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### INTERACTIVE MANAGEMENT OF THE SINO-INDIAN BORDER DISPUTES: A GAME THEORY ANALYSIS

<sup>a</sup>**Bo Wang\***, <sup>b</sup>**Pelagia Karpathiotaki**, <sup>b</sup>**Xinmin Sui**<sup>a</sup> *School of International Relations, University of International Business and Economics, 10 Huixin Dongjie, Chaoyang District, Beijing, 100029, China.*<sup>b</sup> *School of Politics and Law, Zhongyuan University of Technology, Zhengzhou, Henan, China.**\*Corresponding Author Email ID: bowhu@163.com; bo.wang@drake.edu*

#### ABSTRACT

The complex Sino-Indian relationship is the result of the historical evolutions and shared borders between the two countries. Their underlying tensions are being exacerbated by today's expectations of playing an increasingly important role in the global governance and a trend of mistrust of their respective geopolitical intentions. There exists a big gap of perception of Sino-Indian boundary and a massive deficit of mutual trust between the two states in addition to political differences and populism confronting both Chinese and Indian policy-makers. Sino-Indian relations are characterized by a security dilemma as a result of a mutual lack of trust. Both parties are trying to determine the true intentions of the other party. Although since the 1990s the management and control measures and the political vision of the policymakers have made their border disputes controllable without affecting the development of bilateral relations and cooperation in other fields, the boundary problem continues to reside in the nondeterministic elements between the two countries' relationship, which in turn generates abnormality and even "crisis", along with electoral changes in the Indian domestic political landscape from time to time. The "spillover effect" of the Sino-Indian border game is remarkable and has mitigated the border tensions or crises in the region. Therefore, the armed cold peace with controllable and low extent local crisis is expected to be the common "status-quo" for the Sino-Indian border regions. It is safe to assume that the spillover effect of the Sino-Indian border disputes leads to competitive cooperation under a dynamic, non-cooperative, incomplete information game. This central feature of the bilateral relations could not exclude the possibility of a conflict in the future as happened in 1962.

**Keywords:** Border Disputes, Equilibrium, Security Dilemma, Sino-Indian Relations, Strategy Interaction.

#### INTRODUCTION

The rise of China and its growing competition with US tends to take up most of the strategic debate in the Indo-Pacific region. Moreover, the simultaneous rise of China and India key actors in Asia and their likely competition has the potential to critically influence the geopolitics of the region (Mohan, 2011; Ryan, 2012; Malone & Mukherjee, 2010). Not only does the Sino-Indian relationship bear the consequences of the historical and common borders issues, but similarly faces the current challenges of global governance and a trend of mistrust of their respective geopolitical intentions (Smith, 2013). There is a big gap of perception of the Sino-Indian boundaries and a massive deficit of trust between the two neighbors in addition to political differences and

populism confronting both Chinese and Indian policy-makers. Sino-Indian relations are characterized by a security dilemma as a result of this very mutual lack of trust. Each party finds it difficult to determine the true intentions of the other (Jervis, 1978).

The 'security dilemma' is a fundamental concept of the realist school of thought in International Relations. In an anarchic international environment, competition is inevitable. The states are seeking their survival and independence and, for these reasons, they exercise caution with regard to their security. The power of a state is compared with the power level of other states. States evaluate the power in relative rather than in absolute terms. The power increase of a state constitutes a reduction in the power of another. This situation was

defined by John Herz's "security and power dilemma" (Herz, 1950) and describes the obstacles that two countries face in achieving peace and cooperation.

John Herz has been characterized as the deviser of the term "security dilemma" (Booth and Wheeler, 2008). In recent years, offensive realists (Mearsheimer, 2001) argue that in the anarchy of world politics, fears about the intentions of rival states may drive even two security-seeking states away from cooperation. On the other hand, defensive realists (Glaser, 1995) claim that two security-seeking states should not find it difficult to cooperate if they recognize each other as security-seeking, and while uncertainty about state's motivations can complicate matters, uncertainty alone does not imply the dire predictions of offensive realism.

In an essential contribution to the security dilemma debate, Kydd (2005) proposes the **Bayesian realism**, as an alternative theory to offensive and defensive realism. In Bayesian realism, **states have different preferences for revising the status quo and the level of trust between them is a variable**, as opposed to offensive and defensive realism in which states are always security-seeking.

Equally important is Robert Jervis' analysis on the security dilemma, in which he emphasizes how the increase of a state's security reduces the safety of others, not because of misunderstandings or an imaginary hostility, but because of the anarchic nature of international relations. According to Jervis, even though states have confidence in the peaceful intentions of others, one cannot ignore the possibility that a state can express aggressive behavior in the future (Herz, 1976). Jervis introduced the spiral model into the theory of the security dilemma. According to Jervis, the security dilemma is a dynamic situation in which states, in the competition for more power and security, enter a spiral process, also known as the arms race. Such a situation has the potential to lead to conflict, although conflict was not part of the original intention. The spiral process is easy to be activated, as the increase in power of a national state factor diffuses into the international system (Holsti, 1985). This "vicious circle of security and power accumulation" is called security dilemma.

Between China and India there is a mutual suspicion that each is seeking to contain the other through strategic encirclement. In their view, this encirclement is being achieved through competition for regional influence and military maneuvering in the other nation's traditional

sphere of influence. This situation leads to a classic security dilemma.

It is safe to assume that the Sino-Indian border game is a dynamic, incomplete information and non-cooperative game and, more specifically, it could be presented as a bargaining or security dilemma game that cannot exclude the possibility of a conflict in the future, as it happened in 1962.

The research question of this paper regards the status-quo of the Sino-Indian border dispute in the context of the complex interaction between the two countries, involving, inter alia, interest defining, rational choice, bargaining, trust building and information communication. How should the Sino-Indian game be regarded in the context of the aforementioned independent variables? And what role shall the management and control measures mechanisms in the Sino-Indian border areas play in the bilateral game? How to evaluate the prospects of the Sino-Indian boundary negotiation? The current article attempts an analysis of the questions above in the light of non-cooperative game theory.

#### **APPLICABLE MODELS OF SINO-INDIAN BOUNDARY DISPUTE GAME**

The border disputes between India and China can be presented as a bargaining game where conflict occurs if the states cannot agree to share the disputed territories peacefully (Baliga and Sjostrom, 2015). In this bargaining game between China and India, there is a status quo which each country (China or India) may challenge in the future.

**Hypothesis 1.** As for solving the boundary disputes, China and India's strategies could be divided into Hawk (challenge-mobilize marked with M) and Dove (no challenge non-mobilize marked with N). We will not consider the cases of no contact and no dialogue (i.e., to maintain the status quo of isolation, no game environment) under both parties' Dove strategy. If Hawk is adopted (i.e., to enter the disputed region between the two countries), there is a high probability of a Sino-Indian boundary crisis and even war, and a low probability to sign a boundary treaty and, consequently, divide territory peacefully. If both parties mobilize army, both China and India's expected earnings are 0; if the parties don't mobilize the army, the possibility for settling the border dispute through negotiations is very high between China and India, so both parties' expected earnings become the positive value B. If one country

mobilizes the army or enters the disputed territory, while the other country does not mobilize its military, and itself or any third party cannot ask the respective party out of the occupied disputed territory, the expected earnings of mobilization party would be A while the expected earnings of demobilization party would be C. The current analysis will be constructed around the potential strategies listed above.

**Hypothesis 2.** IN order to analyze the China-India border dispute and the security dilemma associated with it, the Stag Hunt was chosen as the most appropriate dynamic game for the case. According to Sandeep Baliga and Tomas Sjostrom (2010, if the actions of the states are strategic complements<sup>i</sup> then the game is Stag Hunt and if the actions are strategic substitutes<sup>ii</sup> then the game is Chicken. However, Chicken was not preferred for this analysis since it is a game of strategic substitute, which means that if the gain from becoming more hawkish is smaller, the more hawkish is the other country. In other words, a show of toughness might force the opponent to back down. Surely the case of China and India could not be mirrored by the Chicken Game given their size and power, hence the game model was not selected for analysis. According to Jervis (1978), when there is a security dilemma between two states and a lack of trust, the games that can be used are Stag Hunt and the repeated Prisoner's Dilemma. The Prisoner's Dilemma (Jervis, 1978), unlike the Stag Hunt, does not envisage a solution that is in the best interests of both countries. In other words, there are offensive as well as no defensive incentives to defect from coalition with the others, and if the game is to be played only once, the only rational response is to defect. But if the game is repeated, the latter characteristic no longer holds and we can analyze the game in terms similar to those applied to the Stag Hunt. Only if Prisoner's Dilemma is repeated, it could accurately present the situation (China and India relations), but, in such case, it would resemble the Stag Hunt. For this reason, Prisoner's Dilemma was not selected for the analysis.

**Hypothesis 3.** When calculating one boundary strategy's output, both China and India will consider whether the boundary dispute is solved or not, and the potential spillover effects of their respective border status; that is to say that the actors tend to choose the most feasible strategy considering the discount factor. In this case, the payoff function expectation shall influence both parties' behavioral strategies toward disputed

territory. On the one hand, this eliminates the possibility of a cold war in Asia caused by border disputes between China and India; on the other hand, this also decreases both parties' motivation to solve the boundary problem as soon as possible. In other words, the two countries won't set the border dispute as their top priority. It is necessary to consider spillover factors in space and delay influence in time in order to choose boundary strategy (i.e. discount factor). In this regard, mainly three factors shall be considered: economic benefits (expressed as D), security (including domestic security) benefits (expressed as E) and international reputation (expresses as F). The interaction of China and India in the border region depends on the contrast of pure territorial payoff function and the discount factor under one specific strategy (M/N). If  $A > D + E + F$ , the parties are more likely to mobilize their troops; conversely, if  $B$  or  $C \geq D + E + F$ , the state party is less likely to mobilize the army, negotiate a border delimitation agreement or maintain a "cold peace", i.e. an armed coexistence within the border area.

**Hypothesis 4.** For reasons that serve the analysis and study of the Sino-Indian relations, the paper assumes that the game is played by two states only. In fact, the game is played by more players. Scrutinizing the relations between China and India would be incomplete without studying the part played by USA (Indibara, 2014), Pakistan (Holslag, 2009), the buffer states like Nepal and Myanmar (Burma) and other actors like Bangladesh and Sri Lanka and, to some extent, by Russia and Japan.

The Stag Hunt game model perfectly illustrates the bargaining game and how actions of the states are strategic complements. (Baliga and Sjostrom, 2010) This captures the idea that fear can cause aggression and escalate into conflict, as Hobbes's "state of nature", where conflict is caused by lack of trust (Baliga and Sjostrom, 2012) or Jervis's "spiraling model". In Stag Hunt, toughness feeds on itself in a cycle of fear (Baliga and Sjostrom, 2015). When the bargaining game is a Stag Hunt game (strategic complements), then the moderates are "coordination types" who behave as in a stag hunt game: they want to match the action of the opponent. This can trigger an escalating spiral of fear, as in the classic work of Schelling (1960) and Jervis (1978). Moreover, that means that the greater the gain from becoming hawkish, the higher the incentive for the other player to replicate the behavior (Baliga and Sjostrom,

2015). In most bargaining situations, neither country knows the opponent's true preferences. (Baliga and Sjoström, 2015).

According to Jervis (1978), Baliga, Sjoström (2010), Acharya and Ramsay (2013), defense is advantaged in the Stag Hunt model. The technology and geography are the two main factors that determine whether the offense or the defense has the advantage. As Brodie puts it, "On the tactical level, as a rule, a few physical factors favor the attacker, but many favor the defender. The defender usually has the advantage of cover". When the defense has the advantage (Jervis, 1978), it is easier to protect and to hold than it is to move forward, destroy, and take. If effective defenses can be erected quickly, an attacker may be able to keep territory he has taken in an initial victory. The security dilemma is at its most vicious point when commitments, strategy, or technology dictate that the only route to security lies through expansion.

When defense has the advantage (Jervis, 1978) status quo states can make themselves more secure without gravely endangering others. Indeed, if the defense has enough of an advantage and if the states are of roughly equal size, not only the security dilemma ceases to inhibit status-quo states from cooperating, but aggression becomes next to impossible, thus rendering international anarchy relatively unimportant.

**THE MODEL**

Following Jervis, we begin by supposing that relations between China and India are described by a Stag Hunt (Hypothesis 2). The bargaining game can be represented as a two-by-two matrix game with strategies labeled **Hawk** (the optimal challenge-mobilize marked with M) and **Dove** (no challenge-non mobilize marked with N). With sufficient uncertainty about the opponent's cost of making a challenge, there is a unique Bayesian-Nash equilibrium. The challenge is a commitment (Schelling, 1960): which means that a conflict is likely, unless there is a favorable change in the status quo.

If only one actor (China or India) challenges, the other must either concede or risk a conflict. The optimal challenge is to make the most substantial claim the opponent would concede to (which depends on the cost of conflict, the military technology, etc.).

✓ If both actors challenge the status quo, one state may, by chance, manage to make her commitment first and thus gain the first-mover advantage.

✓ If both actors simultaneously make commitments to incompatible positions, conflict will occur (Nash, 1953).

The game theory matrice for this situation are given below. (Table 1)

Table 1. Stag Hunt- Trust dilemma game

<i>Stag Hunt</i>			
	<b>India</b>		
		Hawk (M)	Dove (N)
<b>China</b>	Hawk (M)	0,0	A,C
	Dove (N)	C,A	B,B

Source: the table is made by the author.

In the game China and India must decide whether to challenge (Hawk) or not challenge (Dove). The true payoffs are given by the above matrix that the defense is advantaged.

If  $A > B > C > 0$ , then each payoff matrix are possible in theory, that is, there are two pure strategy equilibrium and one mixed equilibrium. Apparently, war (M, M) is the worst outcome. If  $A > B > 0 > C$ , then the "prisoner's dilemma" applies and war becomes more popular since, shall a party choose not to mobilize its troops, it will suffer prestige losses. Therefore, M becomes the absolute advantage strategy for both India and China. Considering the discount factor irrelevant to territory, if  $A > C > B > 0$ , the "knot game" applies. They prefer defeat or maintaining the dispute status quo than dividing territory peacefully, thus M continues to be the absolute advantage strategy for both India and China. The result of the Sino-Indian game in disputed boundary region depends on several factors, such as both parties' comprehensive discount factor in different stages, the calculation of strategy earnings or utility expectation, strategy, behavior, and interaction. As reflected by the international practice, both pure strategy equilibrium and mixed strategy equilibrium do not effectively solve the Sino-Indian boundary dispute. On the one hand, the status-quo is rooted in the complexity of the boundary issue as well as in the tensioned and sensitive Sino-Indian relations; on the other hand, it is also related to poor communication and low mutual trust between the two countries. Starting by the early 90s, however, the bilateral relations have gained momentum, entering a new era of dialogue, laying down the premises for setting up a mechanism on border disputes and

gradually reaching a correlated equilibrium<sup>iii</sup> (Aumann, 1976) situation, as further depicted.

### **STRATEGIC CHOICE AND EARNING CALCULATION OF THE SINO-INDIAN BOUNDARY GAME**

The Sino-Indian border conflict went through a dynamic range of changes in the modern era, out of which four major stages are particularly distinguishable: from the beginning of the Republic to "the March 1959 Tibetan Uprising", 1959 to the 1962 Sino-Indian War, from the Sino-Indian War to the early 90s, and, lastly, from the 1993 Sino Indian Bilateral Peace and Tranquility Accords to the present. Each stage shows different interactive features, respectively. From the perspective of effectiveness, the Sino-Indian border disputes lasted for more than 60 years. The length of the dispute showcases that any strategy combination of the game between the two sides is either ineffective or inefficient; from a process-based perspective, the two countries' interaction in border region has developed from conflict and opposition to war and to the cold peace, and then to dialogue and negotiation under complete information. India's strategy and behavior adjustment is particularly obvious; from the perspective of strategy choosing, it turned from pure strategy equilibrium to the mixed strategy equilibrium, and then to the correlated equilibrium managed through a dialogue coordination mechanism.

During the first stage (1950.1-1959.3), the focus of border strategy and behavior interaction was located in the eastern section: India controlled the Chinese territory (hereinafter referred to as the "disputed territory")<sup>iv</sup> northwards of the traditional customary line and southwards of the so-called "McMahon line" (hereinafter referred to as the "M-line"), which is characterized by Indian party's mobilization and occupying of the disputed territory and China party's silence or inaction. Pure strategy Nash equilibrium (A, C) is more reasonable in the boundary game. The analysis of the pure strategy equilibrium follows as below:

Given the historical background, particularly the *Sino-Indian Trade Agreement over Tibetan Border*, it could be argued that the Sino-Indian cooperation on the Korean War prisoner exchange and the Bandung Conference temporarily covered up the territorial disputes. The Sino-Indian relations could be understood as an "unreal" friendly status-quo based on misperception. First of all, the prioritized security concerns of the People's Republic of China are the northeast and southeast, which

are regarded as strategic focus, while the southwest is not included in China's priority concern agenda. In other words, India is not regarded as a major threat to China's security. Second, China's attitude towards the border is consistent; China has never openly admitted the legality of the so-called "M-line", but also never crossed the line into the disputed region. It could be argued that solving the remaining boundary problems through bilateral negotiations has been postponed until the time is ripe. From the Indian perspective, by mixing the history view of Indian nationalist and modern national outlook, and based on the colonial inheritance of territorial expansion, its political elites seem to have adhered to a Historical Border Determinist Paradigm, which enounces that as long as a legitimate government declared a line, it is enough to determine the location of "historical boundary" without the negotiation between relevant countries (Maxwell, 1999; Lamb, 1970, 1989, 1997; Hoffman, 1990; Varhney, 1993). As for utility calculation, India stated that the "Sino-Indian Agreement" of 1954 made India abandoned the original privilege to inherit China's Tibet from the British Indian government, so as a kind of compensation, China should also accept India's border claims and territorial claims. Since China's strategic focus resides in the northeast and southeast, and there is less trade and economic cooperation between the two countries, the game for China in border areas is of low economic utility expectations. Moreover, India thinks in high terms regarding its superpower status (achieve success with both camps) and its territorial expansion consisting of small and quick steps has not been objected by China. Hence, it would be safe to assume that India believes China won't respond severely to India's expansion and infiltration in the border region, and the two countries won't wage war against each other.

It then becomes clear that the economic earnings of the Sino-Indian game in the disputed region D is negligible. As for security benefits E, India inherited the policy of "three levels of strategic frontier" in northeast during both British-colonialism and modern period and advancing the control force to the "M-line" is of strategic significance. At the same time, China has not paid attention to the Sino-Indian game as it has not perceived the security threat from southwest critical. It is not an over statement that "India almost has not attracted Chinese attention and is of little importance in (China's) diplomatic security agenda." (Overholt, 2008) As for soft

power-international prestige F, in 1950s, India regarded himself as the advocate of China in the United Nations and the Bandung Conference and played an independent role in the international political arena, especially in the Korean War and the Bandung Conference, which attracted high international reputation to India. This in turn gave birth to what is known as the "Honey-moon period" (Singh, 1999) of the Sino-Indian relations, however short-lasting. India associated China's reaction with its superpower status identification, which also became the apparent reason to promote advancing strategy in the Sino-Indian border region. In reality, the government of the People's Republic of China cherished the recognition and support from the independent, non-socialist India, so China's principle of avoiding conflict objectively further solidified India's power status recognition (also including the misperception on the boundary issue). Therefore, occupying the disputed territory is related to whether India can realize its utility expectation in the three core fields  $A + E + F$ , and its determination to win the "disputed territory" is an absolute advantage strategy for India.

During the second stage (March, 1959-October, 1962), the strategy and behavior of the two actors in the border areas presented a mixed strategy equilibrium, which marked the escalation of border skirmishes, followed by border war, local armed confrontation in post-war border regions and the overall cold peace of bilateral relations. The Lanju Conflict and Kazan Conflict of 1959 made the Sino-Indian border dispute reignite, as India crossed the line of actual control to the Chinese territory<sup>v</sup> (Shafiq, 2011) and India's behavior of further advancing across the "M-line" broke the bottom line of China. Concerning strategy and behavior, China no longer insists on the principle of avoiding conflict and "inaction" and adopts randomized response strategy according to the Indian strategic behavior. When necessary, China also responds by "punitive" attack. In theory, the Sino-Indian boundary game has two possibilities, dialogue negotiation and mobilization (including conflict and even war), namely (0, 0) and (B, B) respectively. However, given India's determined adherence to the "historical boundary", and its rejection of any form of negotiation while implementing the "advancing policy", (0, 0) becomes the only reasonable result of this mixed equilibrium game. Provided that India continued to implement the "advancing policy" on both east and west borderline at the same time and the

policy of permeating to the Chinese side of line of actual control, China would change its original strategy naturally. In March 1959, upper-class reactionary forces in Tibet incited rebellion with internal and external collusion and the Dalai Lama was exiled to India where he set up a "government-in-exile". The situation was particularly aggravated by the Indian government's attitude (Hoffmann 2006), and international anti-China forces working behind to support the so-called "Tibetan Independence" forces (Knaus, 1999). The factors above determined China to reassess the security situation of the southwest line. Consequently, both the border disputes, as well as the security status-quo urged China to adjust its game strategy and behavior model in the Sino-Indian border areas<sup>vi</sup>. If P represents the probability of the Sino-Indian border war in the case of India implementing the "advancing policy", then war probability in the Nash equilibrium is represented as  $P = (A, B)/(A B + C)$ <sup>vi</sup>, following the logic of "winner makes the best of benefits while loser make the best of its calamity" for the gain and loss in disputed territory. If China does not mobilize her troops in response to Indian "advancing policy", not only the territory will be lost, but also China's security situation (E, here also includes internal security) shall further deteriorate and international prestige (F) will be severely damaged. War probability P increases along with the decrease (or even the negative) of China's benefits function C. As long as India's advancing behavior breaks supersedes this limit, the Sino-Indian border skirmishes and even war are inevitable.

During the third stage (1963-1992), strategy and behavior interaction in border region led to a "cold peace" under deterrence equilibrium. In October 1962, the border war ended India's "advancing policy" and restored the Sino-Indian border region to the status before the crisis. In this period, the two small-scale conflicts, i.e. Nathula and Chola Conflict in 1967 (Singh, 1999) and Wang Dong Confrontation Crisis (also known as "Sumdorong Chu confrontation crisis") in 1987, as well as the ministerial level border talks in the end of 1981, did not change the basic structure of mixed strategy equilibrium. Deterrence and threats contributed to the peaceful status of Sino-Indian border areas in a special way. China's attitude towards the Sino-Indian border dispute is clear and consistent, namely the Sino-India boundary has never been defined, the "M-line" has never been recognized, and consequently India

cannot cross the line into China's territory. This status quo should be regarded in the light of China's commitment, stressing on the importance granted to game-theory: "We will not attack unless we are attacked; if we are attacked, we will certainly counterattack" (the equivalent of "tit-for-tat" strategy). It now becomes clear that China's reaction in the Sino-Indian war was purely self-defensive, striking India proportionately for its advancing and infiltration behavior across the line of actual control. Such a response along with the credibility of the Chinese military combat efficiency determined India to adopt a more cautious position (Schelling, 1956)<sup>viii</sup>. After the border war, India adjusted its misperception that "under any circumstances China won't start the war with India" and ended the "Advancing Policy". Therefore, Sino-Indian relations reverted to the previous status-quo, namely that "locally and occasionally there are conflicts, while the bilateral relations are generally peaceful".

Provided the lack of trust in the Sino-Indian relations, the "brink-of-war" policy aiming at conflict deterrence has become the focal point between two countries. Dual earnings payoff matrix (India chooses one strategy listed in column, and the first number in each combination represents the benefits of the Indian party) is shown in Figure 2. Both (war, war) and (peace, peace) mixed strategy equilibrium are likely to be the ending. And if the winner's earnings in a one-off game  $(4, 0) > (3, 3) > (1, 1)$  are considered, two completely rational participants may eventually head to the worst outcome (1, 1). However, based on game experience in border regions, considering the discount factor's utility (D, E, F) in space and time and the cost of retaliation, China and India are likely to unanimously select the random mixed strategy, that is, taking action while inspecting the other's strategy behavior. The "Margin Policy", i.e. gradually increasing the level of conflict yet avoiding war, became a feasible choice for both countries' rational decision makers. The Sino-Indian border area has maintained the cold peace situation of armed confrontation (3, 3), which consequently became the realistic strategy equilibrium. The "Sumdorong Chu confrontation crisis" in 1987 is the classic case of Sino-Indian "margin strategy" game. In the early 1980s, India revised the so called "defense battle plan" towards China on the basis of the security situation reevaluation and approved a military plan to speed up the deployment of troops beyond the line of actual control. Since 1983,

India has sent intelligence corps on an annual basis to collect intelligence and inspect China's activities in the SumdorongChu, i.e. within the Chinese side of line of actual control and constructed a temporary watch house. China attached a great importance to the above Indian activities and reciprocally set up a semi-permanent watch house in the area. Provided India's "check board activity" in the border regions in early 1986, that is, large-scale military exercises and frequent military maneuvers, China similarly deployed its army near the line of actual control in order to prevent India from occupying Chinese territory again. Therefore, a confrontational status reemerged. In other words, it is India's actions which determined a re-escalation of the crisis. At the beginning of 1987, India issued the order code-named "Saker Activity", and beefed up military force under the ridge of Taguerra Mountain, threatening watch-house sentinels directly;<sup>ix</sup> the Chinese army reacted swiftly and strengthened the deployment protection. Though border war was imminent at the time, diplomatic engagement in late summer, along with meetings of high level army-officials, cost benefits calculation and believable deterrence sent by the Chinese party, alleviated the border tension situation quickly and dramatically. Both parties withdrew their troops from the triangle delimited by the Bhutan border, "M-line" and Taguerra ridge. The border areas returned to the demilitarized zone situation before crisis, stressing both parties' adherence to the "Margin Policy".

Table 2 Game Theory of Peace and War

	War	Peace
war	1 · 1	0 · 4
peace	4 · 0	3 · 3

Source: The table is made by the author.

**Correlated Equilibrium of the Sino-Indian Boundary Game under Coordination Mechanism**

Before the border issue reaches a final settlement, armed peace in the border areas will continue to be the status quo, reflecting the strict dominant strategy equilibrium between the border dispute interactions. The below arguments follow: 1) A consultation and coordination mechanism with a certain regulatory system would render the Sino-Indian border areas interactions in conformity with a correlated Nash equilibrium; however without eliminating the causes of mutual distrust - under a setting in which "Trust" should

be regarded as inferior to "Power". Both China and India hold sufficient military resources - defense forces to ease insecurity and apprehension which could also be regarded as deterrent resources. 2) The Sino-Indian constant tense confrontation is a costly peace, and (war, war) equilibrium cannot resolve the border dispute. Instead, it would further increase the cost of implementation. Even if one party wins temporarily, the earnings would shrink dramatically, and considering the discount factor (D, E, F), i.e. the losses over the gains, that is  $(A-C) \leq 0$ . From the perspective of economic earnings (D), the volume of bilateral trade in recent years stood at 600-700 billion dollars, and is committed to exceeded 100 billion dollars in 2015; as a member of the BRICs group, the two countries have a wide range of common interests in world issues and bilateral security issues, ergo China and India have to consider the factors of security earnings (E) payments and a huge mobilization / war costs during border interaction. In addition, decisions of both sides are subject to varying degrees of internal populism, therefore maintaining the armed peace can be acceptable as a suboptimal strategy; China and India have seen a dramatic rise in their power status, which has been widely recognized by the international community. Waging war against each other again due to a border dispute (regardless of its outcome), would lead to their international prestige (F) being severely affected. 3) The dynamic boundary game has a pre-complete information (that is, each side is trying to make each other aware of their strategies), one will select or adjust own policy depending on the other side's course of action. Hence, any simulator of sub-game behavior should take into account its policy's influence on the other side. 4) The historical experience - i.e., two conflicts in 1959, border war in 1962, the conflict in 1967 and the crisis in 1987 - confirms the non-feasibility of force to resolve border disputes, and the two decision-makers learned from their experience by manufacturing what could be regarded as a consensus (the recognition of common interests), which in turns changes the interaction method of the Sino-Indian game. India eliminated the premises for a negotiated settlement left by Nehru, i.e. the Sino-Indian boundary delimitation and the agreement that it should mobilize its forces within the territory it claimed. Similarly, India refuses any negotiations for maintaining the status quo on the border before controlling it absolutely. In 1988, the Indian National Congress adopted a resolution that India

should search for a way to resolve the border dispute with China based on "mutual interest". Such a resolution should be "acceptable (...) by the people of the two countries". This indicates that the adjustment of the boundary policy recognition has already been in place from the inception of the Indira Gandhi government to the Rajiv Gandhi government. Besides, both sides' management of interaction under the cold peace state as well as during the confrontation crisis in 1987 supports the following argument:

Boundary peace can be maintained as long as India does not cross the line of actual control in the border areas. The demarcation line has been repeatedly stated and gradually quasi-institutionalized, starting with the 1990s agreements. Such agreements include: *The Joint Working Group on border talks*, launched in 1988, the 1993 *Agreement on Maintaining Peace and Tranquility in the Border Line of Actual Control Area* and the 1996 *Agreement on Trust-building in the Military Field of the Border Line of Actual Control Area*, the *Special Representative Consultation Mechanism on the Border Issue*, launched in 2003 and the 2012 *Agreement on Establishing the Sino-Indian Consultation and Coordination Mechanism for Border Affairs*, and, finally, the *Sino-Indian Border Defense Cooperation Agreement* signed in 2013 when Indian Prime Minister Singh visited China to propose the "guidelines of conduct at the border areas"<sup>xi</sup>. Provided the above coordination mechanisms and agreements, the negotiation pattern between China and India gradually evolved from a previously mixed strategy equilibrium to a pure strategy equilibrium to finally reach what could be interpreted as a Nash equilibrium. The dual earnings payoff matrix of the Sino-Indian border interaction under related policy equilibrium is shown at Table 3. Due to the significant increased weight of the discount factor (D, E, F), conflict/war or armed confrontation demands a high cost, reducing earnings sharply, even for the winner. Hence a (3,3) payoff function represents the most likely result of the game, leading to a very low probability of war. Shall war occur, the loss would outweigh the benefits for both parties? Provided factors of gradual increase in mutual trust, as well as the combination of economic trade, personnel communication, system construction and military communication, etc., there is no possibility that a border war would occur once again between China and India. However, China and India have to face the reality and admit that pending divergences in



terms of borderline and actual control area could still cause the occurrence of an unexpected incident or border skirmish. It would be safe to assume, then, that the Sino-Indian relations status quo is most likely a long-term armed coexistence, along with intermittent crisis from time to time (Joshi, 2011).

Table 3. Game theory of peace and negotiation

	War	Negotiation
war	1 · 1	0 · 4
Negotiation	4 · 0	3 · 3

Source: The table is made by the author.

**Analyzing the Interactive Game Theory in the Sino-Indian Border Areas**

What the two nascent Republics inherited was the "frontier line", i.e. a traditional area loosely dividing the two countries following customary rules, instead of a modern, well delimited "borderline", one of the important symbols of the modern state. Provided the current modern setting, it is inevitable for China and India to dispute the exact delimitation of their "borderline". India inherited the "three-level strategic

frontier" policy, which was once adopted by the British government towards the Northeastern, and which still lies at the origin of the Sino-Indian border dispute. Following this policy, India gradually encroached the territory between the Sino-Indian border and the "M-line", which traditionally belongs to Tibet. China has consistently adhered to a border resolution drawing on mutual benefit, peaceful negotiated settlements on disputes and maintaining the status quo prior to properly addressing the issues left. It was in this light that the Indian border policy and its related actions in the early 1950s caused the start of the Sino-Indian boundary game. The game tree below clearly depicts the strategy and action paths among border areas.

During the mid-1950s, India advanced to several critical points nearby the eastern side of the "M-line", with China taking no further action in this regard. Such "inaction" has been regarded as immobilization; hence India gradually controlled the north of the border and the "disputed territory" located in the south of the "M line", traditionally controlled by Tibet. In the game tree below, (A,C) represent the result of the Sino-Indian boundary game in the first round (see Figure 1).

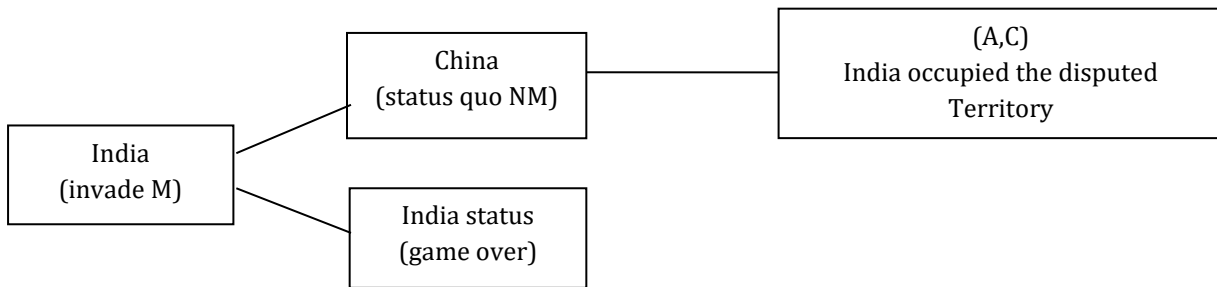


Figure 1. Game tree of the first stage (1950—1958)

Source: the figure is made by the author.

The Sino-Indian border dispute entered the public agenda in 1959. China pleaded for a negotiated settlement to solve the dispute caused by the historical lack of a modern demarcation, while India refused any negotiations under conflicting claims of "historical frontier" and "scientific frontier". India advanced its eastern mobilization to the north of the "M-line" controlled by China and insisted on the Johnson-Alda line as the Western boundary. Moreover, India attempted to occupy Aksai Chin, which in reality has always been controlled by China, by modifying its old version of the map published before 1950 (Noorani,

2011; Shaqiff, 2011; Pai, 2004) <sup>xii</sup>. At this time, China began to adjust its strategy of boundary game, opting for "Tit-for-Tat" retaliation. When Indian "advancing" policy encountered China's military response, the probability of border conflict or even war increased sharply. While Chinese territory was wrecked off against the core interests of the country, China adjusted her policy to respond accordingly to the Indian "advancing policy". Besides, the study argues that China's assessment of the security situation and her recognition of India's strategic intentions were greatly influenced by the policies and interferences India performed on the Tibet issue. On

March 1959, after the reactionary clique of the Tibetan aristocracy failed its rebellion, the Dalai Lama fled to India and obtained a "political asylum" in India, where the Indian "Tibet Independence" elements, under the support of international anti-China forces (CIA included), the Indian "Tibetan Independence" elements threatened the stability of the Chinese society and the security of Chinese Southwest frontier line (Conboy and Morris, 2002; Grunfeld,1996). On March 22, 1959, Nehru wrote to Zhou Enlai transmitting large territorial claims, while the Indian military gradually advanced in the Chinese territory. Therefore, provided India's aggressive practices on the border dispute, a limited punitive strike has been taken into consideration with China consequently adjusting its policy. The only result of China's "Tit-for-Tat" policy against the Indian "advancing policy" was the border conflict with the potential escalation of war (See Figure 2). China's actions have been aimed at defending homeland security rather than

territorial expansion, so after the border war, China retreated 20 kilometers from the line of actual control held before November 7, 1959, so that the two armies would disengage and return to a confrontational state of peace. Following that day, the Sino-Indian relations maintained their status quo with no further development. The status quo maintained until the end of the Cold War, cultivating the defining features of the third phase of the Sino-Indian boundary game. Despite some talks on boundary issues during that time, the following period has seen no substantial improvements in the Sino-Indian relations. The boundary talks, however, provided an important message, thus India began to adjust its policy rather than adopting an "ostrich policy" by refusing any negotiation on boundary issues with China. Such a dynamic laid the groundwork for the next stage of interaction, strategic adjustment, and bilateral relations.

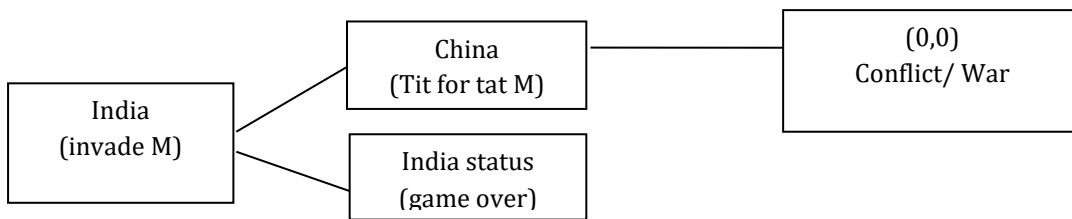


Figure 2. Game tree of the second stage (beginning of 1959—end of 1962)  
Source: the figure is made by the author.

Much different from the ante-1990s period, the Sino-Indian boundary interaction assumed quasi-institutionalized features in the early 90s, which is the result of both parties' efforts to avoid conflicts by misjudgment. After the Wang Dong confrontation crisis (known in the Indian literature as the "Sumdorong Chu crisis"), involving more than 200,000 troops from both armies, the two countries restarted the negotiation process in several areas (Garver, 1996). Not only that China's settlement policies have received India's response, but a series of bilateral agreement and consultation mechanisms have been created for the Sino-Indian interaction game in the border areas. This, in turn, saved resources for the peaceful settlement of

border disputes and consequently generated a win-win outcome (B, B). China adopted a positive role in this round of the game, with the Chinese conflict resolution proposal as the starting point of the game. India changed its belligerent attitude and accepted to negotiate the proposal, promoting the process of boundary negotiation with positive early results in the borderline delimitation rules. However, in the present stage and predictably for the following period, this dynamic game with related equalization characteristics can only contribute to "improved status quo"-low-intensity armed peace (see figure 3), given the difficulty in reaching a mutually acceptable boundary agreement for both sides. The main reasons are outlined below:

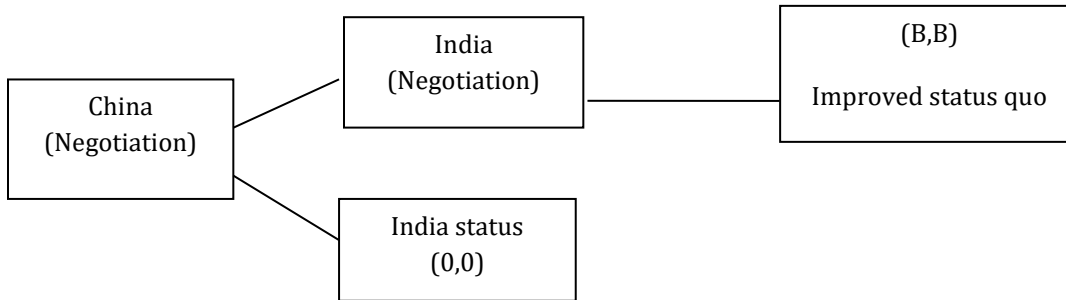


Figure 3. Game tree of the current stage.

Source: the figure is made by the author.

Firstly, the Sino-Indian boundary negotiation will experience a long and rough process provided its complex history and present situation. The *Agreement on Political Parameters and Guiding Principles for the Settlement of the India-China Boundary Question*<sup>xiii</sup>, signed in 2005, is not only the first stage of the "three-step" strategy to solve the boundary dispute, but also a relatively easy step. The toughest second step, i.e. the "framework agreement to resolve the boundary issues" should consider many details, and, undoubtedly, time-consuming dialogue and consultation shall be required. In addition, the so-called "line of actual control", is, to a large extent, just a concept, and the two countries haven't reached a consensus about it. Actually, there is no such clear line of control in some regions, so that the boundary friction is inevitable. It therefore becomes clear that determining the line of actual control between the two sides is of great significance.

Secondly, there are severe divergences in the "disputed territories" and the delimitating principles between two parties. For example, India even proposed the delimitation issue between Xinjiang in China and Kashmir in Pakistan (Frankel, 2011), while China will never accept any similar proposals. Similarly, concerning the issue of land swap, the two sides hold different positions: India refused to land swap inhabited areas. However, the Tawang region under Indian control holds a special significance to China, as the sixth Dalai Lama was born there. Narrowing and bridging these differences requires innovation and courage, as well as patience and wisdom.

Thirdly, it is a double-edged sword for China and India to effectively control the boundary issue at the expense of cooperation in other areas. On the one hand, it enhances the immunity of the Sino-Indian relations on the boundary disputes; on the other hand, it also reduces

the sense of urgency and impetus to resolve the boundary dispute.

Fourthly, considering the lack of mutual trust, the Sino-Indian boundary issue is no longer confined to the high-end category of politics; any boundary agreement must take the acceptance of the two states into consideration, especially the negative impact of populism to boundary negotiations and interaction processes. Such a boundary agreement involves the legality of the government and requires both sides to be cautious.

Fifth, China and India are two countries in a dramatic rise. It is therefore essential to both of them to maintain a stable and peaceful internal and external environment and achieve development goals. A stalemate situation of boundary issues would negatively impact both countries development goals. Thus, in the absence of sufficient mutual trust, and providing the difficulties in reaching a proper settlement of the border dispute, a realistic and helpless choice is to keep the peace and stability under low-intensity confrontation and low-confidence at the border areas.

#### CONCLUSION

Despite setting an *Agreement on Trust-building in the Military Field of the Border Line of Actual Control Area*, as well bilateral and multilateral channels of communication, a surge in bilateral trade in recent years, several quasi-institutionalized contacts established and interactions in various fields, the mutual trust is still a noticeably scarce resource in the Sino-Indian relations. Combined with the inertia effect, the Sino-Indian relations are likely to face long-term challenges. "The security dilemma was strengthened by many factors, including uncertainty for future growth and some unknown signs, opaqueness of military planning, lingering historical grievances, and spread of multisource information, resulting in the border dispute

being distorted by deep suspicion, particularly prominent in New Delhi (Joshi, 2011). Relative to the official policy statements, the basic characteristics of mutual recognition between the Chinese and Indian society are still ambiguous and driven by mistrust (Holslag, 2009; Shearer and Hanson, 2010). Fortunately, the Indian Government's attitude towards border issues and behavior is more cautious and sensible than its national media. For the past decade, the Indian government maintained various channels of dialogue with China and high-level military communication and joint military drills. Based on these premises, the negative impact of the "media war" in 2009 and the crisis of "tent confrontation" in 2013 have been successfully avoided.

Provided the borderline interactive agreements and consultation mechanisms, the calculation of gains and losses among "disputed territories", as well as the discount factor having reached a saturation level, combined with the serious divergences of demands of territories<sup>xiv</sup>, the Sino-Indian boundary game is likely to remain at related equilibrium over a long period of time. The two sides are expected to avoid conflict and continue to negotiate without reaching an agreement aiming at a deterrent balance. Quasi-institutionalized border management can relieve anxiety of trust deficit, preventing borderline skirmishes or war. However, these are not expected to bear a substantial impact on the process of boundary negotiations. Consequently, the peaceful coexistence under armed security dilemma may occasionally lead to controllable low-intensity crisis, skirmishes and even conflicts, being disturbed by the "spillover effect" of boundary problems<sup>xv</sup>. Extended to the full scope of the Sino-Indian relations, a competitive cooperation under the non-cooperative game will most likely encompass the future of the bilateral relations.

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- <sup>i</sup> The decision of two or more states is called strategic complements if they mutually reinforce one other.
- <sup>ii</sup> The decision of two or more states is called strategic substitutes if they mutually offset one other.
- <sup>iii</sup> Robert Aumann first proposed the relative equilibrium conception in 1976. In the Nash equilibrium, the decision-makers are acting independently. Aumann also proved a truth: if the decision-makers could choose actions according to some signals observed commonly or some rules discussed previously, they may enter a relative equilibrium bringing benefits to each decision maker simultaneously.
- <sup>iv</sup> Here “disputed territory” is used for the convenience of expression, which doesn’t mean the author takes a particular stand on the “disputed territory”, where India controlled the China-claimed territory north of the traditional customary line and the south of the “M line”.
- <sup>v</sup> Until the summer of 1959, India advanced beyond the line of actual control and patrolled in China (controlled) area, building more than sixty posts, with forty-three of them located north of the “M-line”. India claimed its power in these regions based on that, while China regarded the policy as proof that India expanded to Tibet (Shafiq, 2011).
- <sup>vi</sup> On May 6, 1959, the People’s Daily published an editorial named *Tibet’s Revolution and Nehru’s Philosophy* to indicate the adjustment; On April, 1960, Zhou Enlai visited New Delhi and tried to solve the boundary dispute, but the negotiation failed to reach any agreement. China changed policy and action qualitatively after then. Mao Zedong proposed a relative refrain from conflict (“*never back down but avoid the war; communicate to achieve long-term armed peace.*” Editorial Team of *History of Sino-Indian Boundary Self-defense War*, 1994) and Zhou Enlai mentioned his opinion (“*India misinterpreted our patience and self-restraints to its invasion as (tacit permission) so that it can do it again and again... So they advanced in the eastern, and they thought we just tolerate the disturbances, which is wrong*” (World Affairs Press, 1993). Both of their attitudes plead for balancing conflict and communication, armed confrontation and cracking down in necessity at outposts, rather than the previous policy of avoiding conflict and peaceful negotiation.
- <sup>vii</sup> A simplified model of war probability. Combined with the interactive situation between boundaries, the force mobilization model of the Nash equilibrium can be seen as a model of war probability. Of course, “mobilize” does not mean “war”, however the two countries lack the constraints to adjust their payoffs/ earnings, provided that both sides refuse to be tolerant, so the mobilization of one side (Indian advancing policy) results in war.
- <sup>viii</sup> Thomas C. Schelling defined this negotiation as “self-binding”. One’s retaliatory capability provides a more favourable position than simply resisting an attack (Schelling, 1956).
- <sup>ix</sup> While mobilizing the army, both houses of the Indian Parliament passed a bill to upgrade the “union territories”, where India occupied the area between the traditional customary line and the “M-line”, i.e. the “Arunachal Pradesh”, attempting to strengthen the de facto control of the disputed territory by domestic legislation (Maxwell, 1999)
- <sup>x</sup> During the process of boundary crisis/war from 1960 to 1962, Nehru catered to public opinion and parliamentary behaviour, taking negative policy towards boundary disputes. The Indian Parliament passed a resolution calling on the government and its successor to “recover” all the Indian territories “occupied” by Chinese. In other words, any compromise with China would mean ceding Indian Territory. However the Constitution does not grant the right to cede territory to executive agencies. In practice, this means that the implementation of any boundary agreements requires India to amend its Constitution, which is both difficult and unpopular under any political circumstances.
- <sup>xi</sup> Formed by diplomatic and military personnel, the negotiation and coordination mechanism was led by higher agencies of both countries Ministries of Foreign Affairs, mainly dealing with the boundary issues and aiming to maintain peace and harmony between the two states. On February 2014, while hosting the 17th Special Representatives Meeting, China proposed to agree on a range of “guidelines of behavior at the boundary area” in order to avoid crisis or even conflict caused by misunderstanding and differences in terms of boundary recognition.
- <sup>xii</sup> Indian scholar A. G. Noorani considered that the Aksai Chin conflict was entirely due to India’s unilateral interpretation of a boundary un-demarcated by history (Noorani, 2011). The Ministry of the Interior led by S.V. Patel enclosed a map on the government’s white paper of 1948 -1950, illustrating there is no clearly demarcated boundary in western line (Shafiq, 2011). As for the order Nehru made on July 1, 1954, to change the un-demarcated boundary into established boundary on the old map, Noorani concluded that qualifies as “unilateral modification with no legal effect” for India (Noorani, 201; Pai, 2004).
- <sup>xiii</sup> The Agreement contains eleven principles of common sense, as it follows: the two sides are not to use force or threat of force, avoiding the border differences that could affect to other areas of bilateral relations; the border demarcation needs to consider both the historical facts, the national emotions, the practical difficulties, the legitimate interests, as well as the sensitivity of the border status quo; before reaching a final border agreement, the parties shall strictly comply with the line of actual control and jointly safeguard the peace and stability in the border areas.

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- <sup>xiv</sup> India also realized that the different opinions of “intervention” and “over-boundary” were caused by the cognitive differences between both sides (Express News Services, 2014; Rediff News, 2010).
- <sup>xv</sup> Any Border dispute will inevitably affect the Sino-Indian interaction in other areas, for example in 2009, India made an application of \$ 2.9 billion loan for the construction of infrastructure to the Asian Development Bank, of which a sub-project of 60 million dollars involves water conservancy facilities of disputed territories "Arunachal State ". China's proposal, though in good faith (leaving out the “Arunachal State” sub-project from the plan) was rejected, with China eventually opposed to the case so that India would ultimately withdraw the Loan Scheme. (Minder, Anderlini, and Lamont, 2009). In another example, in 2011, known as “stapled visa”, India temporarily suspended all military communications except the routine meetings of border officers.
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