

**Manipulating Risk and Gaining
State Control In An Uncertain
Situation: A Game Theoretic
Approach to Diplomatic Relations
between the United States and
China Over Taiwan.**

By Zoheb Hooda
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Introduction:

The current uncertain relationship between the U.S. and the Republic of China dates back all the way to World War II. During the 1950's, the U.S. and China engaged in a contested game of bargaining, strategy, and brinkmanship over the autonomy of the Republic of China (Taiwan) that again threatened the stability of a delicate region recently impacted by two devastating wars and over seven million human casualties.¹

In the erratic nature of international relations, game theory is a good way to explain the strategic engagement among states. Game theory a method of studying strategic interaction among actors has been used widely in social sciences. Arguments structured by formal logic or mathematical analysis are considered to be clear and unambiguous, and can be used to determine inconsistencies in analysis between assumptions and conclusions.² I will use a unique game theory model to examine the strategic interaction between People's Republic of China and the U.S. during the First and Second Taiwan Crisis. I will utilize the model to discuss the origins and strategies of brinkmanship of the two states and show how the same game was played over time during each of the crises.

The first two sections of my paper will explain the perceived payoffs of military and political decisions made by both the U.S. and the People's Republic of China during the two crises, and the uncertainties that resulted. Section I will give a brief description of the situation that transpired before and during the First Taiwan Crisis during which the nationalists fled China and were uprooted to Taiwan.

The second section will describe the political, security, unification and economic motives of each state. Why was the P.R.C. willing to risk full scale war with the U.S. to take control of Taiwan (Particularly Quemoy and Matsu)? Why was the U.S. so willing to protect Taiwan (and Quemoy and Matsu), when they just had finished with two major wars? Answering these questions will help explain the payoff structure that existed for these two countries in the coming game. Section III, will introduce theoretical application of bargaining in crisis situations in

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international relations, as discussed by Thomas Schelling, Robert Powell, and Branislav Slantchev. This will build the foundation for a game model formalized in sections IV and V.

Section IV will apply the game model to the First Taiwanese crisis, in 1954-1955. Section V will apply the game model to the Second Taiwanese Crisis in 1958-1959, and discuss the effects of the first stage on the beliefs of the actors involved in the second stage. Having defined the parameters and payoffs of the game in Section IV, Section V will show how the flow of information across time can influence the actions and associated payoffs available to each player.

Section I: Conquest of China

The communist conquest of China has been the topic of heated American debate for many years. I will give a brief history of how Communist China arose, what happened to the Nationalist government thereafter, and American's reaction to the events. Understanding the early events of this P.R.C.-U.S. conflict will help illuminate the source of some uncertainties that developed during the subsequent crises.

I will begin with a brief review of what happened during the first crisis, to help set up my analysis of the bargaining situation during the crisis.

Initial Beginnings

The fall of the nationalists in mainland China was primarily due to the efforts of Mao Zedong, a Marxist who started his rise during the May Fourth Movement (a student led nationalist movement that opposed the Treaty of Versailles in 1919). He believed in the revolutionary potential of peasantry.³ He advocated that a revolution in China focus on the common peasant rather than on the urban proletariat, as prescribed by traditional Marxist-Leninist theoreticians (Shinn, Worden, 2005). Despite the failure of his rebellions (Autumn Harvest Uprising of 1927), Mao continued to work among the peasants of Hunan Province.

He began establishing peasant-based soviets (Communist local run governments) along the border between Hunan and Jiangxi provinces (Shinn, Worden, 2005). In collaboration with his military commander Zhu De, Mao turned the local peasants into a politicized guerrilla force (Shinn, Worden, 2005). By the winter of 1927-28, the combined "peasants' and workers'" army had some 10,000 troops (Shinn, Worden, 2005). In October 1935, after deadly campaigns against the red army, the Communists set up their headquarters at Yan'an. (Shinn, Worden, 2005) The movement would grow rapidly for the next ten years during World War II, undermining the Nationalist government.

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After the U.S. entered the war, Chiang Kai-Shek (Nationalist Leader) needed assistance from the U.S. to fight the Japanese brutal aggression in the Pacific. However, Roosevelt wanted to engage the Nazis first, and Washington consistently gave highest priority to smashing Hitler, providing minimum attention and resources to the Pacific.⁴ Additionally during the war, Chiang really sought after money, but all he obtained was American advisors (Tucker, 1994). The U.S. commitment to Chiang Kai Shek and his war efforts was not as committed as Chiang had expected. Roosevelt even tried to barter off Chinese political, economic and security rights in Manchuria and Mongolia to the U.S.S.R during the peace process. However, Chiang Kai Shek strongly claimed this territory was his. If the U.S. was not willing to acknowledge claims made by Chiang Kai Shek, in post World War II, how committed would they be to protect his claim in the upcoming crises?

The Conquest of Mao, the downfall of Chiang, and U.S. Response

After 1940, conflicts between the Nationalist government and Communist rebellion became more numerous in the territories not under Japanese control. The Communists expanded their influence wherever opportunities presented themselves through mass organizations, administrative reforms, and promising land and tax-reform measures favoring the peasants, while the Nationalists attempted to neutralize the spread of Communist influence.⁵ Mao Zedong's Red Army utilized guerilla warfare, and publicized an image that they were fighting for the people. Through this propaganda, and through organization tactics, the Communists increased party membership from 100,000 in 1937 to 1.2 million by 1945 (Guillermaz, 1972). In 1940 Mao outlined a program for the Chinese Communists that would lead to an eventual seizure of power.

Through the mediating diplomacy of the United States, a military truce was arranged in January 1946, but battles between Nationalists and Communists soon resumed (Guillermaz, 1972). The U.S. realized that short of large-scale armed intervention it could not stop the war. Thus, the United States withdrew the American forces in early 1947.⁶ During the revolution, the United States aided the Nationalists with massive economic loans but no military support, and the

civil war became more widespread (Thornton, 1982). Battles raged between the two sides, not only for territories, but also for the allegiance of cross sections of the population (Thornton, 1982).

The United States initial goal was to bring the Chinese communists into the government by means of the Nationalist's rendering some power.⁷ Truman believed that, although Washington and Moscow had embarked on road to confrontation with communism in Europe, he did not believe these policies, based on cold war assumptions, should be implemented in China. Therefore, this further produces more uncertainty on how committed the U.S. was to engage China in the 1950's and take that risk to fight communism in the Taiwan Strait.

By late 1948 the Nationalist position was bleak. The demoralized and undisciplined Nationalist troops proved no match for the People's Liberation Army (PLA). Even though the Nationalists had more troops, and weapons resources had been exhausted from World War II weren't as effective in battle.³ In 1949, major cities were taken by the Communist's, including Beijing in January.⁸ Chiang Kai-shek and a few hundred thousand Nationalist troops fled from the mainland to the island of Taiwan in the December prior.

The First Crisis

The P.R.C. in 1951 had prepared 800,000 troops and arranged that the R.O.C would be attacked by a joint air-sea-land amphibious force.⁹ However, the start of the Korean War, and U.S. intervention in Taiwan, changed these plans (Li, 1998). Beijing could no longer attack mainland Taiwan without risking a war with Washington. Mao attempted to communicate to the Americans directly, through diplomatic means; however, he was never able to arrange direct meetings with Zhou and Dulles going (Li, 1998). The U.S., also during this time, signed the Collective Defense Treaty with eight other countries, which alarmed Beijing (Li, 1998). The United States and Chiang were also collaborating on terms for a mutual security treaty, and if Mao did not do something quickly he believed the treaty would have the effect of technically legitimizing U.S. defense of Taiwan, and obstructing any of Beijing's effort to unify it.

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Mao decided to attack the small islands off the coast; because he believed they would not draw enough international attention to risk a conflict with the American forces over what he believed was a domestic matter (Li, 1998). Therefore, he decided to carry out attacks on the islands one by one, started with the Dachen Islands between March and May 1954 (Li, 1998). Though Dulles stated on August 3rd that a treaty was still in a thought stage, it did not reassure the P.R.C. ¹⁰ On August 17th 1954 the US warned the P.R.C. against action against Taiwan, but on September 3rd 1954 the Communists began an artillery bombardment of Quemoy with 5000 shells (New York Times, 1954). Several days of heavy fighting followed, during which the Communists continued to shell Quemoy and other places (New York Times, 1954). On September 4th, powerful U.S. Navy Forces including three aircraft carriers began converging on Taiwan for maneuvers that lasted almost three weeks. ¹¹

The United States signed the Mutual Defense Treaty with the Nationalist government on Taiwan on December 2nd 1954.⁹ The US-Nationalist Chinese Mutual Security Pact, which did not apply to islands along the Chinese mainland, was ratified by the Senate on February 9th 1955 (Li, 1998). The Formosa Resolution passed both houses of Congress on January 29th 1955.¹² The Resolution pledged the US to the defense of Taiwan, authorizing the president to employ American forces to defend Formosa and the Pescadores Island against armed attack, including such other territories as appropriate to defend them (Stolper, 1985). On April 23rd 1955 the P.R.C. stated at the Afro-Asian Conference that it was ready to negotiate on Taiwan, and on May 1st 1955 shelling of Quemoy-Matsu ceased, ending the crisis (Stolper, 1985).

This initial bombardment reveals a few uncertainties about the risk of brinkmanship. One of Mao's orders which he reiterated to all his troops during the crises through General Zhang was, "there should be no exchange of fire with U.S. airplanes or ships."⁹ To avoid any pilot accidentally engaging with the American airplanes, Mao explicitly commanded that only he directly would give the order about whether to fire on the U.S. Dulles also engaged in this risk, when he sent the aircraft carriers to the strait. There is uncertainty about whether the orders that

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were assigned to both militaries would be followed precisely. Will a soldier rebel against the orders given to him, and attack the other side, creating a misperception that could lead to war?

This summary examines some uncertainties such as U.S. commitment, risks of disobedience, and finally one other factor of uncertainty: the Soviet factor. The Soviet Union, (especially through the first crisis), was very quiet in publicly supporting its fellow communists but did provide some private guidance. Interestingly, the U.S. gave tremendous public and private support to the Republic of China. What the soviets were willing to do, and how they would respond, is an uncertainty I will illustrate in the following application of game theory.

Section II: Summary of Chinese and U.S. Motives for Engaging in the Crises.

To understand how bilateral relations deteriorated into strategic brinkmanship during the First and Second Crisis, it is necessary to first understand the incentives of each state.

Chinese Catalysts

The Chinese communist government (People's Republic of China) had been recently established in 1949, when Mao Zedong came to power, attempting to establish political legitimacy among its own people and among the international community after years of civil war.³ One of the main fears it had was the U.S. presence and policy of containment of communism. From American actions, Mao truly believed that Americans were imperialists and were going to invade the P.R.C. He was highly suspicious of the U.S. and any possible attempt to topple communist China, because of the U.S. grand strategy whose central aim was to contain communism. For this reason, political insecurity was one of the factors that caused the P.R.C. to engage in both of the Taiwan crises

Another major reason for engaging in the crisis (first and second), was the payoff of achieving their One China Policy goal. Before the rise of the nationalist government, China was fragmented into regions fought over by warlords. One of Mao's dreams was to bring back one China by reuniting all the major territories that China had controlled in its history. This included mainland China (which he controlled now), Taiwan, Tibet, and Mongolia.¹³

The Insecurity Factor For Mao Zedong

For the P.R.C., Taiwan represented insecurity similar to Cuba's role toward the U.S. during the early cold war. Because of the U.S. presence in Taiwan, the P.R.C. was concerned that if the Taiwan was not controlled, the U.S. would have a strategic opportunity to place military and weapons near the Chinese coast. This would enable the U.S. to place military bases and equipment necessary for attacks against the P.R.C, either through the air, or on the ground.

To make matters worse, the U.S possessed Matador cruise missiles. The Matador-A was radio-guided by an operator tracking it on radar from a beacon carried on the missile, and was

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fitted with a 50 kilotons nuclear warhead¹⁴. Though some sources also state that it could be fitted with a high explosive conventional warhead (Pike, 2005). Its range was six hundred and ninety miles, and the distance between Taiwan and China was about one hundred and fifty miles (Goebel, 2004). The U.S. also developed the Regulus 1 missile which was radio controlled and fitted with a nuclear warhead.¹⁵ Either a W-5 fission warhead with a yield of about 40 kilotons or starting from 1958, a W-27 fusion warhead with a yield in the megatons range could be utilized (Pike, 2005). The missile could fly up to a distance of five hundred miles (Pike, 2005). For these reasons, the P.R.C. was afraid that Taiwan would be used as a deployment point for U.S. troops attacking China similar to the tactic the United States employed in the Korean War, when over ninety-thousand troops were deployed from Japan.¹⁶

Not only was the P.R.C. insecure about Taiwan due to the added military capability it would give the U.S., they also felt insecure from recent U.S. signals that were contrary to Chinese interests and that were viewed as hostile. At the beginning of 1950, China was surrounded by the U.S. from South Korea, and Japan. The P.R.C. and the U.S. were enemies during the Korean War. In the 1950's the U.S. began the construction of missile bases in Korea, introducing nuclear weapons which made the P.R.C. even more insecure.¹³

This belief would be even more confirmed during the second crisis when a Taiwan-based C.I.A aircraft was used in the American attempted overthrow of the Lebanon government in 1958 (Gurtov, 1976). The Lebanon intervention may have convinced Mao and his colleagues that Nationalist activities in the Strait and elsewhere in Asia were part of an anti-communist pressure engineered from Washington. However, some experts believe that Beijing was never truly motivated by any U.S. invasion. During the entire campaign, Beijing tried to avoid any conflict with the American armed forces, and Mao never wanted to demonstrate U.S. vulnerability.⁹ Mao seemed to accept its (U.S.) overpowering position, and his strategy was just to alert the U.S. his concern, not threaten, and thus left a lot of room for bargaining. He wanted to channel U.S.

aggressiveness back into a diplomatic arena, because it would mean the failure of Chiang's efforts to bring about a U.S-P.R.C. confrontation, and a behind the back deal.¹³

The P.R.C.'s insecurity was also tied to its strong belief that a Nationalist-Communist conflict was a civil, and not a global cold war, conflict. At the Geneva Talks in 1953, the Chinese delegation sought acceptance of the principle of noninterference-the United States had no right to occupy Chinese territory, patrol the Strait, or have any security relations with Taiwan (Gurtov, 1976). In the P.R.C.'s eyes, the "Americans were just looking for ways to legitimize their intervention in Taiwan while denying the possibility of reconciliation with Peking".¹⁷ Mao Zedong thought that the P.R.C. people were exercising their sovereign rights in Taiwan, and it was a matter of China's internal affairs.

Therefore, the P.R.C. motives in engaging the war were a response from its insecurities. Mao's concern was to deflect a dangerous and growing threat to the P.R.C.'s security at a time of rapid domestic change and military weakness. He initiated a limited, low risk preemptive move against the offshore islands, in order to bring the Americans to their senses about their alliance with Taiwan. The P.R.C. was just responding tit-for-tat.^{18, 13} The P.R.C.'s incentives to take Taiwan were renewed with each U.S. action that illustrated its intention to protect and possibly utilize it.

The Dream of One China

One of the P.R.C.'s fears of losing Taiwan was not only because they would not achieve their dream of one China, but also that they would lose their claims over the other territories. If the P.R.C. were to allow Taiwan to be independent and not under its control, this would weaken the P.R.C.'s claims to Tibet and Mongolia, areas that constituted roughly thirty-five percent of its territory.¹⁹ Minister of National Defense Peng Dehuai broadcasted PLA orders in his hope for a peaceful settlement among the Chinese (since they believed it was a civil war), to create one China.¹³ Long before the crisis there had been American proposals for an agreement in the Strait.

Peng had always rejected them because they always implied the acceptance of a separate Taiwan (Gurtov, 1976).

Seizing the islands of Quemoy and Matsu would strengthen the P.R.C.'s claim for one united China. Experts state that "before during and after the Quemoy crises Mao and Chiang looked upon the island alike: the linchpin that made Quemoy and Taiwan parts of One China."²⁰ Mao, in a letter to Khrushchev, wrote that he wanted Chiang to remain situated on the islands and didn't want Chiang to be too far away. Having Chiang on Quemoy and Matsu meant that the P.R.C. could get Chiang at home with their shore batteries as well as their air force, sending the signal to the U.S. to not allow the division of Taiwan from the P.R.C.. Taiwan was also in the P.R.C. news such as People's Daily, several times a week.¹³ The Taiwan crisis helped Mao gain support for his one China policy, because it helped stimulate enthusiasm for united China, and also created enthusiasm for his Great Leap Forward economic policy.

Many experts state the crisis was created as Mao's attempt, to drown out his domestic problems in the eyes of his people (Gurtov, 1976). However, at the Chengdu party meeting in 1958 in the midst of the second crisis, Mao had many of his critics impressed concerning his domestic economic policy (Gurtov, 1976). Therefore, one of the other primary motivations for Mao to engage in the crisis was to fulfill his dream of a One-China. Engaging in the crisis, in his mind would enable him to attempt to deteriorate the U.S.-Nationalist relationship. It also allowed Mao to alert the U.S. with the bombardment (and no invasion of Quemoy and Matsu) that its claim should be taken seriously, and the P.R.C. would never settle for any two China's policy. Taiwan was central to the unification of Chinese territory, and the P.R.C. could not accept any treaty arrangement between the United States and Nationalist that formally separated Taiwan from the mainland or established an independent status for Taiwan. If the P.R.C. relinquished claim of Taiwan, its fear was that it could lead to a snowball effect of a fragmentation of its territory.

U.S. Stakes

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Similar to the P.R.C., security interests were one of the primary reasons the United States got involved in both crises. The U.S. had recently fought two major wars (Korea and World War II), in the Asia-Pacific and it believed its commitment in Taiwan was important to keep stability in the region and keep the P.R.C. from becoming the next threat.

The United States at this time also was beginning to implement its free trade policy around the world. Since it had a comparative advantage over many countries around the world that were small or destroyed, the U.S. wanted to open up new markets around the world, and Taiwan was one of its targets.

Preventing the Next War

Secretary of State John Foster Dulles believed that the U.S. occupation of Taiwan was viewed as crucial in the Cold War struggle between the free world and the communist bloc.²¹ The U.S. grand strategy at this time was containment developed by George F. Kennan, in which the idea was to prevent at every step the spread of communism around the world.²² The essence of containment was the domino theory, which held that allowing one regional state to fall to communism would threaten the entire region, similar to a series of dominoes toppling (O'Malley, DeAnza College). Furthermore, in the wake of communist conquest of China, economic dislocation in Japan, war in Korea and fighting in Indo-China, Dulles viewed the region as vulnerable in need of some protection.²¹ If the U.S. abandoned Taiwan it would be followed by a decrease in U.S. influence in the Asia-Pacific region and an increase in the P.R.C.'s ability to control the sea lines of communication that Japan and South Korea needed for their economic well-being and domestic stability.

However, Dulles was very cautious about the islands off the coast of China. For Chiang Kai-shek, the islands were important because he wanted to use the islands as a stepping stone for his eventual reconquest of the mainland.⁹ For Dulles, the prospect arising from Quemoy and Matsu -- that the United States might be plunged into a world war over handful of islands barely off China's coast-made the secretary pragmatically cautious. However, Chiang Kai-Shek

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stubbornly pursued his own agenda, investing approximately \$500 million, and deploying 100,000 of his best troops (one-third of national forces) on Quemoy and Matsu (Li, 1998). Chiang's strategy was his desire to ensure American participation in defending the offshore islands. This was one of the motives why Dulles engaged in the crisis, because he was left with no other choice, to stay the course with his grand strategy.

Additionally, if the U.S. abandoned Taiwan, it would create doubt from its regional allies about its commitment to them. It might lead them to rearm in future years to build up their military (such as Japan), because of their insecurity from the U.S. ability to protect them. It also would have negative implications for the U.S. and their image of commitment in the Cold War to the U.S.S.R.

Before the Korean War, there were virtually few motives the U.S. had to protect Taiwan; however, after the outbreak of the Korean conflict, the Truman administration openly reversed its position. The president announced that he had ordered the Seventh Fleet to neutralize the Taiwan Strait, thereby intervening in the Chinese Civil War.²³ The U.S. felt that they needed more allies in the region, especially after the P.R.C. entered the cold war. Thus, they created an alliance with the R.O.C. (Taiwan), and provided it with military and economic support. Between 1950 and 1968, massive amounts of military aid poured into Taiwan including about 2.5 billion dollars in aid to Taiwan, about \$167 million each year.²⁴ Security and creating stability (creating stable allies economically and militarily) in the region was one of the primary reasons the U.S. engaged in the crisis.

Protecting Their New Market

Not only did Washington have a desire to strengthen its strategic defenses in Asia against communist expansion; it was also paralleled by its determination to expand its commercial interests. It wanted to acquire new markets in the region, protect its trade routes, and increasingly find low-cost sources of productive labor.⁴ This was fueled by its new free market theme as evident by the creation of GATT.²⁵ GATT, a 23-nation, international treaty created in 1946 after

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World War II, encouraged reduction in tariffs and other international barriers, for example, 45 tariff concessions totaling of \$10 billion (Choi).

One example of U.S. self interest was the U.S. food aid under the Agricultural Trade Development and Assistance Act of 1954⁴ designed to help post World War II, countries recover. A closer look, however, reveals more than the desire to assist Taiwan — here was an opportunity for the U.S. to dispose of farm surpluses as well. The United States had invested a great deal of money from 1950 to 1965 to create a strong Taiwanese economy for its interests. From 1950-1965 the United States provided an annual average of \$100 million on Taiwan in nonmilitary assistance exceeding the per capita contribution made to any other government in the world during the same period (Tucker, 1994). U.S. assistance paid for 40 percent of Taiwan's total imports of both goods and services.²⁶ In addition, companies such as Singer Sewing Machine and Nationalist Distiller and Chemical Corporation were beginning to show interest investing there in the early 1950's and would eventually relocate there in the 1960's.⁴ As a consequence of this investment and new initiative in creating new markets abroad for their products, the U.S. engaged in the Taiwan crisis to protect this market.

Section III: International Relations Theory and Coercive Diplomacy in Crisis Bargaining Situations.

The center of my analysis now turns to a discussion of international relations, and the special case of general diplomatic strategy: crisis bargaining and brinkmanship. This section attempts to situate elements of the US-P.R.C. game within a broader theoretical framework developed most notably by Thomas C. Schelling, and Robert Powell. It will also include some theory from Melanie Hohlfeld and Branislav Slantchev.²⁸

Bargaining and Diplomacy of Violence in International Relations

International relations, at their most basic interpretation, are bargaining games. Through diplomacy players negotiate new solutions, bargain new contracts. However, they are different than usual bargains because these contracts are not enforceable by a court. This process is typically time consuming, and involves the players making offers and counter-offers to each other (Hohlfeld, 2003). Bargaining is diplomacy; it seeks outcomes that, though not completely ideal for either party, are better for both than some of the alternatives (Arms and Influence, 1967).

With enough military force, however, a country may not need to bargain. It can repel, expel, penetrate, occupy, seize and exterminate to achieve its goal (Slantchev, 2005). It can do this if it has enough strength. “Enough” in our crisis depends on how much strength the U.S. or the P.R.C. has. However, brute force can only accomplish what requires no cooperation. The principle is illustrated by a technique of unarmed combat: one can disable a man by various stunning, fracturing, or killing blows, but to take him to jail one has to exploit the man’s own efforts (Arms And Influence, 1967).

Another primary technique which a nation can use in crisis bargaining to achieve its objectives is armed influence (coercion). Armed influence by a country is a basically a threat or promise that is instituted by a country A to country B, in order to force country B to achieve some objective of country A. It is very different than brute force, because the pure military recourse to forcible action is concerned with an enemy’s strength, not enemy’s interest; the coercive use of

the power to hurt, though, is the very exploitation of enemy wants and fears (Arms and Influence, 1967).

In crisis bargaining situations such as the two Taiwanese strait crises, we can observe that armed influence is used as the primary tool for both the U.S. and P.R.C, not brute force. For example, the P.R.C. attacked the islands of Matsu and Quemoy for this purpose. In addition, brute force succeeds when used, whereas the power to hurt is most successful when held in reserve (Arms and Influence, 1967). It is the threat of damage or of more damage to come, that can make someone yield or comply (Arms and Influence, 1967). Whether it is sheer terroristic violence to induce an irrational response or cool premeditated violence to persuade somebody that you mean it and may do it again, it is not the pain or damage that is the purpose but the influence it has on somebody's behavior that matters (Arms and Influence, 1967). It is the expectation of more violence that gets the wanted behavior, and this is the diplomacy of violence.

Brinkmanship is another version of diplomacy of violence. It is the manipulation of risk to achieve new ends. In brinkmanship, solutions are negotiated using threats that raise the risk of war to both parties, the risk that the bargaining process will break down (Hohlfeld, 2003). Threats in brinkmanship do not suggest the certainty of disaster but the possibility of it. Thus, players engaged in brinkmanship must calculate which moves will be effective in arriving at an advantageous contract given the parameters of the game (Hohlfeld, 2003). The two players in the following model are carrying out such actions. These two states (the P.R.C. and the U.S.) have employed brinkmanship tactics to negotiate in a repeated bargaining game marked by a mixture of both conflict and a mutual dependence of their decisions. This is demonstrated when the P.R.C. step by step attacked one island after another off the coast of China near Taiwan, during the first Taiwanese Crisis (Quemoy, Matsu, than the Yijiangshan Islands), then observed the U.S. response.

However, how the game is played and the outcome of it is tremendously influenced by the tactics used by each side.

Bargaining Tactics, Outcomes, and Expectations.

Bargaining power has been described as the power to fool and bluff, “the ability to set the best price for yourself and fool the other man into thinking this was your maximum offer.”²⁹

According to Schelling’s Strategy of Conflict, power, strength, and skill, contrary to commonly held beliefs, are not always advantageous in bargaining situations. They might not get you far if you are dealing with a stubborn and unsophisticated counterpart. People in bargaining positions should note that bluffing, either by tactic or deception, can be an important element of bargaining. In cases of limited war, where issues of incomplete and asymmetric information are prevalent, tacit bargaining becomes important (Schelling, 1963). Assuming common interests, tacit coordination would require coordination of predictions, i.e. mutual recognition of some unique signal that coordinates the parties’ expectations of each other (Schelling, 1963). Results from certain artificial environment tests have suggested that “people can often concert their intentions or expectations with others if each knows that the other is trying to do the same” (Schelling, 1967). Finding a mutually recognized sign may depend on several different factors such as analogy, precedent, symmetry, aesthetic or geometric configuration etc (Schelling, 1967).

These mutually recognized signs or focal points tend to be well-known or noticeable in some way or another. They tend to be unique in a fashion that prevents vagueness and ambiguity.

However, innuendo and vagueness can often prove to be more successful than directness in bargaining. For example, one major strategy that can be used is tacit bargaining -- the ability to manipulate communication and use it to your advantage. Tacit bargaining is implicit and unstated (Schelling, 1963). A state can destroy communication or refuse to collaborate if one is aware of his advantage and confident of the solution he foresees. If a pilot crash lands his plane, and is able to announce his position stating that his transmitter works but not his receiver, and he will wait where he is until help arrives, the listener has no choice but to obey or ignore his instructions (Schelling, 1963). He can make no effective counter-offer, since no effective counter offer can be heard. This can be an effective strategy to influence the subsequent move of the other player in

the game. However, though tacit bargaining is possible, there is no assurance that it will succeed or that it will result in a particularly favorable outcome compared to the alternatives if full diplomatic communication had been possible.

Schelling states that most bargaining situations ultimately involve some range of possible outcomes within which each party would rather make a concession than fail to reach an agreement at all (Strategy of Conflict, 1963). Each party's strategy thus is guided mainly by what he expects the other to accept or insist on and each party knows that the other is guided by the same thoughts. The final outcome must be a point from which neither expects the other to retreat and the main ingredient of this expectation is what one thinks the other expects the first to expect. According to Schelling, these expectations will converge onto a single point, in which each party expects the other not to retreat.³⁰ In our game theory model, this could possibly occur in two places during the crises. The first possible outcome could occur where the P.R.C. believes that the U.S. will not retreat from Taiwan. Thus they converge on this focal point, and decide it is better to abandon any One China policy aspirations they have desired, at least for the time being.

The outcome could also occur vice versa. The U.S. may have the expectation that the P.R.C. will not retreat, and thus makes the concession rather than have no agreement at all. It decides to not follow through with providing security for Taiwan, not willing to take the risk (since it just has fought two major wars), and abandons any security or guarantees of security they have provided. However, the basic problem with both of these scenarios is that both the United States and P.R.C. will view these outcomes as having the ability to create even more challenges in the future. Thus, based on this expectation, these two scenarios are not likely to occur. Schelling discusses at length the coordination of players' expectations on certain outcomes, especially in tacit negotiation situations, and proposes that outcomes built on simplicity, precedent, or uniqueness are the solutions to which players will gravitate during the bargaining process.³¹ The most probable scenario to conclude these crises, therefore, will be a third option: the maintenance of the status quo. The P.R.C. will submit and allow U.S. security

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presence in Taiwan. However, the U.S. will not regain any territory lost during the crises, and the P.R.C. will not loosen its claim to Taiwan. But the method it chooses to enforce this claim will be implemented more subtly.

Finally, Robert Powell's theories on bargaining outcomes present good analysis on crisis situations and brinkmanship. He states that in a scenario of international relations where there is complete information, bargaining never breaks down in war and the state never fights in equilibrium. If both states are satisfied, neither can credibly threaten to use force to revise the status quo, and the status quo goes unchanged. If one of the states is dissatisfied, the satisfied state offers the dissatisfied state some control or power. The dissatisfied state accepts this offer, and the status quo is peacefully revised in its favor.

However, in our situation there is a case of asymmetric information, because the satisfied state (the U.S.) is uncertain of what is needed to appease the dissatisfied state. This uncertainty creates a risk-return trade-off. The more the U.S. offers the P.R.C., the greater the probability of satisfying the P.R.C.'s demands, and thereby averting war. But the more the U.S. concedes in the Taiwan crises the less it will have if the concession is accepted (meaning the less influence it will have in Asia to achieve its goals).

In balancing these factors, states often accept some risk of war and this is a calculated risk. If the states agree to revise the status quo without war, the agreement generally reflects the underlying distribution of power (Powell, 1999). Thus, Powell's theory confirms the possible resolution proposed from Schelling's theory. The U.S. and the P.R.C. agreed to leave the status quo unchanged without war; this generally reflects the underlying distribution of power, where the U.S. continues to be the hegemony. Therefore, the outcome that results is one where the P.R.C. is not successful in achieving its one China policy (regaining control over Taiwan). Because if the P.R.C. did regain control, the U.S. would lose control and influence over their regional hegemony in the Asia Pacific which would challenge Powell's assumption to be reflective of the underlying distribution of power.

The Art of Commitments, and Threats

Coercive devices such as threats or commitments form the communication structure of brinkmanship games and are tools to limit the choices of the other player. Players employ these devices to change the payoff structures in such a way that some moves become prohibitively costly and thus make certain decisions attractive (Hohlfeld, 2003). Both stratagems – promises and commitments– facilitate the bargaining process by communicating the intent, reservation prices, political factors, economic limitations, psychological thresholds, and goodwill of each player (Hohlfeld, 2003).

The threat is a surrender of choice, a renunciation of alternatives that makes one worse off in the event the tactic fails (Strategy of Conflict, 1963). According to Schelling there are two types of threats. Firstly, there are threats of actual intervention--where each party has every incentive to carry out retaliation against an unfavorable move by the other side. The potential deterring effect of these threats is not their primary function. Second, there are threats of deterrence only-- each party has no real incentive to carry out intervention and whose specific purpose is to deter through promise of mutual harm. Committing oneself to an act one would rather not perform, as a way to deter the other party, can be successful if the party commits to the point of no return, forcing the other to concede if it wants to avoid mutual destruction. When a person has lost the power to help himself, for example, or the power to avert mutual damage, the other interested party has no choice but to assume the cost or responsibility (Strategy of Conflict, 1963).

According to Schelling, the commitment is a strategic move, a move that induces the other players to choose in one's favor. It constrains the other player's choice by affecting his expectations. Both the threat and commitment are motivated by the possibility that a rational second player can be constrained by his knowledge that the first player has altered his own incentive structure. (Strategy of Conflict, 1963).

However, there is a very clear distinction between threats and commitments in game theory. The difference between the two lies in each player's interpretation of the moves of the other. The commitment can be interpreted as a "first move" tactic by converting an indeterminate negotiating game into a two-move game where one player makes a commitment to a certain action by altering his existing payoffs and the other player makes a decision in response to this changed incentive structure (Hohlfeld, 2003). The threat, conversely, is a promise to respond to an undesired move. The threat proposes costs to both players and, if effective, will change the payoff structure and expectations of the target so as to provoke a move that favors the player that made the initial threat (Hohlfeld, 2003). The threat is a "second move" tactic that converts an indeterminate negotiating game into a two-move game; one player threatens to retaliate only if the other player fails to choose a desired action (Hohlfeld, 2003).

However, using the commitment tactic creates some risks. If it fails to work, you may be left with a commitment you never intended to execute. It also leads to a commitment problem where each actor acting in his own self-interest leads to an outcome that leaves everyone worse-off (e.g. war in our model). (Robert Powell, 1999).

Application of Coercion strategies between the United States and the P.R.C.

Strategic coercion takes two basic forms: deterrence and compellence, two notions explained in the lectures of Professor Branslav Slantchev.

Deterrence

Deterrence persuade opponents not to initiate action; we make the demand, explain the consequences of acting, and then wait (success is measured by whether something happens); if the opponent "crosses the line" we've drawn, we take punitive action (Slantchev, 2005). An example of this are jails (punishment whose purpose is to deter potential criminals. The success of prisons is thus measured by how empty they are. However, it is hard to judge whether an event fails to occur because of successful deterrence or for other reasons. Basically, deterrence is conservative: it seeks to protect the status quo (Slantchev, 2005).

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As described above, deterrence helps the U.S. keep the status quo for its economic and security motives. The U.S. wanted to continue to have influence in the region, and believed that any political gain for the P.R.C, would threaten its hegemonic stability. The U.S. action which attempted to deter the P.R.C. was the signing of the 1954 Mutual Defense Treaty-- a commitment that the U.S. would use its troops stationed in nearby Korea and Japan in case the P.R.C. attacked the Republic of China. It was a deterrent in the sense that it prevented the P.R.C. from invading Taiwan to accomplish its One China policy.

One of the weaknesses of a deterrent threat is that it will fail if it is not credible, that is, if one's opponent does not believe he will abandon his alternative choices. This is the reason the P.R.C. did not believe the threat from the Mutual Security Treaty and seized Yijiangshan Island, 210 miles north of Formosa, completely wiping out the ROC forces stationed there in 1955.

Compellence

Compellence persuades an opponent to change his behavior we make a demand of action, then initiate our own, and continue doing it until the opponent ceases (Slantchev, 2005). Success of compellence is easy to see because it entails the reversal or halting of ongoing behavior. Again, this may happen for other reasons but it is hard to avoid this coercive threat. Because compellence is active and seeks to change the status quo it usually requires that you make the status quo sufficiently unpleasant and promise to improve if the opponent complies (Slantchev, 2005). You can also threaten to make the status quo progressively worse if he persists in non-compliance (Slantchev, 2005). Types of threat includes: denial (making it difficult to gain an object); punishment (hurt); and escalating risks/costs, all of which are methods to create compellence (Slantchev, 2005).

The action the U.S. undertook to compel the P.R.C. to change its ways utilized the threat of massive retaliation. In February of 1955, Dulles began to publicly signal his willingness to use nuclear weapons. He stated that the US was seriously considering using atomic weapons in the Quemoy-Matsu area. The following day President Eisenhower publicly stated that "A-bombs can

be used...as you would use a bullet" (Stolper, 1985) thus threatening to make the status quo substantially worse if the P.R.C. persisted in its aggression against the R.O.C. and the border islands (Stolper, 1985).

By the same token, the P.R.C. used strategic coercion to compel the United States to withdraw its support and forces from the ROC. They bombarded the islands of Matsu and Quemoy in 1954, and continued their hostility toward other islands during the crisis (Stolper, 1985). However, their strategy of compellence was different. They made the status quo sufficiently unpleasant, but also promised to improve it, if the U.S. complied and withdrew.

Thus the nature of a compellent threat differs from the deterrent threat in that it often requires the punishment be administered until the other acts rather than if the initiator acts (Schelling, 1967). Experts argue that because compelling another state is usually much harder than deterrence, this is why crises often result in the maintenance of status quo. This, in fact, may have been one of the main reasons why our third option played out, as described above.

Communicating Threats and Commitments

The Art of Communication

In order for coercion to be successful an actor must be able to communicate his threats and commitments to the opponent he wishes to influence. It is through communication of threats and commitments that players publicize information about their expectations and incentives (Hohlfeld, 2003). If your adversary does not receive the threat or comprehend the commitment, he will not update his beliefs regarding the payoffs of each player and thus the coercion techniques will fail (Hohlfeld, 2003). However, words alone may not be effective in communication. For example, from August 23rd through October of 1958, the communist government resumed a massive artillery bombardment of Quemoy and Matsu, and threatened invasion (Li, 1998). These actions attempted to communicate to the Eisenhower administration its toughness and resolve to regain control of the R.O.C. Once the shelling began, the United States made it clear that it would support the R.O.C. in the defense of the islands, deploying a large

naval contingent in the Taiwan Straits. Thus, this proved that these moves were not credible enough to prevent the U.S. from assisting the ROC further. They were not credible enough because they did not change U.S. expectations of a low probability of a full scaled war with the P.R.C. and the Soviet Union. Words alone do not make the adversary convinced of your commitment because the opponent knows that talk is cheap, and it is almost costless to make a baseless threat.

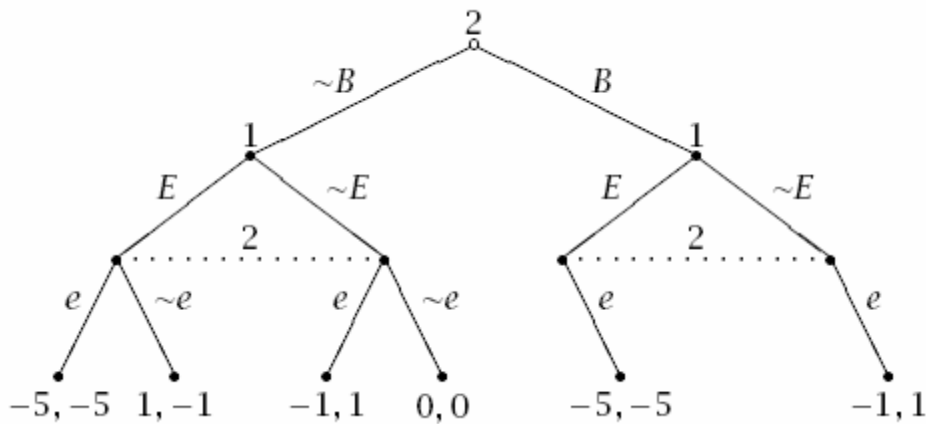
The Art of Making Threats Credible

The major problem in using threats and promises is that one may have no incentive to follow through on them because they are always costly to the player making them. That is, they may not be credible. But as we have seen, if they are not credible, they will have no effect on the expectations of the opponent, who will ignore and refuse to believe them. If they fail to influence his expectations, he will not change his behavior, and, most importantly, the initiator will have to face the consequences (Hohlfeld, 2003). Thus, the art of credible commitments constitutes an enormously important part of achieving the goals of national security.

There are three ways, according to Slantchev, to make threats credible, and to solve the commitment problem. The first method of acquiring credibility is to structure the situation in such a way that you would have no choice but to carry out the action you have threatened or promised. Conversely, you may attempt to maneuver the opponent into a position where it will be up to him to make the painful decision. A method of doing this is constraining choice (Slantchev, 2005). Limiting one's choices in an observable and irreversible way may help establish a credible commitment by eliminating an embarrassing array of choices that tempt one to escape the commitment. When you think about it, the credibility problem arises from the temptation not to carry out the action expected of you. If you eliminate these tempting alternatives, then you would have no way of choosing them (Slantchev, 2005). That is, you will have no choice but to execute the threat or promise you have made. The U.S. initiated this process by signing the Mutual Security threat. By signing the treaty they were signaling to their adversary that they had no

choice but to carry out their threat to protect Taiwan because they had staked their honor and reputation on it.

An even more plausible strategy (another technique in strategy 1) is to remove the option for your opponent to select the tempting action altogether. This is called burning bridges and comes from the ancient practice of armies burning the bridges behind them to ensure that they have no choice but proceed forward (Slantchev, 2005). An example is show below (Slantchev, 2005).



The initial action is B (burn the bridge) or $\sim B$ (do not burn it). If player 2 chooses not to burn the bridge, then the original crisis game is played. If player 2 burns the bridge, he cannot choose not to escalate in response to player 1's escalation. Our model is heavily influenced by this commitment strategy.

Another general way of acquiring credibility is to change your own future payoffs such that what was not in your interest to do before becomes optimal now (and therefore credible) (Slantchev, 2005). One technique for doing this is acquiring your reputation, a strategy that allows one to restructure the future payoffs in a way conducive to making commitments credible (Slantchev, 2005). For example, it may not be worth the expense for the U.S. to defend Kuwait from Iraq for the sake of the Kuwaitis, or West Berlin from the East Germans for the sake of the other Germans before. A threat to use costly force for such a purpose can be dismissed as

incredible. However, if the U.S. manages to convince Iraq or the U.S.S.R. that it considers such defense a matter of reputation, in the future it might work to create credibility. (Slantchev, 2005). It could work because the U.S. would be telling its opponents that it expects grave consequences from the failure to act: not only the (admittedly negligent) loss of the current prize at stake, but future losses resulting from losing the reputation for being a trustworthy ally (Slantchev, 2005).

During our two crises, both the United States and the P.R.C. may have been able to implement the strategy. The P.R.C. could have used this strategy because it could have communicated to the U.S. that if they lost Taiwan, their reputation would reflect that they were weak. Thus, they would not be able to acquire the other remaining territories that the P.R.C. wanted. The U.S. who wanted to remain stable in the region needed to maintain its reputation vis à vis the Soviet Union. Otherwise, if they lost this conflict they would appear weak and uncommitted to the U.S.S.R.

The last strategy to make your commitment appear credible is manipulating risk, or brinkmanship. This strategy depends on the willingness of the players to take a risk of desired and maybe unexpected consequences (Slantchev, 2005).

Additional Brinkmanship application in our Model

In games of brinkmanship, players are unable to assess how willing or capable the other players is to carry out a threat (Hohlfeld, 2003). In our game theory model, it is difficult to distinguish between these two types of players. A state that is engaged who will never surrender and is committed regardless of the consequences (willing to go to full scale war) can be identified as a strong type of player in our model (Strategy of Conflict, 1963). A state that is willing to surrender, and is not really committed to make military or resource sacrifices, is a weak actor in our model.

In our model, if the P.R.C. knew which type of U.S. it was dealing with, it would have a tremendous effect on how it would play the game. A primary strategy that the U.S. could utilize, in our conflict model, would be to appear tough if it is weak (Schelling, 1960, and Hohlfeld,

2003). A non-committed, weak type U.S. could choose an aggressive strategy that could convince the P.R.C. that it is dealing with a strong committed state that would rather go to war than surrender to the P.R.C. demands.

The Failure of Coercion

As Hohlfeld explains, coercion fails because the threat fails. The goal of the threat is not to follow through with the punishment, because coercion operates only the absence of punishment. Therefore, coercion fails if either party miscalculates the incentives or payoff structures of the other parties in the game, and thus the threat will not be credible enough to change the other player's expectations (Hohlfeld, 2003).

One of the other primary reasons a threat can fail is because of the lack of control in brinkmanship. A state does not have full control of all its people and elements involved in the conflict such as "faulty information, faulty communication, misunderstandings, misuse of authority, panic, or human or mechanical failure" (The Strategy of Conflict, 1960). Any or all of these can produce war, even when it is not wished for. One example of this risk could have occurred before the invasion of Yijiangshan Island, when Ma specifically ordered his troops that there should be no conflict with the U.S. forces. However, if a few of the Chinese soldiers rebelled and disobeyed the order, it could result in a full-fledged confrontational war between the countries. Since coercion carries these risks, it is not costless to display threats.

Section IV: The First Taiwan Strait Crisis

Now I will apply the game model to analyze the relationship between China (P.R.C.) and the U.S. We treat these separate conflicts as the same game repeated over time. They are linked by the beliefs that the players adjust in the first interaction, which may affect the outcome in the second one.

Specifically, I will analyze the use of brinkmanship in the First Taiwanese Strait Crisis, which concluded with the Afro-Asia Conference.¹ After defining the players, parameters, and payoffs of a two-stage game, I will examine the process by which players develop strategies to optimize their payoffs in every outcome and through this, identify deceptive maneuvers that will never be optimal for a player to pursue, given the conditions of the game.³²

Chronology of Moves that occur in the Certain, Uncertain Crisis Bargaining Game.

In 1950, America was involved with Korea, Indochina and the Taiwan Straits, all of which were neighbors of the P.R.C. After the Korean War had ended the P.R.C. leaders believed that the American intervention in the Taiwan Straits (its defeat) might lead to U.S. withdrawal. At the Geneva Conference in July 1954, the P.R.C. had warned the U.S. that this situation was a civil war, not a cold war conflict, and thus the U.S. had no right to occupy Chinese territory.¹³ The U.S. countered by insisting that the P.R.C. renounce any use of force to decide Taiwan's future, and accept Taiwan's right of self-defense, implying defense partnership with Washington and separation for Taiwan (Gurtov, 1976).

The P.R.C. grew especially worried about U.S. intervention. If they did not respond quickly the U.S. would solidify their defense of the island and any opportunity Mao had to unify China would be gone. The P.R.C. launched a three channel liberate Taiwan campaign, and entered Phase I of the game. Channel one was the political campaign itself; the second channel consisted of condemnation of the U.S. at the U.N. council; the third channel was continuous military operations aimed at the off shore islands (Li, 1998). The P.R.C. chose the Dachen Islands

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as their first target for air and sea control (Li, 1998). By challenging U.S. support, the P.R.C. initiated phase I of the game with the U.S.

On Sept 3, they bombarded the island of Quemoy with 7000 artillery shells and over the next several days, shelled Matsu and the other Islands.¹² The shelling was designed to signal to Washington that if Chiang tried to gain control over any territories (island or the Mainland), they would encounter the stiffest opposition. Thus, Mao began the process of developing credibility in the game. In turn, Dulles, who was visiting Manila for a conference during this time, made a statement to local politicians urging the U.S should and will defend those islands.⁹ He believed that the loss of Quemoy would have great psychological repercussions and lead to mounting Communist action. The U.S. responded immediately when three carriers, a cruiser division, and three destroyer divisions of the seventh fleet were standing seven miles from Quemoy on September 5th (Li, 1998).

Dulles had initially told Chiang that the United States would not back an invasion, creating some friction, between them.¹² However, in October of that year the United States sent a message to Chiang stating that they were prepared to negotiate a mutual defense treaty with him (Stolper, 1985) After a month of negotiations, Dulles and Chiang agreed to the Mutual Defense Treaty (November 23rd), and it was officially signed on December 2nd (Stolper, 1985). Peking responded by expressing its utmost anger at America's open occupation of the P.R.C.'s territory and warned of grave consequences if the United States did not withdraw its armed forces from the area of Taiwan (Stolper, 1985).

On January 18th 1955 mainland Chinese forces seized Yijiangshan Island, 210 miles north of Formosa and completely wiped out the ROC forces stationed there. Mao told his troops before the attacks that there should be no conflict with the U.S. forces (Stolper, 1985). The Tachens had to be evacuated on January 19th.^{9, 12.}

The two sides (Nationalists and Communists) continued fighting on Quemoy, Matsu, and along the mainland Chinese coast. The fighting even extended to mainland Chinese coastal

ports.¹² The Formosa Resolution passed both houses of Congress on January 29th 1955, pledging the US to the defense of Taiwan, and authorizing the president to employ American forces to defend Formosa and the Pescadores Island against armed attack, including such other territories as appropriate to defend them (Stolper, 1985).

In February of that year, Dulles began to signal that the United States was prepared to assist Taiwan in an invasion, and publicly stated that the US was seriously considering using atomic weapons in the Quemoy-Matsu area. The following day President Eisenhower stated that "A-bombs can be used...as you would use a bullet" (Stolper, 1985). Dulles and Eisenhower issued a threat of massive retaliation to compel their P.R.C. opponents in the game to stop their aggression and depart the islands they had invaded. But more realistically the goal of the threat was to deter the P.R.C. from invading the R.O.C.

After these events occurred, tensions starting easing a bit over the next few months, with the P.R.C. attempting to interest the United States in negotiations (Stolper, 1985). Each side made moves reducing tensions for the next two months and on April 23rd 1955, The P.R.C. stated at the Afro-Asian Conference that it was ready to negotiate seriously on Taiwan. The first crisis concluded on May 1st 1955 when the shelling of Quemoy-Matsu ceased, ending the crisis (Stolper, 1985).

The risk of mutual disaster was raised by each player's succeeding move, the risk that the bargaining process would fail to find a feasible agreement and lead to war. This would result in the worst payoff for each player. The threats and counter threats of United States and P.R.C. can be broadly defined as signaling tactics in an undetermined bargaining situation, as described by Schelling. The decision of the United States to sign the mutual security treaty transformed the indeterminate dialogue into a determinate cooperative bargaining game.

Uncertainty of the Players

The interactions between China (P.R.C.) and the U.S. are characterized by incomplete information. When the P.R.C. applies pressure on the U.S. through military actions, or threats to

compel it to remove their support for Taiwan, they are unclear about what type of state they are dealing with. Are they dealing with a “committed U.S.” player who would rather go to full scale war than submit to the P.R.C.’s demands, or a “not committed” soft player, who would rather abandon their Taiwanese goals than initiate a war with the P.R.C.? The P.R.C. is uncertain of the payoff structure of the U.S. (which one it belongs to) and therefore lacks the knowledge to know the viability of its (U.S.) threats.

Game theory illustrates this uncertainty by separating one actor into different types of players: a “committed” type player who is willing and able to engage in war to protect their regional alliance, and one “uncommitted” type player that is either not willing or not able to wage war to guard their ally (Hohlfeld, 2003). If the U.S. is an “uncommitted” type of player, then it is neither willing nor capable (or both) to follow through with a threat of nuclear action or full scale war. It prefers to abandon the challenge over Taiwan, if it is left with no other choice. If the U.S. is the “committed” type then it is willing, and capable, of launching a nuclear strike against the P.R.C. If left between the choice of going to full scale war with P.R.C. or abandoning their alliance with Taiwan, the committed player would choose the former.

In the game model we represent chance events by a random move of nature. Nature, denoted by N , is a pseudo-player whose actions are purely mechanical and probabilistic; that is, they determine the probability distribution over the chance events (Kreps, 1990). In our example, nature chooses which type of player (committed or not committed) interacts in the game with the P.R.C. Once nature has chosen, it informs the U.S. of what type of player it is competing as.

The P.R.C. is unaware of the type of player the U.S. is, in this bargaining situation. Thus, even before the game is started it assigns a probability depicted by the letter ρ . This variable measures the probability that the U.S. is a “committed” type of player that is willing and capable to commence a full scale war, which may include nuclear weapons, and prefers this outcome to the alternative of submitting.

As the game progresses, this parameter is updated using Bayes' Theorem following each move by the U.S.; presumably with each move the U.S. reveals more about which type of U.S. it is: committed or not committed. Conversely, the probability that the P.R.C faces an "uncommitted" U.S. is equal to $(1 - \rho)$ (Hohlfeld, 2003). Thereafter the model closes. The P.R.C. generates a probability distribution to measure the likelihood that the U.S. is a hard committed regime and the estimation of ρ by the P.R.C. is common knowledge among all players.

Analysis of the Game

The game model shown below is a sequential game with a strict order of play. Players take turns making their moves, knowing the previous moves of the other players. Each player in the game must consider: if I make this move, how will my opponent respond? Thus players decide their current moves based on calculations of future consequences. The main task of the game model is to create a description of the strategies available to the players, and more importantly predict the actual behavior when the game is played. The primary mission of this first model is to find the equilibrium which is the purpose of our game.

In our game there is a set of N players= (1, 2), where 1 represents the United States and 2 represents the People's Republic of China. Each player knows his own payoff function for every outcome, but is uncertain as to the payoff functions of the other player. For player 1, there is a finite number of types selected from the set V of possible types such that player 1's true type, $b_i \in V = \{I, II\}$ for $i = 1$. Type I represents the committed U.S. and type II represents the uncommitted U.S. player. As stated by Hohlfeld, this expanded the game from two players, original player one (U.S.) and player two (P.R.C.), to three potential players: committed U.S., uncommitted U.S. and the P.R.C.

The game starts with an outside force (nature) determining the U.S. player type. Each branch then leads to a decision node, where player 2 (P.R.C.) makes a move. As stated before, all available actions are common knowledge among players—the P.R.C. has complete information

regarding the “committed” and “uncommitted” of the United States at each stage of the game and vice versa. Both U.S. types draw from the same set of feasible actions (Hohlfeld, 2003). An information set for some player i summarizes what the player knows when he gets to move (Harsanyi and Selten, 1978). For each of the information sets a player must choose what to do. An action (or move) for player i is a choice, denoted by ai that player i can make at that information set. Let $Ai = \{ai\}$ denote the set of choices at an information set, that is, the set of actions from which the player must choose. The set of actions may be different depending on the information set. Let h denote an arbitrary information set. Then $Ai(h)$ is the set of actions available to player i at information set h . If the player does not get to move at information set h , then $Ai(h) = \emptyset$ (Gates and Humes, 1997). In my description A_{1a} will represent uncommitted U.S., A_{1b} will represent committed U.S, and A_2 will represent moves of the P.R.C.. There are two available actions sets that each player can choose from, at stage one of the game. However, the decisions are similar in stage one. The feasible actions for each player in stage one are the following

$A_2, \text{ stage } 1 = \{\text{Challenge, Submission}\}$

$A_{1a}, \text{ stage } 1 = \{\text{Challenge the P.R.C with display, Challenge P.R.C without display, Submission}\}$

$A_{1b}, \text{ stage } 1 = \{\text{Challenge the P.R.C with display, Challenge P.R.C. without display, Submission}\}$

If a player chooses to submit, the game is over, and there is a convergence of expectations where a contract is formed. The result is that the U.S. submits, pulling its troops out of the R.O.C and leaving it to battle the P.R.C. alone. The U.S. will let the situation work itself out without any intervention. Another conclusion of the contract is that the P.R.C. submits, and halts military aggression against the R.O.C., and the nearby islands. However, this conclusion does not mean it will abandon the nearby islands. The challenge with display by the U.S. is intended to represent that it rejects the P.R.C.’s proposal to pull out, and illustrates a use of force to demonstrate its resolve against the P.R.C.. Two examples that illustrate this challenge with display, during the actual crisis, were when the U.S. deployed the three carriers, a cruiser division, and three

destroyer divisions of the Seventh Fleet, and the signing of the Mutual Defense Treaty with the R.O.C.

This option is distinct from challenge without display, which is comprised of a verbal threat alone such as threatening that “a-bombs can be used as a bullet” (Stolper, 1985, Hohlfeld 2003). If neither of the states submit then the game continues to stage 2, with the P.R.C. moving first, and then the U.S. The possible actions in stage two for three players are as follows:

$A_2, \text{ stage } 2 = \{\text{Military Response Threat, Face saving submission, Submission}\}$
 $A_{1a}, \text{ stage } 2 = \{\text{Submit}\}$
 $A_{1b}, \text{ stage } 2 = \{\text{Submission, Full Scale War}\}$

In the second stage of the game, note that the uncommitted actor will not go to full scale war, since he is neither willing nor capable. Thus, his option at the end will be limited to submission, compared to the committed actor who is capable and willing to go to war.

If war has commenced then the game is over. If a player submits it is assumed that there is a convergence of expectations and a contract is formed. The contract consists of either the U.S. withdrawing its troops and support for the R.O.C., or the P.R.C. halting their aggression against the R.O.C., and allowing the U.S. to continue their support for it. If war has begun, no convergence of expectations has occurred and no contract is formed. However, it is logical to believe that at this time, since the P.R.C. does not have the military and economic resources to win a battle against the U.S., they would lose and be forced to stop their aggression and their government would probably be dismantled and given back to the Nationalists. But one of the risks of brinkmanship is that there could be a collapse of negotiations between the two sides, and this could cause a conflict, even if this conflict could represent a costly, worst case outcome for both players (Hohlfeld, 2003).

The Game played in a Two-stage Negotiations Process

Nature chooses the vector of player types at the start of this determinate bargaining game. Since the game is incomplete, player two (P.R.C) does not know the type of its opponent (the U.S.), but each player has full knowledge of its own type once nature has moved. There are two

possible states in the world, as described by Hohlfeld. The first state of the world describes a committed U.S. playing the P.R.C and occurs with probability ρ . The second state of the world describes the uncommitted soft type U.S. and occurs with probability $(1 - \rho)$.

Figure one illustrates the game, taking into consideration the two possible states of the world. The model assumes that both the U.S. and the P.R.C. are rational, payoff-maximizing players. It also assumes that the payoff structure for each player at every outcome is common knowledge among all the actors in the game (Hohlfeld, 2003). Under these assumptions, each player will look into the future nodes of the game to develop strategies that will optimize their payoff at any particular node, in any possible event. Before we discuss the payoffs and risks associated with every outcome for each player, we want to try to eliminate any actions that, while possible, will never be optimal for a player to choose.

The dotted arcs in the figure below show the information sets faced by the P.R.C. The P.R.C. cannot identify which type of U.S. Nature has chosen to play. However, it can observe what kind of challenge the U.S. responds with (with display or without display).

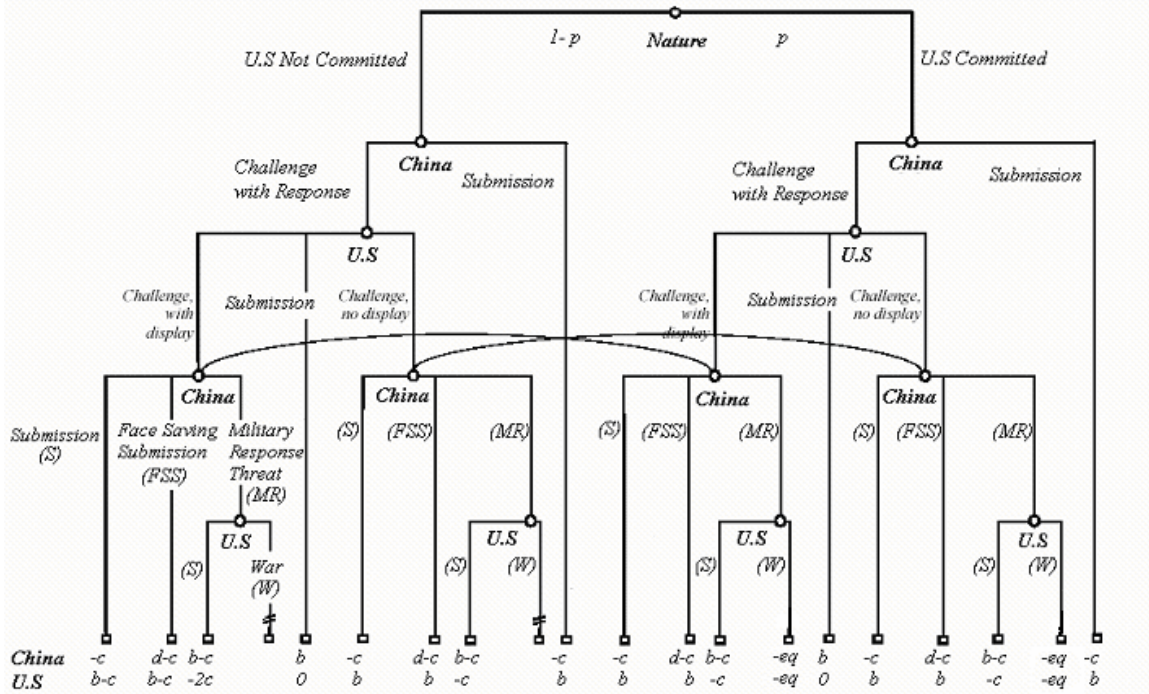


Figure 1: Two-Stage Negotiations

The decision tree of figure one above shows the payoffs won by each player at every outcome. Whenever the P.R.C. secures an outcome that requires the U.S. to pull out, it earns a payoff of b ; conversely, whenever the U.S. secures a contract that allows for the halt of aggression from the P.R.C. it earns a payoff of b for itself, regardless of its type. However, from the payoffs structure illustrated in the model, we can observe that different types of U.S. players incur different costs for displaying. For example, a committed U.S. can choose the action “challenge and display” without incurring a cost to display because it is both willing and capable to fulfill its threat. However an uncommitted U.S. incurs greater costs for displaying when it challenges, even when the P.R.C. submits. The uncommitted U.S. must assume these additional costs because it risks more by imitating the committed type U.S. It is neither willing nor able to uphold a threat of war, unlike a type I committed U.S.

Comparing these payoffs helps us eliminate which actions will never be optimal for any type of U.S. We will examine each information set to complete a process of elimination:

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- I. {U.S. committed/ U.S. displays, U.S. uncommitted/U.S. displays}. Here the P.R.C. has observed some form of display by the United States. It is common knowledge among players that an uncommitted U.S. will incur a cost for imitating the committed type U.S. and that a committed U.S. displays without incurring any cost.
- II. {U.S. Committed /U.S. no display, U.S. uncommitted/ U.S. no display}. Here the U.S. rejects the P.R.C.'s proposal to withdraw but does not make any display to show its commitment to support the R.O.C. Although the P.R.C. does not know which type of U.S. nature has chosen, the payoffs at each outcome are, as previously stated, common knowledge. Therefore the P.R.C. knows that a committed U.S. does not suffer any additional costs to display. Because display will enhance the credibility of its threat, the committed U.S. will do so automatically. The committed U.S. will never choose to challenge without display. Thus the P.R.C. can assume that anytime the U.S. chooses an action "Challenge without display" it is facing an uncommitted U.S. The uncommitted U.S., knowing this move will reveal its type to the P.R.C. automatically, will instead choose to submit. Thus, challenge without display is omitted.

This examination has led to omitting challenge without display option for both the committed and uncommitted U.S.

Figure Two shows the revised simplified model and the payoffs to each player at each outcome.

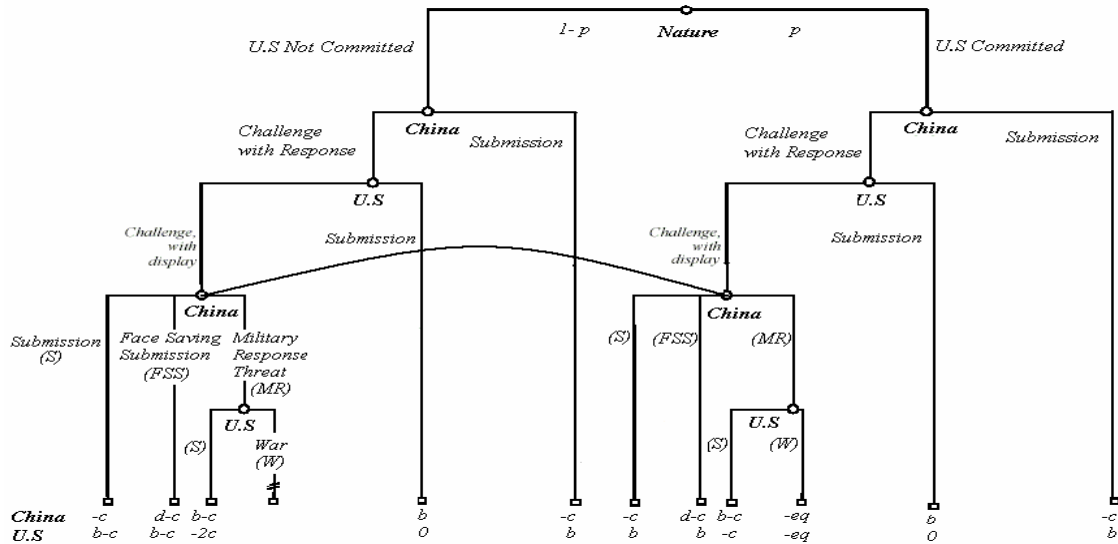


Figure 2: Two-Stage Negotiation

U.S. Payoffs: We assume that whenever an outcome allows for the U.S. to continue to support the R.O.C and limit P.R.C. aggression, it earns some positive number b as a payoff. However, the major question is what costs must the U.S. assume to achieve an outcome where it is able to protect its alliance with the R.O.C.? The U.S. best outcome occurs where the P.R.C. does not challenge it and the prevailing status is that the United States is the only legitimate authority that has influence in the R.O.C. The payoff that this generates is b , regardless of whether the U.S. is a committed type I player, or type II player.

The next least cost selection for the U.S. is if P.R.C. challenges, but later submits to a U.S. challenge. If the U.S. is a committed type of regime, it can challenge and display without incurring any cost if the P.R.C. submits. Thus, if the P.R.C. submits the committed type U.S. earns a payoff of b for counter-challenging. However, if the U.S. is an uncommitted type of player, when it displays and imitates the type I U.S. it also incurs a cost equal to c . Therefore, if the uncommitted U.S. challenges with display, and the P.R.C. submits, it will earn a payoff equal to $b-c$, which is greater than 0 but less than b ($b > b-c > 0$). If the U.S. chooses not to challenge and simply chooses to submit after the P.R.C. challenges it earns a payoff of zero, regardless of being a type I or type II player.

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If the P.R.C. does not submit to a U.S. counter-challenge, it is assumed that the U.S. cannot continue to ally with the R.O.C. without the cost of P.R.C. aggression. This is based on the assumption the Chinese do have large numbers of troops, that are trained in the art of guerilla warfare. It already has demonstrated its strength when they drove out the Nationalists, so it could be costly against U.S. forces. We also assume, as we stated before, that an uncommitted U.S. will not respond to a military response threat with a preemptive attack of full scale war because the U.S. may not be willing or even capable, because it has to fight the cold war against the U.S.S.R, and has resources committed there. Therefore, if the P.R.C. threatens with military response, the uncommitted U.S. will submit with a probability equal to 1 and suffer some cost $-2c$, the cost of a failed bluff. In contrast the committed U.S. is willing and capable to launch a full scale war against the P.R.C., and the nearby islands. They also can do so with probability q .

Whenever the committed U.S. responds to a military response threat with the initiation of war, it earns some negative payoff e , where $e > d > c$. The value of e represents an outcome of complete disagreement, an un-mendable breakdown in negotiations (e also $> -2c$). It is the worst outcome for both players. While U.S. may gain some satisfaction in standing up to their cold war enemy, it may ultimately result in the demise of their alliance, many casualties, and significantly reduce resources from the Cold War with the Soviets. The expected payoff from the “full scale war” response is $-eq$. If the committed type U.S. submits to a P.R.C. military response threat, it also suffers a negative payoff of c . This is again the cost of a failed bluff. However, the cost is not as high compared to an uncommitted U.S. because this type of player had the capability and willingness to back it up.

One of the last payoffs that the U.S. can receive from this model is the face saving submission choice; distinct from pure submission because it sends a signal of commitment to the U.S. for the next game. The P.R.C. is stating that the U.S. may have won this battle for the R.O.C. However, it still has not lost the war or given up its claim, and gives the P.R.C. some more credibility in the next game. An example of this face saving submission occurred right before the

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P.R.C. surrendered in 1955. On January 18th 1955 mainland Chinese forces seized Yijiangshan Island, 210 miles north of Formosa and completely wiped out the ROC forces stationed there (Stolper, 1985). In the game model, if the P.R.C. conducts this move, the committed U.S. earns a payoff of b . move, and the uncommitted U.S. earns a payoff of $b-c$.

The People's Republic of China Payoffs

If we assume that the U.S. receives some positive payoff b , whenever the final contract allows for them to continue their alliance, we also assume that whenever the final solution dictates a dismantling of this alliance, the P.R.C. earns some positive payoff, which is also illustrated by b . Thus, from the P.R.C. perspective, the best outcome occurs when it initially challenges the U.S. and the U.S. subsequently submits by abandoning their military and state support for the R.O.C. This earns the P.R.C. a payoff of b , regardless of what type the U.S. is. If the U.S. does not immediately submit, but submits after additional threats in the form of military response, the benefits the P.R.C. obtains will diminish in proportion to the costs it must incur to dismantle U.S. collaboration with the R.O.C. A military threat for the P.R.C is costly because it risks the loss of Chinese soldiers, destruction of property, and deters resources from economic growth. Thus, the payoff to the P.R.C. of securing a non-allied R.O.C. by way of military threat is some positive number equal to $b-c$. Whenever the R.P.C. fails to negotiate a contract, or reach a convergence of expectations, it earns a negative payoff of e ($e > c$), similar to the U.S.

If at any point the P.R.C. submits, it faces future risks, in the form of possible U.S. invasion and nuclear strikes, erosion of its economic and military development, and possible loss of other territories that the P.R.C. wishes to reacquire. The payoff of submitting at any point is represented by $-c$. Finally, the last payoff we need to discuss regarding the P.R.C. concerns the face saving submission choice. One of the reasons the P.R.C chooses this option rather than simply submitting is because it earns a payoff of d ($c < d < e$). The payoff d is a type of credibility factor that the P.R.C. gains, illustrating to the U.S. as well as their own people, their resolve. The real payoff they achieve from d is illustrated in the next game. This payoff illustrates the

satisfaction gained by the P.R.C from knowing that it has a better chance to win the next game, due to the risks being higher for the U.S (from China's increased credibility). Thus, the payoff that the P.R.C. receives from the face saving submission choice is $d-c$, regardless of the U.S. type. The P.R.C. still incurs the future costs because it has submitted in the game, and still has to bear that risk, since the U.S. is still right next door, supporting the R.O.C.

The P.R.C. Decision-Making

Both the U.S. and the P.R.C. are rational, profit-maximizing players. They use the available information to look ahead, and solve problems frequently, to develop a strategy that dictates an optimal decision in any possibility. The P.R.C., before it challenges the U.S., must determine how it will respond if the U.S. counter challenges it. It must also consider whether it is the committed or uncommitted type, and the probability (q) that the committed type will initiate war. If the U.S. responds with a counter-challenge the R.P.C. has three available actions at its disposal: 1) submission to the U.S. 2) Face Saving Submission, and 3) Military Response Threat. Using all the available information, it examines the expected payoff of each action, and then calculates the expected utility of any one action. The worst payoff resulting from war can be any number greater than d or $2c$, so we substitute an arbitrary $3c$ for e to show more clearly the R.P.C. decisions and payoffs.³⁴

Firstly, let's look at the expected utility of submitting to the U.S. The R.P.C. earns the same payoff with certainty, regardless of the type of U.S. it faces, so this provides a good benchmark to make other more risky choices:

$$EU(\text{Submission}) = (1-p)(-c) + (p)(-c) = -c.$$

Compare this with the expected value of a face saving submission:

$$EU(\text{Face Saving Submission}) = (1-p)(d-c) + (p)(d-c) = d-c$$

Now we will look at the expected utility of a military threat.

$$EU(\text{Military Threat}) = (1-p)(b-c) + (p)(b-c)(1-q) + (p)(-3c)(q)$$

$$\text{EU(Military Threat)} = b - c - b \rho q - 2c \rho q$$

If the P.R.C chooses to submit after being challenged by the U.S., seeing as the EU of a face saving submission is higher than a pure one it will choose to face save. Thus, when the EU (military threat) is greater than $d - c$, it will consider the military threat as a tool to coerce the U.S. to abandon its treaty. If the military threat is less than the payoff that it earns by face-saving, and it cannot earn a higher payoff by any other action, then it will choose to face save (Gates and Humes, 1997). The precise condition for the EU (military threat) to be greater than $d - c$ is satisfied when $\rho < (b - d) / [q(b + 2c)]$.

What parameters affect this threshold? Taking the partial derivative of ρ with respect to d , one can see that as c increases, or as the cost to the P.R.C. of implementing its threat increases, the P.R.C. requires the probability that the U.S. is a committed type regime to be smaller. Similarly, the decision to use the threat of military action is also influenced by the probability q that a committed U.S. will initiate war. As q decreases, holding all other variables constant, the critical risk threshold for ρ increases. The P.R.C. is only willing to make a military threat against the U.S. when its estimation of ρ is below this risk threshold (Hohlfeld, 2003).

These two thresholds are the answer to Hohlfeld's question of "how likely" a threat must be to deter his opponent: these conditions constitute the critical risk thresholds of the P.R.C. It is the aim of the U.S. in these negotiations to convince the P.R.C through the communication of a credible threat when it "challenges" the P.R.C that it is "too likely" to be the "committed type" U.S., that it is "too likely" to initiate war. When the P.R.C. estimates ρ and estimates the U.S. is "too likely," the risks and costs of these actions become unpalatable, and the P.R.C selects face-saving submission.

U.S. Payoffs and Types of Equilibria

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In the simple two-stage bargaining model, if the U.S. challenges the P.R.C., the P.R.C. will respond with a military response unless the expected payoff to dismantle the alliance drops below the certain payoff of $d-c$. In that case, the P.R.C would prefer to conduct the face saving submission and allow the alliance and independence of the R.O.C. Another question that this raises is: when will the U.S. challenge? The answer to this question depends on the size of the cost to display, c , which depends on its player type. For example if the cost to an uncommitted U.S. of imitating the committed U.S. is too high, it will not be optimal for the uncommitted U.S. to challenge with the display. Specifically, if $2c > b$ (this is the cost for an uncommitted U.S. incurs for challenging with display and submitting after P.R.C. military response threat) then the cost of display for the uncommitted U.S. is too high. This display serves to separate the two types (Separating Equilibrium), because it will never be optimal for the uncommitted U.S. to incur this cost, since the benefits are lower.

However, let's look at the opposite side: what if the cost to display is low such that $2c < b$? If c is low enough, it will be profitable for an uncommitted U.S. to imitate a committed U.S. This could increase the expected payoff to the uncommitted U.S. such that it is optimal to bluff the P.R.C. Thus a necessary condition for a "pooling equilibrium" to emerge would be that $2c$ is less than b (Avinash and Dixit, 1999).

However, there is a further condition for such an equilibrium, namely, that the probability of being uncommitted is sufficiently small. In this case we also require that the probability of a committed type, ρ , to be sufficiently large. The probability of the committed U.S. must exceed the risk threshold developed above. The reason that the probability of the U.S. being uncommitted must be small is because if the U.S. were more likely to be uncommitted, then the P.R.C. would find it optimal to fight any randomly picked type of challenger. As a result, the uncommitted U.S. would not find it optimal to challenge at all (Avinash and Dixit, 1999). Thus, if

c is sufficiently small and p is sufficiently large, we would expect a pooling of types to develop where the uncommitted U.S. could increase its payoffs by pretending to be the Type I regime.

There also exists a third type of equilibrium in our model called the semi-separating equilibrium. This equilibrium occurs when c is very low and the probability that the U.S. is uncommitted is high (Avinash and Dixit, 1999). If there were an equilibrium of this kind, then the P.R.C. would infer that a challenge with display was evidence of a strong type. Thus, a truly uncommitted U.S. would find it optimal to exploit this belief by challenging with display because it would get mistaken for a committed type. This illustrates that a separating equilibrium cannot last. However, a pooling equilibrium cannot last either because the probability of the U.S. being uncommitted is so high that if it always challenged with display, it would be optimal for the P.R.C. to fight every time (Avinash and Dixit, 1999). Thus this illustrates that it cannot be optimal for the uncommitted U.S. to never challenge; nor can it be optimal for it to always challenge. What we have is a semi separating equilibrium, where having no display identifies the U.S. as uncommitted, but using a display leaves some ambiguity about its type (Avinash and Dixit, 1999).

Equilibrium Conclusion

The table below summarizes my conclusions for the equilibria that are possible.

		Probability of a Weak Type, p	
		$p < (b - d) / [(q)(b + 2c)]$	$p > (b - d) / [(q)(b + 2c)]$
Cost of Display, c	$2c < b$	Pooling	Semiseparating
	$2c > b$	Separating	

In my analysis of two-stage negotiations, I have highlighted the process by which the P.R.C decides to employ a threat in a game of incomplete information. I have also shown how an uncommitted U.S., given certain conditions, can exploit the uncertainty in the game to increase its payoffs by imitating a more committed type of player. From my discussion of the real-life crisis

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that includes U.S. nuclear threats and concluded with the P.R.C. face saving submission, there is strong reason to believe that the U.S. did precisely this in the conflict with Mao. This confirms the claims made by Avinash and Dixit, Gates and Humes, and Hohlfeld. The U.S. exploited the elements of uncertainty to achieve a higher payoff in the short run. Next we will run a second model, and show the effects of the first model.

Section V: The Second Taiwan Strait Crisis

In the spring of 1955, the Eisenhower administration was fully prepared to support the Chinese Nationalists in the offshore islands. However, Eisenhower still was cautious about the continuing occupation of Quemoy and Matsu. As we will show in this section, the tactics of the second crisis derive from the outcome of the bargaining game concluded under the first crisis. As relations between the two states are essentially the same game repeated in time we will not go into depth, as we did in section IV, about how each player makes a decision at each node.

I will also choose an equilibrium according to what occurred historically, and analyze whether this can be a true equilibrium in the model for plausible values of the payoffs, and initial prior probabilities. This section is used to highlight how the flow of information across time affects the costs incurred by players and to illustrate how players update information based on previous bargaining outcomes.

Chronology of moves during the Second Crisis

In the spring of 1955 President Eisenhower sent a mission to persuade Chiang Kai-shek to withdraw from Quemoy and Matsu because they were exposed. The President was unsuccessful; Chiang Kai-shek would not pull out (Stolper, 1985). Subsequently Eisenhower provided the Nationalists with air-to-air missiles that enabled them to sweep Mao's MIGs from the skies over the Taiwan Straits. He also sent to Quemoy and Matsu 8-inch howitzers capable of firing nuclear shells (Li, 1998). The military situation in the strait began to look more favorable for the Nationalists in 1956 and 1957, a result of these improvements in the Nationalist forces due to US military assistance, and of the 1957 agreement between the United States and the Republic of China that placed Matador missiles on Taiwan. These surface-to-surface weapons were capable of carrying conventional or nuclear warheads up to 600 miles (Goebel, 2004).

Such developments, when combined with the US reduction of its representation to the US-P.R.C. Geneva talks from ambassador in early 1958, may well have led the P.R.C. to believe that the situation in the strait was menacing (Gordon, 1985). The renewed threat to the islands

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came after reliability of the Soviet deterrent (Soviet ICBM'S) was being questioned within the Chinese defense establishment (Gordon, 1985).

In 1958, the second phase of the game began. From August 23rd through October of 1958, the Communist government resumed a massive artillery bombardment of Quemoy and Matsu, and threatened invasion (Stolper, 1985). In 1958, the P.R.C. shelled Quemoy from August 23 to August 29 with an average of over 10,000 shells per day. However, they lowered the level of shelling to less than 1,000 shells per day from August 30 to September 4 (Stolper, 1985). The P.R.C. patrol boats blockaded Quemoy and Matsu against Chinese Nationalist re-supply efforts This was accompanied by an aggressive propaganda assault on the United States, threats against American naval ships, and a declaration of intent to "liberate" Taiwan. Quemoy had been used by the Nationalists to mount raids on mainland China (Gordon, 1985).

The U.S.S.R. was very late in its support for the P.R.C. in the second crisis. Not until Beijing signaled its intention to limit the level of military commitment to the strait did the USSR make an unambiguous statement in support of the P.R.C. Furthermore, in a letter to President Eisenhower, Khrushchev wrote that an American attack on China would be viewed as an attack on the U.S.S.R. On October 5th 1958, Khrushchev reiterated this position in an interview with a Tass reporter (Gordon, 1985). It is clear, however, that Khrushchev's "nuclear threat" was to serve as a demonstration of his support for the P.R.C. -- not of readiness to fight the United States.

Having learned the lessons from the 1954-1955 crisis, Eisenhower was able to act quickly in 1958. Responding to public commitments by the US to defend Quemoy and Matsu, the Eisenhower administration deployed forces to the region. On August 25th, he directed the U.S. military to prepare to escort and protect supply ships to the offshore islands. Also, the possibility of a major attack seriously endangered the islands. Thus, he took protective steps, which included possible plans of attack on the P.R.C. coastal air bases, and use of atomic weapons if necessary (Stolper, 1985). The American response also included a large naval contingent in the Taiwan Straits. The defenders of the islands were supplied by ships escorted by US naval vessels on

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August 29th (Stolper, 1985). Senior American officials, including President Eisenhower and Secretary of State John Foster Dulles, publicly affirmed the US commitment to defend Taiwan and to counter naval threats in the Taiwan Straits. Dulles declared that the U.S. would take "timely and effective action to defend Taiwan" (Stolper 1985 & Herring 1990).

American naval aircraft also helped the Nationalist air force establish control of the region's airspace. Nationalist pilots flying American-made fighters defeated their Communist opponents in a series of air battles that cast doubt on the quality of Communist's pilots and aircraft (Hickey, 1994). As tension mounted between the United States and the P.R.C., the U.S. Joint Chiefs of Staff developed plans for nuclear strikes at the Chinese cities of Shanghai, Guangzhou and Nanjing (Stolper, 1985). These plans were consistent with the public statements of Dulles, who on January 12th 1954 had threatened "massive retaliation" against Communist aggression and expressed willingness to go "to the brink" of war to stop such aggression (Herring, 1990). The Joint Chiefs of Staff plans for nuclear strikes which would result in millions of non-combatant casualties, were publicly stated (Hickey, 1994).

The day of decision for the United States was September 4th, 1958, when Eisenhower formally decided that the loss of Quemoy whether by invasion or surrender might bring about the loss of Taiwan. Dulles and Eisenhower also issued a public statement warning the P.R.C. of the extremely dangerous situation which might be created by its military actions against Quemoy or Matsu (Stolper, 1985).

The bombardment abated, then virtually ceased after President Eisenhower's warning. This unexpected forceful American response surprised the P.R.C. and Soviet leaders, and on September 6th 1958 Zhou Enlai proposed a resumption of ambassadorial-level talks with the United States in order to arrange a conclusion to the crisis (Stolper, 1985). The United States during this time still had six carriers and more than 500 warplanes on call (Stolper, 1985). From September 8th to October 6th, Peking resumed shelling of about 11,000 shells per day to protest the use of American naval escorts. The crisis ended on October 6th 1958 when the P.R.C.

Minister of National Defense Marshal Peng Dehuai offered to negotiate a peaceful settlement with the nationalists and announced that the P.R.C. would suspend the bombardment for one week (Stolper, 1985). Chinese leaders were careful throughout the crisis to avoid a direct confrontation with US forces. However, they continued to declare their ultimate intention to extend their sovereignty over Taiwan and the offshore islands by resuming shelling starting October 25th, on odd-numbered days, that persisted for 20 years (Stolper, 1985).

The Effects of the First Crisis On The Second

The actions and strategies of the first game during the first crisis are the same under the second game during the second Taiwan Crisis. Specifically, we assume that there is a set of N players = $\{1, 2\}$, where 1 represents the U.S. and 2 represents the P.R.C. For player 1, there is a finite number of types selected from the set V possible types such that player 1's true type, $b_i \in V = \{1, 2\}$ for $i = 1$. Type 1 represents the committed type player 1 and type 2 represents the uncommitted player 1. Thus, there exist two possible states of the world: $B = [11, 2\cdot], [12, 2\cdot]$ where the first state of the world $B = [11, 2\cdot]$ describes a committed U.S. playing the P.R.C. and occurs with probability ρ . The second state of the world $B = [12, 2\cdot]$ describes the uncommitted U.S. and occurs with probability $(1 - \rho)$. However, as this analysis will show, the P.R.C.

estimates of ρ have been updated based on information learned from outcomes of earlier games.

Each player selects an action from the available action set A_i for $i = \{1, 2\}$ at stage one of the game, which is common knowledge among players.

$A_{2\cdot}, \text{ stage } 1 = \{\text{Challenge, Submission}\}$

$A_{1a}, \text{ stage } 1 = \{\text{Challenge the P.R.C with display, Challenge P.R.C without display, Submission}\}$

$A_{1b}, \text{ stage } 1 = \{\text{Challenge the P.R.C with display, Challenge P.R.C. without display, Submission}\}$

If a player chooses to submit, the game is over, and there is a convergence of expectations where a contract is formed in which either the 1) the U.S. pulls its support for the R.O.C. if player 1 submits or 2) the P.R.C. stops the aggression and bombardment, and gives up its claim for the R.O.C. for now.

If neither player submits in stage one, the game progresses to stage two, again with player 2 moving before player 1. The feasible action sets for each player in stage two are the following:

$$A_2, \text{ stage 2} = \{\text{Military Response Threat, Submission}\}$$

$$A_{1a}, \text{ stage 2} = \{\text{Submit}\}$$

$$A_{1b}, \text{ stage 2} = \{\text{Submission, Full Scale War}\}$$

Whenever war is initiated or a player submits, the game is over. Figure 4 illustrates the two-stage bargaining game, complete with payoffs, played during the second Taiwan Crisis.

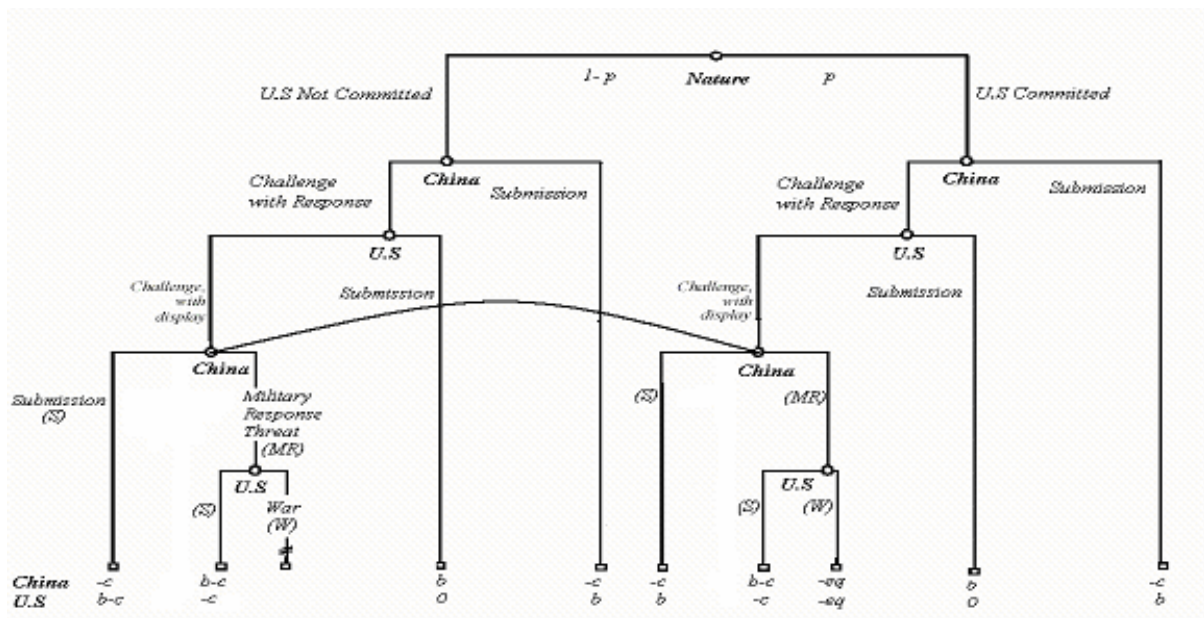


Figure 4: 2nd Taiwan Strait Crisis

The game is a repeat of previous play, but it should be underscored that some parameters of the game have changed because the players have learned something of each other from earlier games. One element of the game that has changed is the cost to display or make a threat. The cost of display c is history-dependent. What display tactics were effective in 1954 must be eclipsed in

1958 to carry the same credibility. This raises the cost of c , which may make it sub-optimal for the uncommitted U.S. to challenge (Hohlfeld, 2003).

Another reason the cost is higher is the critical role of the face saving submission. As stated before, when the P.R.C. conducted the face saving submission they were stating that the U.S. may have won this battle for the R.O.C. However, it still has not lost the war or given up its claim. The face saving submission tactic increased the P.R.C.'s credibility in the 2nd crisis, and thus increased even more the costs for the U.S. As we noted in section IV, the precise condition that makes challenging unprofitable for the uncommitted U.S. type is when $2c > b$. When this condition is satisfied, the uncommitted U.S. earns a negative payoff from imitating the committed U.S. and thus will choose to submit instead; a separating equilibrium will emerge. However if c does not increase to satisfy this condition and the probability that ρ is sufficiently large, the game will produce again a pooling equilibrium. In this case, as we explained in the previous section, it will still be optimal for an uncommitted U.S. to imitate a committed U.S. because it can earn a higher payoff by bluffing (Hohlfeld, 2003).

As stated above, the emergence of a revealing or pooling equilibrium depends not only on the cost to challenge and display, which has most likely increased, but it also depends on the P.R.C. assessment of ρ , the probability with which nature chooses a committed type U.S. Using information observed from the earlier game, the P.R.C. will update its prior estimate of ρ . In 1954, the U.S. challenged the P.R.C. with display and ultimately the P.R.C. submitted to U.S. demands to halt aggression through face saving submission. Naturally, one might think that this would automatically indicate the probability of the U.S. being a hard-type regime is 100% ($p = 1.00$).

However, there are more factors at play in a real-world scenario. Imagine an equilibrium, in which the U.S. preferences would have made it optimal for an uncommitted type

U.S. to back down in the first game. The problem with this choice is that it would reveal to its opponent that it is uncommitted, and would have enormous costs and negative effects in the second game. Thus it chooses to play tough in the first in order to create a more optimal outcome in the second game.

There is also a second uncertainty that exists in the game as illustrated through Hohlfeld's model. The source of the uncertainty emanates from the parameter q , the probability with which the committed U.S. follows through with the threat of war in response to military actions. It emanates from the very definition of brinkmanship: posing the risk of disaster, but not the certainty of it (Hohlfeld, 2003). In the first game, q was some number greater than zero and less than one, such that the P.R.C. knew the expected payoffs associated with a threat of war. The P.R.C. uses the information of the first game to generate a posterior probability of seeing a committed-type regime according to Bayes' Theorem.

The probability that the R.P.C. observes of how committed the U.S. is, is based on the strategy that the U.S. played in the last game. As stated above, the U.S. could have imitated to be a committed player, even though it was not (pooling equilibrium), or it could just appear to be a not committed player, resulting in a separating equilibrium.

Strategy 1: Committed Given War Did Not Result

p (probability of how committed it is now)' = pr ($\beta = 11, 2.$ committed in the last game | the U.S. didn't go to war in Stage 1)

$$p' = [\text{pr (U.S. didn't go to war | } \beta = 11, 2.) \cdot \text{pr (} \beta = 11, 2.)] / \text{Pr (U.S. didn't go to war)}^{35}$$

$$p' = [(1-q) (\rho)] / [(1-\rho) (1) + ((\rho) (1-q))]$$

$$p' = [(1-q) (\rho)] / [1-\rho + \rho - \rho q]$$

$$p' = [(1-q) (\rho)] / [1-\rho q]^{35}$$

$$p' = [\rho - \rho q] / [1-\rho q]$$

Strategy 2: Not Committed Given War Did Not Result

p (probability of how committed it is now)' = pr ($\beta = 12, 2.$ uncommitted in the last game | the U.S. didn't go to war in Stage 1)

$$p' = [\text{pr (U.S. didn't go to war | } \beta = 12, 2.) \cdot \text{pr (} \beta = 12, 2.)] / \text{pr (U.S. didn't go to war)}$$

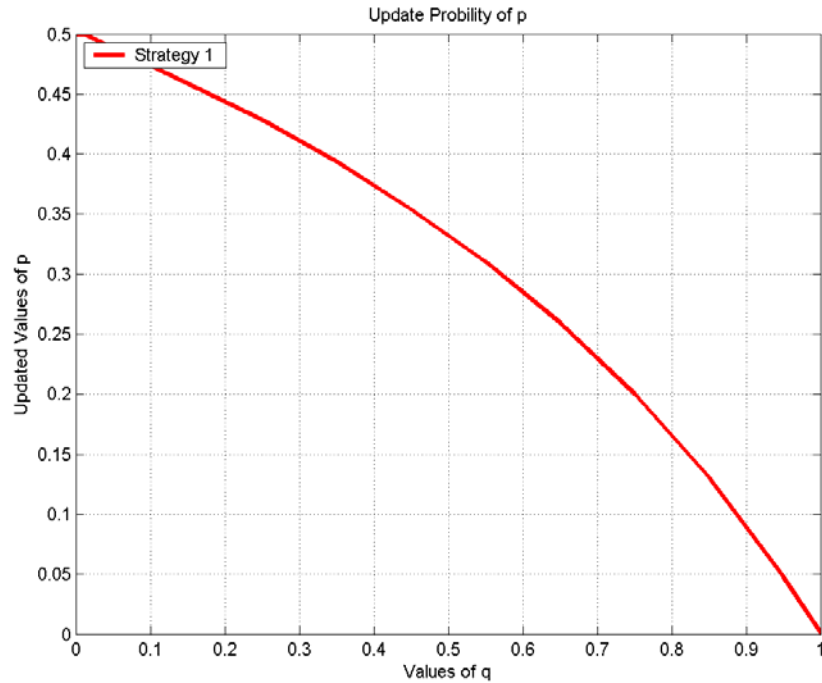
$$p' = [(1 - p)(1)] / [(1 - p)(1) + (p)(1 - q)]$$

$$p' = [(1 - p)] / [(1 - p + p - pq)]$$

$$p' = [(1 - p)] / [(1 - pq)]$$

Thus, the U.S. will choose to imitate the committed type in stage 1 of the game, if it believes the probability of how committed it is in stage 2 (from the P.R.C. calculation) is higher as a result. This occurs when $p - pq > 1 - p$ or when $p > 1 / (2 - q)$. The U.S. will choose to play the strategy of being committed given that war did not result in the first game, as long as the probability that the U.S. is committed in the first game is greater than $1 / (2 - \text{the probability the committed U.S. will go to war which is } q)$. It will choose to imitate if it receives the optimal outcome of a higher belief of being committed by the P.R.C. in the second game. This condition results in a pooling equilibrium. However, if this condition does not hold, then the U.S. will choose not to imitate, and stay uncommitted, resulting in a separating equilibrium.

Let's assume that the equation is satisfied and the U.S. chooses strategy one. Given this relationship of the prior estimation of p , the new estimation of the U.S.'s type by the P.R.C. has been degraded. To make the discussion more clear, let's assume that the U.S. assessment of p in game one was $p = 0.50$. Using Bayes Theorem, strategy number 1, $p' = [(1 - q)(0.5)] / [1 - 0.5q]$ we can plot the relationship between the updated assessment of a committed type U.S. and the probability of initiating war (Hohlfeld, 2003):



36.

As we can see, the original estimation of p' , the probability that the U.S. would have followed through with its threat to initiate war is the upper limit on the updated estimation of the U.S. as a committed-type player (Hohlfeld, 2003). When the probability q that the U.S. would actually fight was very low in game one, the estimation of p by the P.R.C. is relatively unchanged.

However, as q increases, this high value of q dramatically lowers the P.R.C.'s estimation of the U.S. as a committed type player in the second game, based on their decision to submit and save face.

After the P.R.C. conquered the Yijiangshan Island, 210 miles north of Formosa and completely wiped out the ROC forces stationed there, there was no military response by the U.S., only cheap talk threats. The invasion of the island forced the U.S. to evacuate the Tachens who had lived there, and still the U.S. did not strike. Mao concluded from this tactic that America's relationship with the R.O.C. and Quemoy had allowed him to place a "noose" around the U.S.'s neck which could be tightened or loosened. It could be tightened by increasing their bombardment of the islands to put more pressure on the U.S. The noose could also be loosened

by stopping the bombardment to relax the tension temporarily (Li, 1998). Thus as play is repeated over time, if the U.S. just responds with cheap talk, as the P.R.C. conquers small island after island in the strait, its assessment of p' will commensurately diminish.

As a corollary, the benefits from bluffing decrease. From game one we know that the P.R.C will use a military threat to coerce the U.S. to submit when its estimate of \hat{p} falls below the following critical risk thresholds:

$$\text{Military Threat is used when } \hat{p} < (b - d) / [(q)(b + 2c)]$$

As p' diminishes the likelihood that the P.R.C. will submit diminishes as well. Thus, the U.S. must work harder to convince the P.R.C. to estimate the actual risk of p to be below its critical thresholds above, which in turn raises the cost of c . This is illustrated in the second crisis, from the increased amount of military power that the U.S. utilized in the second crisis, such as naval vessels or naval aircraft to assist the P.R.C, which they had not committed in the first crisis.

Our analysis has shown that a pooling equilibrium cannot persist as the number of games is increased over time if the U.S. chooses to play this strategy. Again, because every game will be marked by incomplete information, multiple equilibria will exist (Hohlfeld, 2003). However as the very parameters that allow for bluffing in earlier games by the uncommitted U.S. players eventually serve to reveal its type to the P.R.C. because the benefits from imitating the committed type players is degraded by the flow of information across time.

Conclusion:

This analysis of nuclear brinkmanship between the People's Republic of China and the United States during the First and Second Taiwan Crises has treated the conflicts between the two states as the same basic game repeated through time. It has sought to identify the incentives of each state for engaging the other in negotiations and to draw out the sources of uncertainty in the game. We have characterized the game as one of incomplete information where players look ahead in the game to solve recursively in such a way that they maximize their expected utilities at any given outcome. This necessarily calls for the elimination of certain strategies as sub-optimal, in particular the action by the United States to challenge without display. Because the games are marked by incomplete information, multiple equilibria may emerge depending on the parameters of the game: a pooling of types equilibrium, a separation of types equilibrium and a semi-separating equilibrium. Over time the ability of an uncommitted U.S. player to bluff its opponent by imitating a committed type player is diminished by the flow of information across time.

I hope that my essay was insightful in your knowledge of game theory and crisis bargaining situations. I hope that this subject can be studied further for potential future crisis, between People's Republic of China, and the U.S. hegemony.

NOTES:

- ¹ Over 5 million died in the Korean War, and over 2.3 Japanese died in the region from World War II. "Korean War," Microsoft® Encarta® Online Encyclopedia 2005 <http://encarta.msn.com>
- ² Humes, Brian, and Scott Gates. Games, information, and politics: applying game theoretic models to political science. Ann Arbor: University of Michigan Press, 1997.
- ³ Shinn, Rinn-Sup, and Robert Worden. "A Country Study: China." No Aug 2005. Country Studies. Federal Research Division: Library of Congress. 07 Mar 2006 <<http://lcweb2.loc.gov/frd/cs/cntoc.html>>.
- ⁴ Tucker, Nancy. Taiwan, Hong Kong, and The United States, 1945-1952: Uncertain Friendships. New York: Twayne Publishers, 1994.
- ⁵ Guillermaz, Jacques. A History of the Chinese Communist Party, 1921-1949. New York: Random House, 1972.
- ⁶ Thornton, Richard C. China: A Political History, 1917-1980. Boulder: Westview Press, 1982.
- ⁷ Levine, Steven I. Anvil of Victory: The Communist Revolution in Manchuria, 1945-1948. New York: Columbia University Press, 1987, 75.
- ⁸ Guillermaz, Jacques. The Chinese Communist Party in Power, 1949-1976. Boulder: Westview Press, 1976.
- ⁹ New York Times, September 4, 1954 p. 1
- ¹⁰ New York Times, September 7th, 1954, p. 8.
- ¹¹ Stolper, Thomas. China, Taiwan, And The Offshore Islands. Armonk: East Gate Books, 1985.
- ¹² Gurtov, Mevlin . "The Taiwan Strait Crisis Revisited: Politics and Foreign Policy in Chinese Motives." Modern China Jan 1976: 49-103.
- ¹³ Goebel, Greg. Cruise Missiles Of The 1950s & 1960s. 1 Oct. 2004. 1 Mar. 2006. <<http://http://www.vectorsite.net/twcruz3.html>>.
Pike, John. Weapons of Mass Destruction: Matador. 4 Apr. 2005. 2 Mar. 2005. <<http://http://www.globalsecurity.org/wmd/systems/matador.htm>>.
- ¹⁴ Pike, John. Weapons of Mass Destruction: Regulus I. 4 Apr. 2005. 2 Mar. 2005. <<http://www.globalsecurity.org/wmd/systems/regulus1.htm>>.

¹⁵. Haselden Jr, Carl . "The Effects of Korean Unification on the U.S. Military Presence in Northeast Asia." Parameters 2002:

¹⁶. Young, K. Negotiating with the Chinese Communists: The United States Experience, 1953-1967. New York: McGraw-Hill, 1968.

¹⁷. Developed by Anatol Rapoport, a type of strategy in Prisoner's dilemma in which a player will respond in one period with the same action their opponent used in the last period. Rapoport, Anatol. Game Theory As A Theory of Conflict Resolution . Dordrecht: D. Reidel Publishing Company, 1974.

¹⁸. Scobell, Andrew. "Show of Force: The PLA and the 1995-1996 Taiwan Strait Crisis." Political Science Quarterly, Jan. 1999

¹⁹. Barnett, R. "China and Taiwan: the economic issues." Foreign Affairs, 3 April. 1972, 444-458.

²⁰. Herring, George C. John Foster Dulles and Diplomacy of the Cold War. Princeton: Princeton University Press, 1990.

²¹. O'Malley, Michael. "The Vietnam War and the Tragedy of Containment." DeAnza College. n.d.

²². "Statement by the President on the situation in Korea, Public Papers of the President United States: Harry Truman, 1950. Washington D.C.: GPO, 1965.

²³. New York Times, 2 September 1965, 3; and 5 September 1965, 3; and 6 September 1965, 2; #363

²⁴. Choi, E Kwan. "The roots of the WTO." Iowa State University. 05 Mar. 2006 <<http://www.econ.iastate.edu/classes/econ355/choi/wtoroots.htm>>.

²⁵. The total for aid 1951-1965, was \$4 billion; K.T. Li, The Evolution of Policy behind Taiwan's Development Success. New Haven: Yale University Press, 1988, 55.

²⁶. Sen. H. Alexander Smith, "Interview, " Dulles Oral History Project, Princeton University Library, p. 41.

²⁷. Schelling, Thomas C. Arms and Influence, New Haven, Yale University Press 1967; and Schelling, Thomas C. The Strategy of Conflict, Harvard University Press, Cambridge, 1963.

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²⁸. Morgan, J.N. "Bilateral Monopoly and Competitive Output", Quarterly Journal Of Economics, August 1949.

²⁹. Schelling Thomas C. The Strategy of Conflict, Harvard University Press, Cambridge, 1963. This section is contained in Schelling's discussion of explicit bargaining situations. He states that when compared to tacit bargaining, explicit bargaining doesn't appear to have a need for coordination, since there can be no direct communication. Nevertheless, some form of coordination is still present in explicit bargaining.

³⁰. "The final outcome must be a point from which neither expects the other to retreat... If we then ask what it is that can bring their expectations into convergence and bring the negotiation to a close, we might propose that it is the intrinsic magnetism of particular outcomes, especially those that enjoy prominence uniqueness, simplicity, precedent, or some rationale that that makes them qualitatively differentiable from the continuum of possible alternatives." Schelling, Thomas C. The Strategy of Conflict, Harvard University Press, Cambridge, 1963.

³¹. My analysis builds upon the work of Dixit and Skeath's "Oldstar v. Nova" game and discussion of the Cuban Missile Crisis; Gates and Hume's "Sanctions" game; Kreps's "Beer-Quiche" game; and Selten's "Chain Store" game (1978); Hohlfield's "North Korea Risk Manipulation" game.

Dixit, Avinash, Susan Skeath. Games of Strategy. New York, NY: Norton and Company, 1999.

Gates, Scott, Brian Humes. Games, Information and Politics. Ann Arbor: The University of Michigan Press, 1997.

Kreps, David, Game Theory and Economic Modeling. Oxford: Clarendon Press, 1990.

Harsanyi, John, Reinhard Selten. A General Theory of Equilibrium Selection in Games. Cambridge: THE MIT Press, 1978.

³². For both the U.S. and the P.R.C the cost coefficients have been represented by numbers like one or two to clarify the discussion. We could just as easily have substituted some non-negative variable such as "x" in place of "2" which we could allow to vary with the threats issued.

³³. United States Opposition to Use of Force in the Taiwan Strait, 1954-1962

Leonard H. D. Gordon . The Journal of American History, Vol. 72, No. 3. (Dec., 1985), pp. 637-660.<http://links.jstor.org/sici?sici=00218723%28198512%2972%3A3%3C637%3AUSO TUO%3E2.0.CO%3B2-W>

³⁴. Hickey, Dennis Van Vranken. United States-Taiwan Security Ties: From Cold War to Beyond Containment. Westport: Praeger, 1994.

³⁵. Formula is based on the Bayes Theorem Formula
 $IP(A|B) = [IP(A) IP(B|A)] / IP(B)$.

Also on Bayes Theorem

Probability $(A|X) = pa / (pa + (1-p)b)$, where p is the probability that A exists, when A exists the chance of observing X is a. Similarly when B exists, the chance of observing X is b.

Dixit, Avinash, Susan Skeath. Games of Strategy. New York, NY: Norton and Company, 1999.

³⁶. Graph Generated by Matlab.

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