knowledge and foreknowledge of the world that surrounds us.” – Intelligence: The Acme of Skill (CIA booklet)*

The role of clandestine services in modern times is unprecedented. These unsung heroes are the backbone of any nations security. As already discussed, uncertainty in a game provides an opportunity for a player to bluff about its intentions and obtain higher payoff. At the same time, it increases the difficulty for the other players (nations) in designing their possible actions. Game theory looks at the effect of uncertainty in a game and the possible role of intelligence in two ways.

Firstly, a nation may use a chance device to create randomization. In other words, it acknowledges pure random shocks for instance death of a key figure or a natural disaster et-cetra. These shocks might affect the decisions of the opponent by affecting its payoffs. Under such circumstances, gathered intelligence of its possible pure strategies might help the other nation in anticipating the responses of its rival.

Secondly, a nation might deliberately introduce uncertainty in the environment in order to get benefitted. As mentioned, using mixed strategy is one such way. Mixed strategy equilibrium is the equilibrium of beliefs. The leaders of the nation using *“randomization strategy”* would know their actual plan of action, but the uncertainty is deliberately introduced to create a belief of randomization in the opponent’s head. The actions of the opponent therefore depends on its beliefs about the other players

intentions. It can be studied through Bayesian games as already discussed. Intelligence under such scenarios aid in better estimation of the assigned probabilities, that is,  $p$ . Thus, intelligence would assist the player (nation) to design superior actions.

The maximin value of a player is the highest value that the player can be sure to get without knowing the actions of the other players; equivalently, it is the lowest value the other players can force the player to receive when they know the player's action. (Yang 2018). The minimax value of a player is the smallest value that the other players can force the player to receive, without knowing the player's actions; equivalently, it is the largest value the player can be sure to get when they know the actions of the other players. A hypothetical payoff matrix to understand this concept has been shown in Table 4. So, if the agents are rational then theoretically the gain from the intelligence is the difference between the maximin and the minmax.

**Table 4.** Payoff matrix for understanding the theoretical investment in intelligence services

		PAKISTAN		
		Attack	Don't attack	Maximin
INDIA	Attack	-10	-15	-15
	Don't attack	-12	-5	-12*
	Minimax	-10**	-5	

The intelligence forms the very base in forming a nations tactics. The instructions laid down by the United States Joint Action of the Armed Forces for considering a situation supports the same. According to it, the first part is a collection of data from intelligence about different aspects. Next is to make note all the possible courses of action within the enemy's capabilities. Better the estimation of the enemies courses, the greater the chance that the commander can benefit. After this note, all the form of actions is noted which are practical to the commander. All the strategies are

then written in a matrix form, with the enemies strategies on the column and the defender's strategies on the rows. Thus the strength of intelligence decides the number of columns in the constructed payoff matrix. Before conducting the analysis and making a decision, the matrix needs to be filled with payoffs. The lack of scale of reference from where the payoffs could be chosen therefore becomes an issue. However, a leader may use its experience against the rival to decide the result of possible interactions between them, the qualitative proxy for payoffs Table 5. *"Such knowledge may reward the Commander with outstanding success (Beebee 1957)."*

**Table 5.** Simplified payoff matrix used to form military strategies when the value of scale is absent (Improving the management of an air campaign with virtual reality 1995)

		RED			
		1	2	3	4
BLUE	1	Failure	Excellent	Excellent	Superior
	2	Good	Fair	Fair	Fair
	3	Excellent	Defeat	Superior	Superior
	4	Good	Fair	Defeat	Defeat

If the opponent is stupid or makes a mistake then the commander should use the intelligence, deviate from the strategy to exploit and get a maximum payoff. Von Neumann says, *"All this may be summed up by saying that while our good strategies are perfect from a defensive point of view, they will (in general) not get the maximum out of the opponents (possible) mistakes."*

## 14. Games by Pakistan:

### 14.1. Bullying (Extension of Prisoner's Dilemma)

Bullying is an extension of the Prisoner's dilemma, but unlike it, bullying consists of several players. Thus it can be applied at an international level by including other nations. Bullying operates in the same way as the Iterated Prisoners Dilemma

(with other players being the observers). The operational difference is that when anyone player defects and wins the round, it does not let this information leak out to other players. In the next round, the betrayed party, according to the punishment strategy will rationally retaliate. However, since the other players will not know that this player is punishing because it was betrayed, they see the action of this player as the first defection. Thus everyone will punish the previously betrayed player for retaliating, considering it an "attack". This effectively prevents the betrayed player from retaliating and makes it vulnerable to the next defection. If the truth never leaks, the bully can keep succeeding forever (Bliziński 2007).

This is what Pakistan has always been doing. Through mutual cooperation, Pakistan and India can maintain the status quo and peace. However, Pakistan defects by using sub-conventional war and sending insurgents in India. By supporting these insurgents to successfully conduct terrorist activities in India, Pakistan tries to win the round. But since Pakistan is playing the game of bully, it does not accept the blame of harbouring terrorists and sending them across the border. It therefore always denies its involvement in any terror activities in India. Pakistan does not let this information leak out to the other players. So when India tires being the betrayed party, retaliates, Pakistan starts blaming India of being the defective party. The following statements from Pakistan's PM and foreign minister clearly shows the same.

Pakistan's Prime Minister on 19th February 2019 in his speech had said, "*It is in our interest that we don't want anyone from outside to spread terrorism in our country or any of our men spreading terrorism in another country. We want stability....*" In an attempt to further justify Pakistan's innocence, the statement said that the action *against* Pakistan is a political agenda due to upcoming elections. It is known that some politician's campaigns do include tactics to imposter before elections, however, it is extremely improbable that anyone's campaign would be at the stake of national security.

Pakistan's foreign minister on 22<sup>nd</sup> February 2019 letter to the UNSC stating, "It is with a sense of urgency that I draw your attention to the deteriorating security situation in our region resulting from the Indian belligerence and threats of use of force against Pakistan."

#### 14.2. Mutual distrust

Prime Minister of Pakistan on two separate occasions on 19th February 2019 and 27th February 2019 announced that Pakistan wants peace in the region and are ready for any form of dialogue. With more than 50 years of dialogue between India and Pakistan filled with unfulfilled promises, the existing game is that of mutual distrust.

Each player has the choice between going to the war or keeping the peace. The payoff matrix is shown below Table 6.

**Table 6.** Payoff matrix for India vs. Pakistan mutual distrust game

		PAKISTAN	
		War	Peace
INDIA	War	2,2	3,0
	Peace	0,3	4,4

The game has two Nash equilibrium, that is, (*war, war*) and (*peace, peace*). Schelling's analysis says that if the players are rational, conduct their plans perfectly and have no uncertainty about the opponent's payoff then peace would be the most credible result. Schelling further says that a small quantity of nervousness about the opponent's intentions would be infectious sufficiently to crush the peaceful equilibrium.

It seems that Pakistan with its announcements of "*peace and cooperation*" and "*usage military only for retaliatory purposes*" has attempted to ease the nervousness by declaring their intentions. However, over the decades Pakistan's actions have contradicted their offer of peace and cooperation.

The lack of trust and belief of the other being phoney has brought them to this point of attack dilemma: *“If I go downstairs to investigate a noise at night, with a gun in my hand, and find myself face to face with a burglar who has a gun in his hand, there is a danger of an outcome that neither of us desires. Even if he prefers just to leave quietly, and I wish him to, there is danger that he may think I want to shoot, and shoot first. Worse, there is danger that he may think that I think he wants to shoot”*

### 14.3 Brinkmanship (with respect to Chicken)

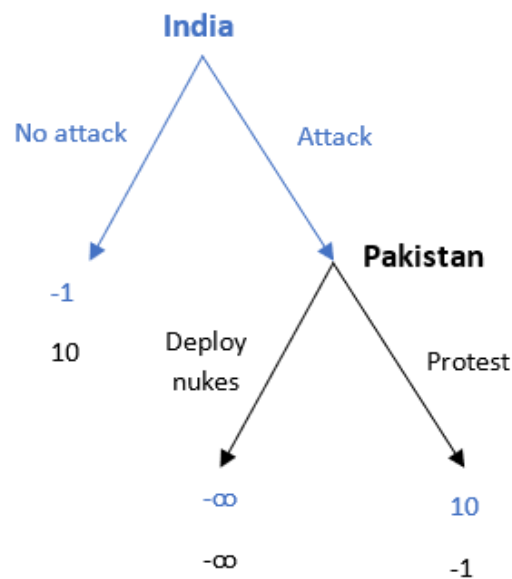
*“Brinkmanship is the practice of trying to achieve an advantageous outcome by pushing dangerous events to the brink of active conflict (Wikipedia 2018).”*

When the tensions between India and Pakistan starts to deteriorate, the game of Chicken kicks in between these two nations. Each nation tries to push the other to back off. India threatens to march its substantial military forces, while Pakistan threatens with weapons of mass destruction.

The statements of Prime Minister of Pakistan on 27<sup>th</sup> February depicts the same where Mr Khan said that with the weapons both these nations possess, can both these nations afford miscalculations of war. Thus clearly, Pakistan has adopted the strategy of Brinkmanship amidst in this case.

This game can be modelled as an extensive form game with the majorant being India and its structure (with hypothetical payoffs) have been shown in Figure 5. India has been kept at the majorant position catering to Pakistan claim of not being the *“first attacker”*. Unlike simultaneous games, extensive form game takes time and sequencing of actions into account. The set of strategies, broadly speaking, under the purview of these nations has been derived by studying their past interactions. So, India being the 1<sup>st</sup> player (majorant) will have two strategies – harsh operations (attack) or no operation (no attack). After India conducts its actions, the game goes in the court of Pakistan. It will also have two strategies – retaliate by deploying nukes or light

retaliation and protest against India's aggression. The game has been shown below (Figure 3).

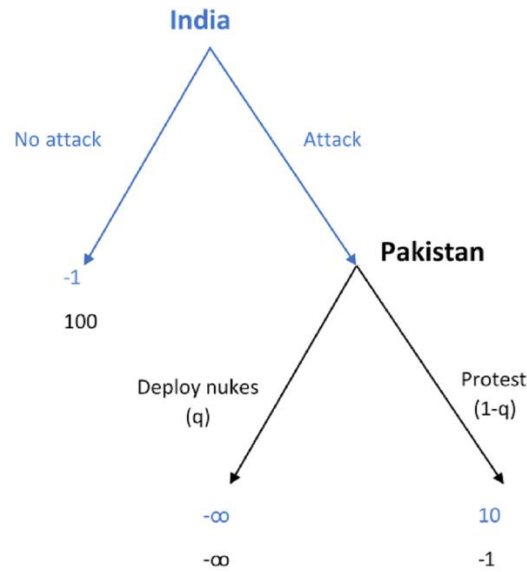


**Figure 3.** Extensive form game between India and Pakistan where Pakistan has adopted the Brinkmanship strategy

The game theory suggests that this game has two Nash equilibria, that is, *(attack, protest)* and *(no attack, deploy nukes)*. However, the game only has one subgame perfect equilibrium, that is, *(attack, protest)*. Therefore, the analysis shows Pakistan's game of brinkmanship, based on non-credible threats. Additionally, it suggests that India should then fearlessly march its military. This unrealistic result prescribed due to exclusion of risk from the analysis (due to the assumption of rationality).

The risk is amongst the major constraints while examining the national security problems (Mesquita 2011). Thus, in order to include the component of risk, the normal extensive form game was modified. Now, in the modified game, there's a possibility  $q$  (say incredibly small  $O(10^{-4})$  or 0.01%) that Pakistan will act irrationally and deploy nukes. The game has been shown in Figure 4.





**Figure 4.** Modified extensive form game between India and Pakistan to incorporate risk, where Pakistan has adopted the Brinkmanship strategy

Now, the action of the first player, India, depends on its expected payoffs.

Expected payoff of India if India attacks : 100

Expected payoff of India when it does not attack :  $q(-\infty) + (1 - q)(10)$

Thus owing to the incredibly large cost associated with nuclear war, no matter how small the irrationality of Pakistan be, the subgame perfect equilibrium of the standard brinkmanship is an unrealistic policy. At the same, it does not infer the absence of any conflicts between the nations. What it suggests is mere improbability of any major large scale war between them. The military strength plays no role in the brinkmanship. (Powell 2015) integrated military balance into the nuclear deterrence theory by including a trade-off between power and risk. Their model formalized the stability-instability paradox which is:

*“When two countries each have nuclear weapons, the probability of a direct war between them greatly decreases, but the probability of minor or indirect conflicts between them increases”* – Stability-Instability paradox. (Wikipedia 2019)

#### 14.4 Deterrence (with respect to Iterated Prisoner's Dilemma)

The concept of deterrence can be defined as the use of threats by one party to convince another party to refrain from initiating some course of action. Brinkmanship is a type of nuclear deterrence. On applying Schelling's analysis to India-Pakistan scenario, the optimal commitment strategy for Pakistan, under the assumption that India would prefer to attack over the negotiations, would be to choose a probability of mobilization that is less than one. Schelling analysis also suggests that in the face of an enemy's military escalation, the opponent should threaten than mobilizing. In Schelling's words, make "*threats that leave some things to chance*", because a modest probability of war can suffice to hold back enemy's mobilization. By acquiring modern weapon systems, nuclear warheads, Pakistan is trying to enhance its credibility of deterrence. However, this is only entrapping both the nations deeper into the spirals of the security dilemma.

*"I analyzed every India-Pakistan militarized crisis since 1986 and that the asymmetric escalation posture has been uniquely "deterrence optimal for Pakistan, directly deterring Indian conventional military power on multiple occasions. But the adoption of this particular posture—not just the acquisition of nuclear weapons—has enabled Pakistan to more aggressively pursue longstanding, limited revisionist objectives against India (the strategy of bleeding India by a "thousand cuts"), with little fear of significant retaliation."* (Narang 2010)

On 19<sup>th</sup> February 2019, Pakistan's Prime Minister's statement had the following line: "*We (Pakistan) would not be the first country to attack but will retaliate with full force if attacked.*" The first half of this statement tries to establish the game of mutual distrust, where Pakistan portrays to be a peace messenger and offers to continue at that equilibria if India remains at it. At the face, Pakistan attempts to look like a white swan to India, while continuing to stab at its back through the covert proxy war. The latter part of the statement "*will retaliate with full force*", however, corresponds to its credible deterrence strategy. As per the classical theory of deterrence, credible threats should

avoid escalations, however, it doesn't seem to be the case. This is explained by the perfect deterrence theory which says, "*Credible threats are neither necessary nor sufficient for deterrence to prevail, and under certain conditions, the presence of a credible threat may actually undermine deterrence* (Zagare 2004)."

## **15 Dynamical Relationship – Iterated Prisoner's dilemma to Mutual distrust to Chicken**

The games between India-Pakistan slide between Iterated Prisoner's dilemma, Mutual distrust and Chicken. The dynamics of the relationship between these nations leads to different games being played at different times. In general, historically, these nations mostly play the Iterated Prisoner's dilemma. They are bound at the mutual cooperation point through various agreements. However, Pakistan has defected repeatedly, earlier dominantly through conventional war strategy and later through sub-conventional strategy. At the same time, politically both the nations show that they are playing the game of mutual distrust, especially Pakistan. In this game with *(peace, peace)* being one of the Nash equilibria, the Pakistan tries to show that if the opponent hails for peace, then it will do the same. Thus in the public eye, the politicians of Pakistan try to justify the defection as the attainment of the other Nash equilibria due to the opponent's action. So, post-defection when a relationship comes under stress and things start to escalate then the game shifts to that of Chicken.

## **16 Games by India**

### *16.1 Pre-emption game*

Pre-emption game is a dynamic timing game in which each player decides when to take an action and a player's payoff is higher when (1) acting before others and (2) waiting longer before acting. The player needs to act neither too late nor too early; time is of utmost importance in such a game. The Prime Minister of India announced

on 15<sup>th</sup> February 2019 that terrorists will have to play a heavy price for what they have done.

The initiation of armed conflict is not permitted by the UN charter. But at the same time due to the changing face of terrorism, the UN charter allows pre-emptive force in self-defence. This is exactly what India did to defend against the sub-conventional war of Pakistan. JeM had attacked the Central Reserve Police Force's convoy on 14th February which resulted in 40 deaths. Thus, on 26th February 2019, the Indian Airforce Mirage aircrafts crossed the Line of Control for the first time for a counter-terrorism operation. Thus the pre-emption game started. Its aim was to strike a JeM camp located in Pakistan Occupied Kashmir (POK). Although India claims to have hit the target, but Pakistan has taken a contradictory stance on the effectiveness of the intended strikes.

## 16.2 *War of attrition*

War of attrition is a timing game in which player's payoff is higher when (1) other players act earlier and (2) actions are taken earlier. In the long run, India is playing war of attrition for Kashmir. This also explains the contentment of India with the status quo (Gupta 2018). The game is played not to win, but to wait for the other to surrender. In this way, it also supports India's nature of an infinite player.

## 16.3 *Deterrence - Classical and Perfect*

Classical theorists proffer usage the following tactics to concede the opponent: Coercion (winning conflicts), constraining (limiting alternative) and signalling (shaping normality) (Felix Berenskoetter 2007). Perfect deterrence theory provides an alternative approach for the realistic understanding of deterrence. Post Pulwama, India used a mix of classical and perfect theories to establish deterrence.

In contract theory, signalling is the way to communicate the intention of a player credibly to the other player. Rational deterrence theorists have suggested that signal

should be costly enough in order to be conveyed credibly. This is exactly what the Prime Minister of India did on 17<sup>th</sup> February 2019 by saying, *“India will give a befitting reply to this incident. The security forces have been given full freedom to decide. I want to tell the terror groups and their sponsors that they have committed a grave mistake for which they will now have to pay a very heavy price.”*

After the *“tying hand”* signal, rapidly and attentively, the government of India opened its foreign policy toolbox. (Giumelli 2011) classifies these policies into 4 categories – Propaganda, Diplomacy, Economic statecraft and Military statecraft. The selection of policy instrument depends on the objective that needs to be accomplished. (Giumelli 2011) posits the objective of survival, that is, any threat to national security is the most serious one. The same was faced by India post 14<sup>th</sup> February 2019 attacks.

Classical theory suggests that as the cost of conflict increases, so does the chances of deterrence’s success. Further, coercive actions have high feasibility and high impact (Giumelli 2011). Post Pulwama incident, India use of diplomacy and international isolation against Pakistan shows India’s utilization of coercion tactics.

On 16<sup>th</sup> February India revoked the most favourable nation status from Pakistan and raised import duties to 200%, the economic channel. On 26<sup>th</sup> February 2019 Indian Airforce conducted air strikes aiming the terrorist camps in Pakistan Occupied Kashmir, the military channel. These correspond to India’s constraint tactics.

Post these airstrikes, India’s threat of possible counter-terrorism operations in case of insurgencies have become more credible as well as capable. Subsequently, it would have reduced the minimum deterrence level required to deter the opponent as per the perfect deterrence theory.

## **17 Kashmir: why an infinite game ? – Altruistic punishment vs Self-control (Ultimatum games)**

In the Ultimatum game one player, the proposer is endowed with some money. The proposer is then asked to split it with the other player, the responder. Once the proposer communicates the decision, the responder has the option to accept or reject the proposed offer. If the responder accepts, the money is split as per the proposal; if the responder rejects, both players receive nothing. So, both players know in advance the consequences of the responder accepting or rejecting the offer.

Fight over Kashmir between these two nations can be understood through this same game. However, the comment on which nation is the proposer and which one is the responder shall not be made since it has its own convoluted history. But what is clear is whomsoever the responder be, it has rejected every proposal.

The Ultimatum game described here has three Nash equilibria:

1. The proposer makes a fair offer and the responder would only accept a fair offer
2. The proposer makes an unfair offer and the responder would only accept an unfair offer
3. The proposer makes an unfair offer and the responder would accept any offer

The game can be viewed as having two subgames i.e. the proposer making a fair split and the proposer making an unfair split. In both the cases, it is favourable for the responder to accept the split. Therefore, the subgame perfect equilibria are the 3<sup>rd</sup> Nash equilibria. However, empirically it has been found that people generally offer nearly fair splits (50:50) and offers less than 30% are often rejected (J. P. al. 2004) (H. O. al. 2004).

The failure of negotiations between India and Pakistan over the Kashmir dispute is similar to the failure of a split in the Ultimatum game as discussed above. This suggests that at least one amongst the proposer or the responder is perhaps motivated

by excessive greed. Either the proposer is reluctant to offer a fair split (desires to play impunity game instead of dictator game) or the responder has been in denial of accepting any split that doesn't give it the majority or the entire region. This might explain the un-success of the negotiations over the past several decades. Behavioral economics and psychological studies which discuss the cause behind the failure of Ultimatum splits might provide a more formalized explanation. These studies suggest that the responder rejects mainly due to two reasons:

1. Altruistic punishment – According to this the responder rejects the unfair offer to teach the proposer a lesson and thereby reduce the likelihood that the proposer will an unfair offer in the future. Therefore, responder hopes to get fair deals and benefits in the future from rejection.
2. Self-control – According to this the rejection constitute a failure to inhibit a desire to punish the proposer for making an unfair option.

Thus a game driven by altruistic punishment would be a finite game. Altruistic punishment may be solved after repeated rounds of talks and negotiations when both nations realize each other's demands and take them into account to reach a conclusion. However, this does not match the observation with regards to Kashmir.

A self-controlled behaviour, on the other hand, can lead to an infinite game. This is because this game would be driven by the "*ego factor*". Both the nations of India and Pakistan have grown big and strong with the time. This would have led to an escalation in their egos, and reluctance towards unfavourable considerations. The experimental studies have also found that "*shortage of cognitive control (ego depletion) led proposers in the ultimatum game (UG) to propose significantly more equal split offers than non-depleted proposers (Eliran Halali 2013).*"

The game of Kashmir driven by self-control attitude is a cause of worry since as these nations grow strong, the issue would only become more difficult to resolve. So the probable game theory solution to the Kashmir issue would be:

1. Both the players start playing it as an infinite game, that is, Pakistan becomes an infinite player
2. Or both the players adopt the altruistic strategy.

India is swiftly emerging as a major power in the South Asia driven by strong rapid growth, influential culture, persistent democracy and attention from major powers (Ganguly, India as an emerging power 2003). Due to this it is more probable for India to be driven by the cognitive control behavior than Pakistan. This would also support the observed India's obduracy towards Kashmir. But at the same time India is always ready to accept the status quo. Thus, it does have leaned towards altruism. As has been previously discussed, peace in the region is in the best interest for India. Pakistan, on the other hand continues its finite play to change the status quo to absorb entire Kashmir. Pakistan should understand that given the status and power of both these nations, it is not possible for any one of them, at least in the recent future, to gain control of entire Jammu & Kashmir. Neither has it been in the past. India has understood this and that is why has been complacent to maintain status quo. But Pakistan first with conventional war and then with sub-conventional war has been trying to achieve the impossible. (Rathnam Indurthy 2010) has also shown that the continuation of the status quo is likely to be the only peaceful way forward.

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