

Simulating the Process of Policy Making:

The Case of the Cuban Missile Crisis

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Abstract

The Cuban Missile Crisis of 1962 was one of the most serious affairs of the Cold War, and nearly resulted in a nuclear war. The Kennedy administration selected ‘quarantine’ — blockade of Cuba out of seven options and succeeded in avoiding an escalation in tension. This project aims to throw light on the reason why ‘quarantine’ was chosen. For this purpose, we used a multi-agent simulation method and a social psychology theory.

The Executive Committee of the National Security Council (ExCom), whose members were the president’s most trusted advisers, was assembled to cope with the Cuban Missile Crisis. We simulated the process of decision-making among these members. The simulation model was designed so as to allow the virtual ExCom members to change their views dynamically through their discussion. Since there were seven options for the Kennedy administration, the simulation tested which option would have been the most likely choice, as well as showed how this conclusion was reached. As a result of our model, in which the member’s initial cognitive structures are entered and then discussion among members is simulated, we verified that ‘quarantine’ was a highly probable choice, and thus confirms the model’s robustness. Moreover, by adding new information or altering some conditions such as changing the members, we show that the United States would have chosen different options.

This project was made possible by integrating computer simulation, empirical analysis, and a theory of social psychology. The model was shown to be valid and has the potential to be widely applicable to similar situations.

1 Six Days of the ExCom

There was a week from the time the Kennedy administration received the information that offensive missiles were being placed in Cuba on October 16th in 1962, to the time the 35th President of the United States, John F. Kennedy, announced that the United States had decided to blockade Cuba in

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order to obstruct the missile deployment from the Soviet Union. This research focuses on those ‘six days’ of the US decision-making process. Its main purpose is to make clear how decision-makers in the Kennedy administration discussed how to cope with this unprecedented crisis and why they reached the conclusion that the president accepted.

Name	Hawk/Dove³	Position
Dean Acheson	H	Former Secretary of State
George Ball	D	Undersecretary of State
McGeorge Bundy	D	National Security Adviser
Marshall Carter		Deputy CIA Director
Douglas Dillon	H	Secretary of the Treasury
Roswell Gilpatric		Deputy Secretary of Defense
Alexis U. Johnson		Deputy Undersecretary of State
Lyndon Johnson		Vice President
John F Kennedy	D	President
Robert Kennedy	D	Attorney General
Robert Lovett		Former Defense Secretary
Edwin Martin		Assistant Secretary of State
John McCone	H	CIA Director
Robert McNamara	D	Secretary of Defense
Paul Nitze	H	Assistant Secretary of Defense
Dean Rusk	D	Secretary of Defense
Theodore Sorensen	D	Special Counsel
Adlai Stevenson		UN Ambassador
Maxwell Taylor	H	Chairman of the Joint Chiefs of Staff (JCS)
Llewellyn Thompson		Ambassador at Large for Soviet Affairs

Table 1-1 ExCom During the Cuban Missile Crisis

ExCom, made up of the president’s most trusted advisors, was assembled in order to cope with the crisis (Table 1-1). According to a comparative study on Presidents’ leadership types in foreign policy making, Kennedy’s leadership style is labeled ‘Director-Navigator’ and ExCom meetings ‘exactly fitted Kennedy’s instinctive style’ (Preston, 2001, p. 113). That is, from the lessons learned from the Bay of Pigs fiasco, President Kennedy greatly took initiative for making foreign policy on

³ This distinction is made by (Blight and Welch 1989).

the one hand, but not making a decision based solely on his own judgment on the other. He was interested in multiple perspectives on policy, listened to many sources of information, tolerated conflicting views, and wanted a substantial policy debate prior to taking a decision (Preston, 2001, pp. 98-113). Indeed, ExCom members did not hesitate to express opinions that the president seemed to dislike. Robert Kennedy, the President's younger brother and Attorney General at that time, stated that 'during all these deliberations, we all spoke as equals. There was no rank...Everyone had an equal opportunity to express himself and to be heard directly' (Kennedy, 1969, p. 46).

As a result of Kennedy's leadership styles in foreign policy making, ExCom members suggested various policies. Those are the seven options shown below⁴.

I No Action

Since this was the most cautious option among the seven, it was inevitably criticized as cowardly.

II Diplomacy

There were three choices within this option. The first was a plan to split Cuba from the Soviet Union by approaching and offering the alternatives to Fidel Castro secretly. The second was negotiating for the secret withdrawal of the missiles with the Soviet Union instead of Cuba. And the third was appealing to the United Nations to negotiate the removal of the missiles.

III Blockade with Negotiation Approach

Since there were two quite different ways to carry out the blockade approach, we separate it into two. The more cautious one was that blockade was a starting point for negotiations, and resorting to the use of arms was not considered.

IV Blockade with Ultimatum Approach

This approach was blockade with armaments. If Soviet boats broke through the blockade line, it was planned to attack them immediately. This policy was adopted in the end.

V Surgical Air Strike

This option was to attack only the missiles and their sites by a swift conventional air attack.

⁴ Needless to say, there are some nuanced variations within each option and it is impossible to make exact distinctions among the seven options. For example, if we consider the Vietnam War, during which the US forces attacked North Vietnam with only air strikes at the outset and gradually committed deeply to total war, we can see that option V, VI and VII are impossible to separate. However, even though we realize this reality, we dare to separate them for the purpose of simplification. If we classify six options as Allison (1971, pp. 58-61) did (two diplomatic options, one blockade option, and one air strike option), a problem will arise as we will mention later.

VI General Air Strike

This option was a comprehensive air attack, which targeted not only the missiles and their sites, but also other bombers, aircrafts, and SAMs (Surface-to-air-missile).

VII Invasion

This option was to remove the missiles together with Castro. It can be considered to be the boldest approach.

As seen in Table 1-2, their opinions regarding which policy was the best way to solve the problem varied drastically among those seven options. So called ‘doves’ tended to insist on relatively cautious policies and ‘hawks’ asserted more risky options such as the air strike. It goes without saying that those who sought a military solution were people involved with the military with the exception of Robert McNamara. Moreover, a notable point is that the same persons often changed their opinions. As Robert Kennedy recollected, ‘For some there were only small changes, perhaps varieties of a single idea. For others there were continuous changes of opinion each day’ (1969, p. 31). This tendency was seen in ‘doves’ more than ‘hawks’. The typical case was McGeorge Bundy. One of his colleagues once made a comment about him, saying ‘you don’t know what he thinks. I don’t know what he thinks. The president doesn’t know what he thinks. I sometimes wonder whether he knows what he thinks’ (Anderson, 1968, p. 270). This comment correctly reflects the vicissitudes of his opinions. In addition to Bundy, Dean Rusk also changed his views frequently.

Our research question is quite simple; *why ‘quarantine’ was chosen out of seven options?*

Table 1-2 Six Days of the ExCom

Name ⁱ	Date & Time	16th (Tue)		17th (Wed)	18th (Thu)		19th (Fri)	20th (Sat)	21st (Sun)	
		* ⁱⁱ 11: 50 ~	*18: 30 ~	8: 30~ ⁱⁱⁱ State Depart- ment	*11: 10 ~	*21:00? ~ ^{iv}	State Depart- ment ^v	14:30~ ^{vi}	12:00 ~ ^{vii}	14:30 ~ ^{viii}
		MRBMs were discovered			IRBMs were discovered			Blockade was decided		
Subjects for discussion ^{ix}	II V VI VII	I II IV V VI VII	II IV V VI VII	I II III IV V VI VII	I IV V	III IV V	III IV V	IV V VII	III IV V VII	
<i>Dean Acheson (H)</i>	^x		V ^{xi}		^{xii}	V				
<i>George Ball (D)</i>	II	? ^{xiii}	?	II	IV ^{xiv}	III / IV V	III / IV			
<i>McGeorge Bundy (D)</i>	V	V	?	II (?)	I	V ^{xv}	V			
Marshall Carter	?	?								
<i>Douglas Dillon (H)</i>	V	VI	^{xvi}	V (?)		IV	IV		?	
Roswell Gilpatric	?	?	IV	?	IV		?			
Alexis Johnson	?	?	?	II	IV					

<i>Lyndon Johnson</i>	V	?							xvii
<i>John F Kennedy (D)</i>	V	V		VI	IV (?)		IV	?	?
<i>Robert Kennedy (D)</i>	VII	?	?	? ^{xviii}	IV	IV	IV	IV	?
Robert Lovett					^{xix}				
Edwin Martin		II	IV	?	IV	?			?
<i>John McCone (H)</i>			V ^{xx}	?		V	IV	IV	?
<i>Robert McNamara (D)</i>	? ^{xxi}	?	?	III	IV ^{xxii}	III	III	?	?
Paul Nitze (H)			?				III / IV		?
<i>Dean Rusk (D)</i>	II	II	V	V		?	III		III
Theodore Sorensen (D)		?	?	?	IV		III		
<i>Adlai Stevenson</i>		^{xxiii}	^{xxiv}				III		III
<i>Maxwell Taylor (H)</i>	VI	VI	V	VI	IV	V	VI	?	?
<i>Llewellyn Thompson</i>			IV	IV			IV		?

Source: May and Zelikow (1997); May and Zelikow (2002); Chang and Kornbluh (eds) (1998); Foreign Relations of the United States (1996); McAuliffe (1992); Stern (2003).

ⁱ Those members names printed in italics are employed by our model (13 agents). Since others hardly gave their opinion in the meetings, we decided to exclude those members.

ⁱⁱ The meetings marked with * were recorded by President Kennedy.

ⁱⁱⁱ The meeting proceeded until late at night, with two discontinuations.

^{iv} The content of the meeting was a summary recorded by the President.

^v Before the meeting, the President had a meeting with members of JCS. Although members such as Taylor recommended VI, the President rejected it.

^{vi} The meeting was, officially, a meeting of the National Security Council.

^{vii} General Walter Sweeney, who was the Air Force's commander for air operations against Cuba, joined the meeting.

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- viii The meeting was, officially, a meeting of the National Security Council. There were a few meetings hereafter until Monday, when the President announced publicly that the United States had decided to blockade Cuba. The subjects of discussions in those meeting were details of actions after blockade, the contents of the President's address, and how to explain the situation to the media and Congress. Therefore, we do not take them up here.
- ix "Subjects for discussion" indicate the options from which at least one discussant took in the meeting.
- x Diagonal lines indicate nonattendance since no remarks were recorded.
- xi Roman numerals indicate his preferred option. However, those options with "(?)" indicate that which we can only infer from the contents of his remarks.
- xii Although he did not attend the meeting, he recommended V to the President in the afternoon.
- xiii "?" indicates that from the content of his remarks, his preferred option is unidentifiable.
- xiv Ball made clear his opinion by writing a memorandum, which opposed V and recommended IV.
- xv Bundy recommended V to the President, who was supposed to meet the staff of JCS.
- xvi Although Dillon did not attend the meeting, he submitted to the President a memorandum, which recommended IV, with the second best option being V.
- xvii After the 16th, Johnson's opinion was not clear until this day. He probably changed his opinion reluctantly from V to IV on the evening of this day.
- xviii Robert Kennedy brought up the moral implications regarding the air strike against Cuba for the first time.
- xix Lovett talked to the President at 7:15 PM, saying that an attack was not desirable.
- xx McCone announced the opinion of the former President Dwight Eisenhower. According to the former President, existence of the missiles in Cuba was not permitted, therefore a surgical air strike was not sufficient. Rather, he asserted invasion of Cuba.
- xxi Since McNamara approved of Bandy's recommendation, which was to attempt more flights on Cuba, he did not commit to any options himself. But McNamara strongly opposed on air strike if the missiles were already in place in Cuba.
- xxii According to the President, all attendants except Bundy supported *blockade*. Although we follow the President's remarks, there was a possibility that McNamara or Taylor supported other options.
- xxiii Before the meeting, the President had a conversation with Stevenson. Stevenson stated that the United States should avoid air strikes as long as there was the possibility of peaceful resolution.
- xxiv Stevenson gave the President a memorandum, which said the United States should select the diplomatic option.

2 The Cuban Missile Crisis and the research of the process of policy making

Although there is much research regarding the Cuban Missile Crisis¹, we can divide it broadly into two categories. One is a descriptive, historical approach. The other is a theoretical approach.

The former was the initiative taken by those who actually participated in the Kennedy administration, such as Schlesinger, Sorensen, and Hilsman (Schlesinger, 1965; Sorensen, 1965; Hilsman, 1967). Thereafter, scholars who major in diplomatic history have analyzed the incident empirically, taking advantage of new sources such as (1) the so-called ‘Kennedy Tapes’, in which the minutes of ExCom meetings were recorded secretly by the President, (2) views of the Soviet’s decision-makers in those days, which became clear by the ‘Moscow Conference’ held in July of 1989, followed by the *glasnost*, and (3) information regarding the Cuban government, which was utilized by the ‘Havana Conference’ held in January of 1992 (Blight and Welch, 1989; Allyn, Blight and Welch, 1992; Nathan 1992; May and Zelikow, 1997; Allyn, Blight and Welch, 2002; May and Zelikow 2002; Stern 2003). The most representative of the theoretical approaches are Allison’s well-known three model approach—the *rational actor*, *organizational process*, and *governmental politics*, labeled model I, II, and III respectively, Janis’s *groupthink* approach, and recently, the *prospect theory* employed by Haas (Allison 1971; Allison and Zelikow 1999; Janis 1982; Haas 2001). In this section, we argue the problem of those approaches, from the question, ‘*why did the United States decide to blockade Cuba?*’

First of all, the historical approach in the early days emphasized the diplomatic sense and morals of the Kennedy brothers, who selected blockade in order to avoid escalation. For example, Theodore Sorensen did not hesitate to praise the choice of the President, saying that ‘Kennedy in fact relied not on force and threats alone but on a carefully balanced and precisely measured combination of defense, diplomacy, and dialogue’ (1969, p. 188). In addition to Sorensen, Schlesinger and McNamara admitted that Robert Kennedy’s speech, which mentioned the immoral atrocity of Pearl Harbor and rejected a similar surprise attack on Cuba, was the most influential factor for the US’s decision (Schlesinger, 1965, p. 277; Kennedy, 1969, pp. 5-8). However, those views were to be revised due to declassification of primary documents inside the US government and the Kennedy Tapes. That is, as Figure1-2 shows, Robert Kennedy supported the most radical option *invasion* at the outset and did not consider any moral problem at all². Likewise, the reason that blockade was decided was not because of President Kennedy’s own judgment (Kennedy himself was very interested in the air strike option to the last), but that the majority of the ExCom members were inclined toward the option. In other words, the reduction of the factors of the US decision should not exclusively be credited to the Kennedy brothers. Diplomatic historians, who take advantage of

¹ As a useful bibliography, see Laurence and Kornbluh (1998, pp. 413-427).

² Since International Security indicated this point (International Security, 1985), this fact has been approved by many scholars.

primary sources about the Cuban Missile Crisis, have emphasized revising those conventional wisdoms³ and/or have made clear the intention of the Communist block. Thus they tend to avoid giving clear-cut answers to the factors of the US decision.

Next, we discuss the problem of the theoretical approach. Needless to say, Allison's achievement is one of the most famous studies regarding the crisis. Allison originally explained the US decision by applying Model III. That is, each member had their own preferred option based on their position and whether their option was adopted depended on their power relations or the distance between them and the President. According to Allison, a 'triple alliance', 'consisting of the advisers in whom the President had the greatest confidence and with whom he was personally most compatible', was that which most affected the course of US action. Those are Sorensen, McNamara, and Robert Kennedy (1971, pp. 202-205). However, his later study with Zelikow using primary materials did not explain in such a way and only gave a description of the fact that opinions of the ExCom members had changed daily. This means that by shedding light on the contents of the ExCom discussions, Model III cannot explain the reason why 'blockade with ultimatum approach (option IV)' was decided. First, it does not explain why the opinions of McNamara and Sorensen in whom the President had the greatest confidence, *were not* adopted by the President. As table 1-2 shows, they asserted 'blockade with negotiation approach (option III)' at the time the US decision was made. Although Allison (1971) regards 'blockade' as only one option, the difference between option III and IV should not be ignored⁴. Second, each member's preferred option was not determined by their position and actually changed dynamically each meeting. Thus, the maxim 'where you stand depends on where you sit' (Allison, 1971, p. 176. see also Allison and Halperin, 1972, pp. 48-49; Halperin, 1972, pp. 66) did not reflect the reality⁵. Third, although Allison and Zelikow state that 'government decisionmaking is a complex multi-participant process' and present seven 'findings' regarding collective decisions, they remain to be no more than suggestions. In addition to the obscurity of the relationship between those 'findings' and Model III, they cannot explain the group dynamics of ExCom members' opinions. Allison's *Essence of Decision* was one of the best-known achievements in the area of political science and we can say that it has won a position as a classical work. However, it fails to explain the *essence* of decision-making of the Cuban Missile Crisis.

Haas (2001), which has used *prospect theory* in order to analyze the incident, also has problems. Prospect theory predicts that decision makers will not dare to make risky choices if they think themselves to be experiencing wins at the time they make a decision. On the other hand, if they

³ For research about *traditionalism* and *revisionism* on the Cuban Missile Crisis, see Lebow (1992).

⁴ In the second edition, Allison and Zelikow describe the difference between option III and IV at the expense of the so-called "triple alliance". Here, relations between Model III and the US decision making process are ambiguous and lacks clarity if we compare them to the first edition.

⁵ This point has been criticized from the outset (e.g., Kasner, 1972, p. 165; Jervis, 1976, pp. 26-27; Caldwell, 1977, p. 94; Bernstein, 1992, pp. 115-116). For criticism on Allison's models from a theoretical point of view, see Bendor and Hammond (1992).

recognize themselves to be losing, and believe their policy option has a success possibility in the moderate to high range, they will tend to make risky choices. According to Haas, installing offensive missiles in Cuba did not mean a change of the objective power balance between the United States and the Soviet Union, but it was the US's loss in terms of '*loss of American credibility if the Soviet gambit were allowed to succeed despite clear American warnings* (emphasis in original)' (Haas 2001, 258). Kennedy 'believed' that doing nothing or pursuing diplomatic approaches could lead to world war because those options would lead Khrushchev to perceive the US's weakness and to take some aggressive action against Berlin. Moreover, military options were also avoidable because a Soviet response with military force was '*virtually certain* (emphasis in original)' if the United States made such choices. Therefore, Haas asserts that even though the United States was in the domain of losses in this period, Kennedy judged that the above mentioned options would cause a war and instead selected a less risky option—the blockade (Haas, 2001, pp. 259-260).

In his study, Haas tries to unnaturally fit historical facts into the theoretical framework. We cannot help criticizing this typical theorist style. First, although he utilizes new sources such as the Kennedy Tapes, we have to say that he arbitrarily selects convenient materials for his theory. He has actually quoted only several remarks of President Kennedy. Second, he writes as if there were only three US options in order to explain the US decision succinctly using his own theory. Third, he discusses the blockade option as if that was the ExCom members' consensus and ignores the difference and dynamics of each member's opinions.

Thus, the fact that the individual ExCom members' views shifted as frequently as they did cannot be explained by reductionism, such as in Allison and Hass's work. One of the influential books studying about individual cognitions and policy decision-making has once stated, 'There is more to a group than the static aggregation of its members' (Axelrod, 1976, pp. 274). Janis's work is much more suggestive from this standpoint (Janis, 1982; Herek et.al, 1987)⁶. Janis defines *groupthink* as a phenomenon within which there is a high degree of cohesion in small groups that tends to restrain a minority opinion and full examination of alternatives. He asserts that *groupthink* can prevent decision-makers from making a 'good-quality' policy. According to Janis, the Cuban Missile Crisis was a case in which *groupthink* *did not* take place, in other words, it was an example of 'good-quality' decision-making. As reasons, he discusses the legacy of the Bay of Pigs fiasco, the existence of both 'intellectual watchdogs', such as Robert Kennedy and Sorensen, and some subgroups, and the fact the President often absented himself from the meetings in order to avoid exerting his influence so that the members could freely present their own opinions. Although this explanation is acceptable, Janis's work as well as the abovementioned works cannot tell us about group dynamics of ExCom meetings. That is, it cannot explain the reasons why policy makers

⁶ Allison and Zelikow also included Janis's work in the aforementioned seven "findings" of collective decisions (Allison and Zelikow, 1999, pp. 283-287).

changed their opinions so frequently and why they ended up deciding on the final policy. Janis suggests that there were some necessary conditions to make a ‘good-quality’ decision in the Cuban Missile Crisis, but does not explain why and how option IV was selected. Answering this question requires bridging a gap between the individual and the group level analyses, thus clarifying how cognition and opinion of each individual changes through group deliberation. For this purpose, it is very helpful to learn from social psychology, where we could find an accumulation of studies of group discussion and decision making, including those using a computer simulation method (see e.g., Kameda et al. 2003).

Group discussion often generates unanticipated macro phenomena, of which the afore-mentioned *groupthink* is one example. Another example is *group polarization* dynamics (e.g., *risky shift*, *cautious shift*), in which group interaction leads members’ opinions to change to a more extreme position than from a prediscussion level (Stoner, 1961, Wallach and Kogan, 1965, Stoner, 1968). One of the major research questions that have attracted social psychologists facing these phenomena is how to understand and explain these group-level behaviors from psychological processes of each individual in a group setting. Faced with such questions, many kinds of research, experimental as well as theoretical, were conducted.

Around the late 1970s, some researchers began to employ computer simulation (Stasser, 1988, pp. 395-397). They modeled discussing individuals as ‘agents’ which have some kind of psychological mechanism, and simulated group deliberation as interaction among these agents. One of these early computer models is the JUS model developed by Hastie, Penrod and Pennington, in which virtual jurors in a virtual jury discuss a focal case and dynamically change their opinions, forming a group consensus of guilty or not guilty for the case (Hastie, et al. 1983, Hastie and Pennington, 1991). They are widely known for their large-scale intensive study of mock jury deliberations, and their computer model receives direct feedback from empirical observations.

To the extent that they are explicit about linking the dynamic changes of an individual’s opinion through discussion to the formation of an opinion at the group level, these models are perfectly fit for our theoretical interests mentioned above. At the same time, however, these early works tended to emphasize ‘strength-in-numbers’ as a major psychological force working in group discussion (Stasser, 1988, pp. 395-396). That is, quite consistent with the ideas in traditional social psychology (e.g., Asch, 1951, Deutsch and Gerard, 1955), they presumed that the likelihood of members shifting their opinion to a new position increases as the number of advocates of that position increases, and did not incorporate any causal logic beyond that assumption.

As Kameda et al. indicated, what is discussed in a group context is not merely whether or not members prefer one alternative to another (Kameda et al. 2003). In many cases, it is also about information and cognition that these preferences are based on. What we can find in the Kennedy Tapes is exactly the process through which this information and cognition (e.g. how the USSR

would respond to a certain US action) was shared among the ExCom members. Reflecting such views, some recent computer models show considerable differences from the early ones. One major example is Stasser's DISCUSS model, which simulates information exchange among individuals during group discussion (Stasser, 1988; Stasser and Vaughan, 1996; Hastie and Stasser, 2000, pp. 100-107). Each agent in this model gets various information through discussion and uses this information to revise his preference of the options. Another example is cognitive anthropologist Hutchins' model of distributed cognition (Hutchins, 1991). Based on connectionism, it models individuals as agents having a certain kind of schema which is represented as a network among 'hypotheses', and simulates formation of interpretations through communication among the agents. What these models have in common is that they represent group deliberation as a process of exchanging and sharing various types of information and cognition, and view opinion formation and revision as a product of this process.

Owing much to these existing models, the simulation model we describe below tries to shed light on the yet-unclarified *essence of decision* in the Cuban missile crisis.

3 The ExCom Model

The simulations below were conducted using the *ExCom Model*⁷. Its idea is quite simple; let virtual ExCom members discuss seven US policy options (see section 1) freely during the six-day period. Each virtual member —*Discussant* agent— has his own simplified cognition of the situation and supports one option or another based on this cognition. Deliberation among the agents affects their cognition, and their preferences over the options change accordingly. The objective here is to examine whether a sufficient convergence of opinion emerges after six days of discussion, and if so, to which option the discussion lead in the virtual ExCom.

3.1 Cognitive Structure and Policy Preference

Much of the time in the real ExCom was spent on talking about how the Soviet Union, Cuba, and the Western allies would respond to possible US actions (e.g. diplomacy, blockade, air strike), and what kind of state (e.g. military escalation, withdrawal of the missiles) these responses could bring about. Each Discussant agent in the model has a very simple cognitive structure representing causal relationships between all possible policy alternatives and all possible states in advance, and bases his evaluation of each alternative on this structure⁸. We gave the Discussants the seven policy alternatives ranging from 'No Action (option I)' to 'Invasion (option VII)' mentioned in section 1. As to possible states facing the United States, we focused on relatively short-term outcomes that could

⁷ The model is implemented using a general-purpose simulator called 'artisoc'. This simulator was designed and developed by Kozo Keikaku Engineering Inc.

⁸ The cognitive structure here shares intuitive ideas with Axelrod's descriptive *cognitive map* (Axelrod, 1976).

have been caused by immediate Soviet responses, and assumed the following five states; (1) Violent Exchange, (2) Buildup Continued, (3) Missiles Destroyed, (4) Missiles Withdrawn, and (5) Castro Overthrown.

For instance, a network shown in Figure 3-1 displays the cognitive structure of the agent named J. F. KENNEDY at the start of discussion. Causal links from two alternatives (options II and III) to state (2) in the network reflect President Kennedy’s doubt about the idea of negotiating with Khrushchev and/or Castro, which his remarks on the first day (Oct. 16) of the discussion make abundantly clear (e.g. May and Zelikow, 1997, pp. 87-88). On the other hand, links from three options V, VI, and VII simplify his persistent view of military actions; seeing extreme danger in extensive military actions against the whole island, he seemed to think that a limited air strike against the missile sites, with its clear political message, was the least risky way to solve the problem, if it could be solved at all (May and Zelikow, 1997, pp. 93-94, pp. 97-98). Lastly, two causal connections from alternative IV to two states, (1) and (2), are based on his early remarks about the blockade with ultimatum approach. That is, this option was not only incapable of stopping deployment of the missiles already carried onto the island, but in the worst case it could also invite Soviet military reprisal, possibly in Berlin (May and Zelikow, 1997, pp. 137-138, p. 144).

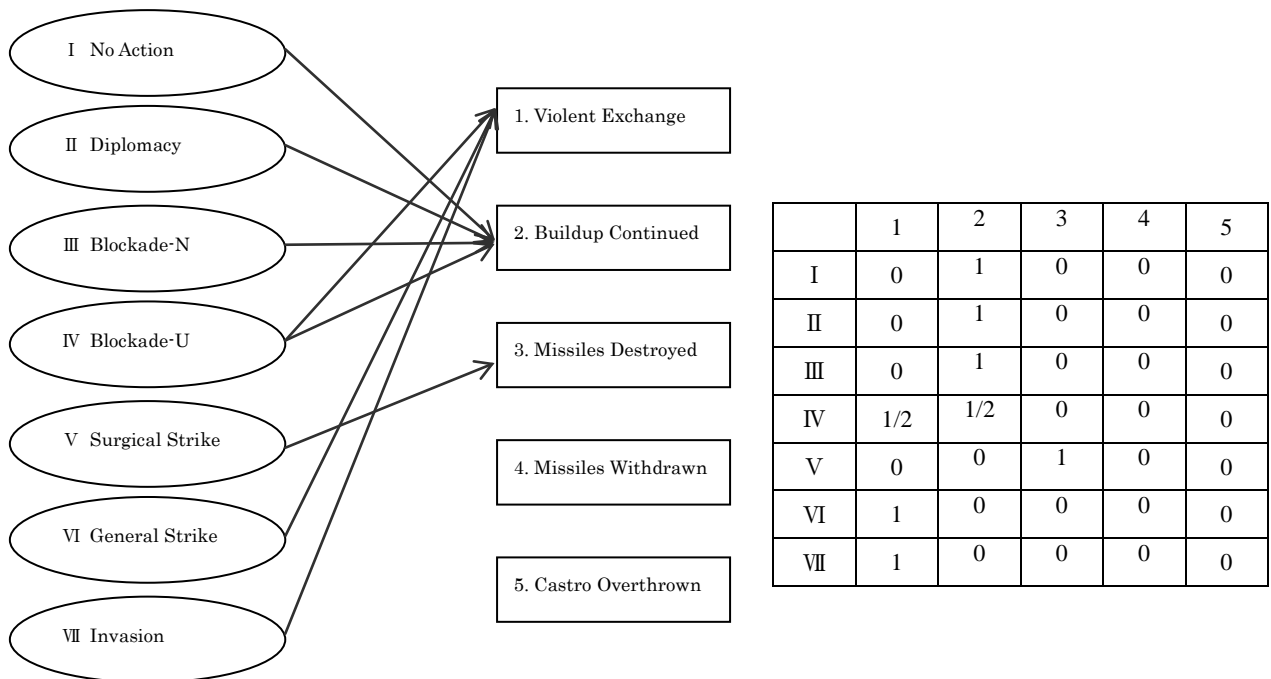


Figure 3-1 Cognitive Structure of “J. F. KENNEDY”
 (left: network format, right: matrix format)

As the above example indicates, a policy maker does not always have a clear one-to-one causal connection between a given policy option and a possible state. To allow such uncertainty, the ExCom model describes an agent's cognition of a given policy option as a distribution of 'cognitive weights' (pseudo-real numbers ranging from 0.0 to 1.0, the latter indicating a one-to-one connection). Each weight specifies the 'strength' of connection between one particular option and one particular state, and in the following discussion, it helps to interpret it as 'frequency' at which a particular Discussant regards the former as leading to the latter. Since it is almost impossible to set specific values to these weights empirically except for the case of a one-to-one connection, we assumed that when an alternative has multiple links in a Discussant's cognitive structure, he is completely indifferent to these links, and accordingly we gave equal cognitive weights to them.

Given this assumption, the cognitive structure of J. F. KENNEDY can be represented as a matrix form shown on the right side of Figure 3-1, each row consisting of cognitive weights as to the corresponding policy option. In the same way, cognitive structures of the other Discussants can also be constructed. According to each member's extent of engagement in the six-day deliberation and the amount and contents of his recorded remarks in the Kennedy Tapes, we selected 13 ExCom members out of those listed in Table 1-1 as major participants, and designed the corresponding 13 Discussants⁹. Their cognitive structures are shown in matrix forms in Appendix. Since it is almost impossible to know each ExCom member's *prediscussion* view and cognition about all possible policy options, the cognitive structures of 13 Discussants at the start of simulation were constructed mainly from records of each member's remarks at the meeting in which he participated for the first time.

At each time step, based on his cognitive structure, a Discussant evaluates all the alternatives and chooses the one(s) he considers leading to the most favorable state as his most preferred policy option(s). In case he is uncertain about possible consequences of the option, this evaluation can change at the next time depending on his distribution of cognitive weights. It is also possible that he becomes indifferent to several alternatives that he believes lead to the same favorable state. In the simulation below, it is assumed that every Discussant evaluates the five possible states in the following order: (1)<(2)<(3)<(4)<(5). This preferential order remains constant during discussion.

3.2 Discussion and Change of Cognition

In the ExCom Model, discussion is a process in which communication among the Discussants causes dynamic changes in their cognitive structures. Their preferences of the policy options also change as a function of that process. More specifically, this process can be described as a repetition of the

⁹ Although there is no doubt that Theodore Sorensen (special counsel to the president) had frequent contact with the president at least on a private basis, we did not include him because we could not find any record of his substantial remarks until the last few days of the six-day period.

following events (see 3.3 for more detailed description). At each time step, one Discussant plays a role of *Speaker*. He takes up a particular option and, according to his cognitive structure, talks about its probable consequence. Then the other Discussants update their own cognition of that option in a way that reflects the Speaker's remark, and the simulation proceeds to the next time step.

To gain intuition about these events, imagine a hypothetical situation where M. D. TAYLOR is making a remark about 'Surgical Air Strike (V)' *vis-à-vis* J. F. KENNEDY. What happens between the two agents is illustrated in Figure 3-2. As this figure shows, the Speaker's remark insisting the causal connection, $V \rightarrow (1)$, influences the listener's cognitive structure so that the corresponding cognitive weight incrementally increases¹⁰. How much the weight increases (+0.1 in the figure) is specified by a *Susceptibility* parameter, which is a normal random number with its average and standard deviation set to 0.005 and 0.001 respectively for all the Discussants in the following simulations.

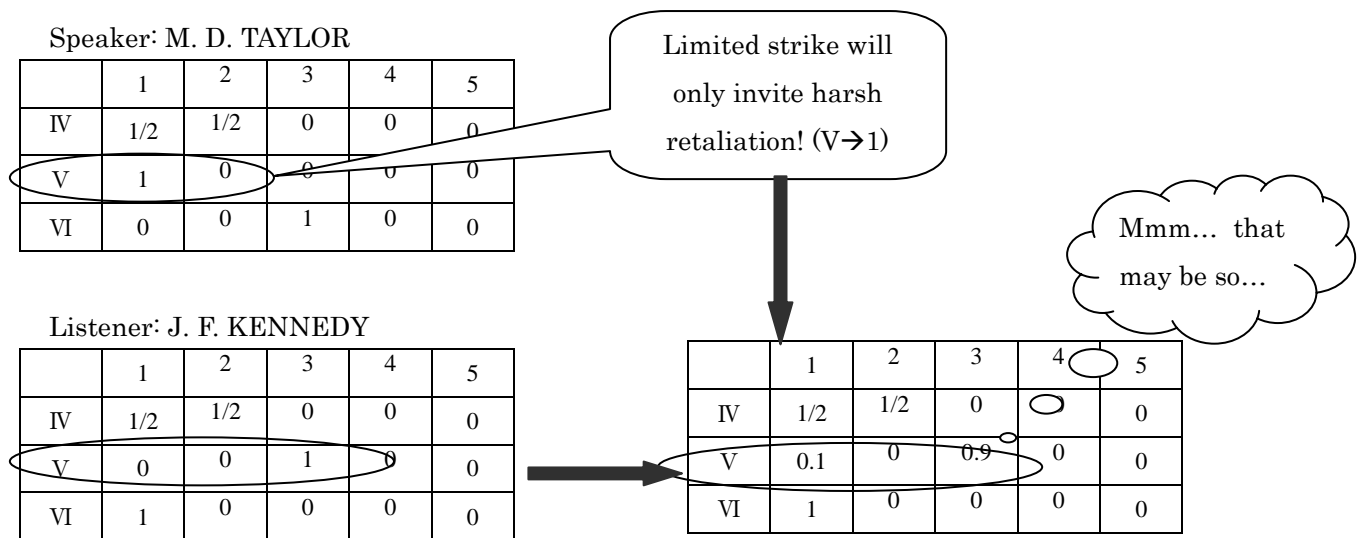


Figure 3-2 Update of Cognitive Structure

3.3 Technical Specification of the ExCom Model

Having gained the basic ideas, it is now not difficult to understand the formal specification of the model. The simulation is run for 3000 time steps, where 500 steps correspond to one 'day', meaning that the deliberation in the virtual ExCom continues for six days. Since the model allows only one

¹⁰ Such a kind of interaction between cognitive networks can be found in the afore-mentioned Hutchins' model (Hutchins, 1991).

Discussant to speak at each step, a total of 500 agents express their views during a one-day deliberation¹¹. As Table 1-2 indicates, some of the real ExCom members, including the president, did not attend all the meetings during the six-day period. Accordingly, we set the schedule of attendance of each agent to exactly the same as that shown in Table 1-2. The rules described below only apply to Discussants who are present in the deliberation.

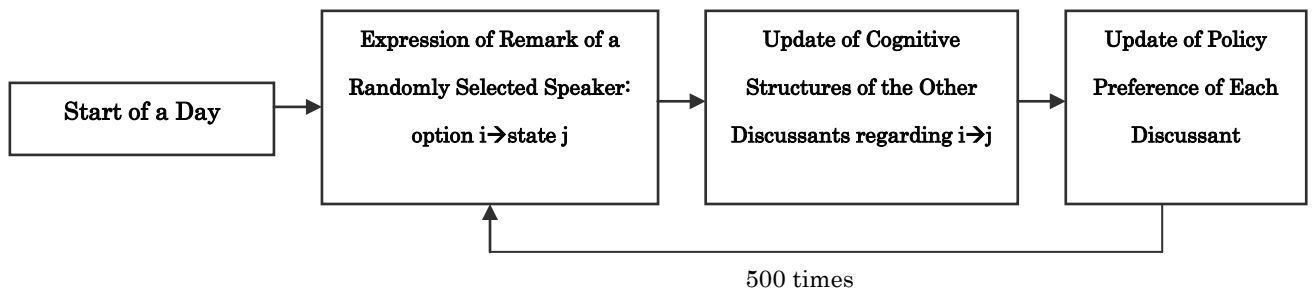


Figure 3-3 Simulation Flow during One Day of Discussion

Figure 3-3 shows the flow of the simulation during a one-day period (500 steps). At each step, the Speaker is chosen at random from the then-present Discussants, and makes a remark that indicates a causal connection between one particular alternative, called ‘Topic’, and one particular state. Then the following rules are applied.

- The first Speaker of the day or the Speaker who previously expressed his view of the Topic that has been discussed takes up his most preferred alternative as the new Topic. With the exception of this case, the Speaker continues to discuss the same Topic as that discussed at the last step.
- When the Speaker expresses his remark, the state j ($j = (1), (2), \dots(5)$) to which he refers as the most likely outcome of the Topic alternative i ($i = I, II, \dots VII$) is randomly chosen according to the weight of the connection between i and j specified in his cognitive structure.

In response to the Speaker’s remark, the other Discussants update their cognitive structures, and choose their most preferred alternatives based on the updated cognition. Specifically, the rule of their behavior is described as follows.

¹¹ This figure is not just a product of guesswork. For example, the ExCom meetings on October 16 and 18, where a sufficient amount of exchanges were recorded, had a total of 656 and 475 speakers respectively.

- In response to the remark $i \rightarrow j$, each Discussant increases his cognitive weight of the connection $i \rightarrow j$ by the increment which is randomly determined according to the Susceptibility parameter. As to the links from i to the other states, their cognitive weights deflate so that the proportion among them remains the same as before the update.
- Then each Discussant chooses the alternative that he considers leads to the best possible state as his most preferred alternative at the step. The state that he relates to each alternative being evaluated is randomly chosen according to the distribution of cognitive weights in his cognitive structure.

4 Simulation Results

4.1 Reproducing the ‘Six Days in the ExCom’

As we pointed out in section 1, as of October 16, the ExCom members’ opinions about how the US should handle the situation were quite diverse. When the virtual ExCom members, who have the cognitive structures as shown in Appendix, start to interact in the way described above, would such diverse opinions begin to show any convergence toward any direction? If it would, which alternative would become dominant among the members? To examine these questions, the simulation needs to be run many times, since, like any stochastic simulation, the model has many sources of random variation, enabling many types of *histories* to emerge from the same setting. We ran the model 20 times to explore a universe of these histories.

Figure 4-1 illustrates the *typical* dynamics of the ExCom model. It plots successive histograms of opinion distribution among the agents as a function of day. The histogram at zero in the time axis shows the opinion distribution at the start of the simulation, and that at six shows the distribution after six days of interactions. As this diagram demonstrates, ‘Surgical Strike (V)’, which was dominant at first, rapidly lost its support, and ‘Blockade with Ultimatum Approach (IV)’, in competition with ‘General Strike (VI)’, took its place, eventually becoming the option preferred by most of the members.

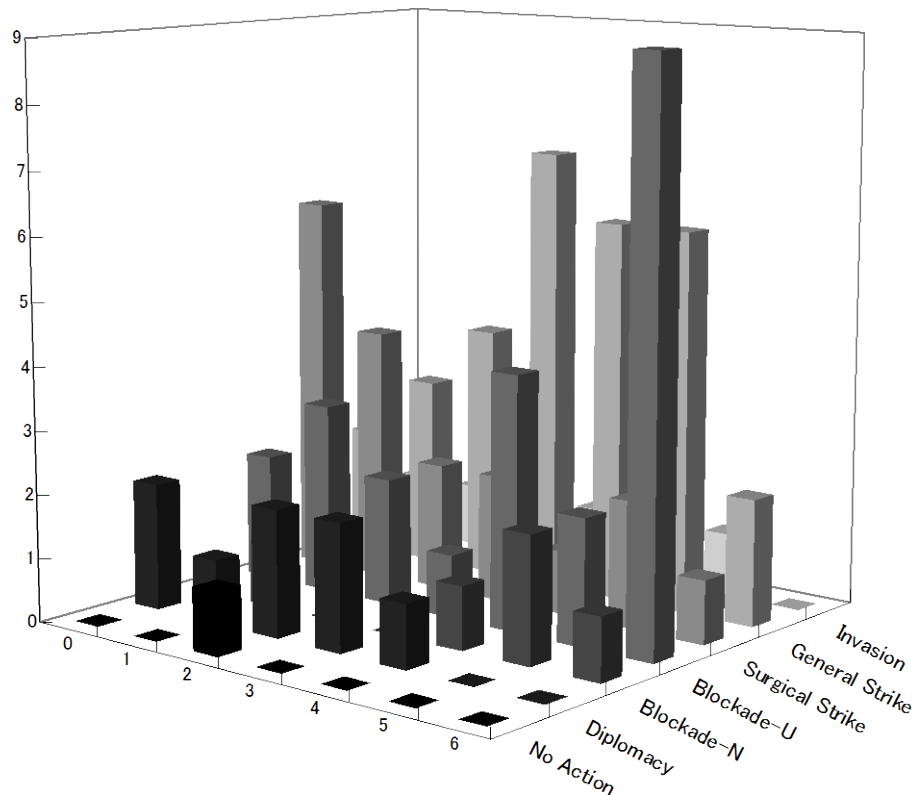


Figure 4-1 Example of Dynamics of Opinion Distribution

The above dynamics is typical not because of the details of its process but because of its long-term tendency. That is, statistically it is highly likely for alternative IV to become the dominant option among the members after six-days of discussion. Figure 4-2 shows this. This diagram displays time-series changes in frequency at which each alternative attracts support from the absolute majority of the Discussants (i.e. more than 9 agents) at the end of each day. Out of 20 runs, there were 13 where an absolute majority opinion had formed until the end of the sixth day. 11 of them were the cases in which alternative IV became dominant¹². Group discussion in the other two runs led most members' opinions to the air strike options (V or VI)¹³.

¹² This tendency shows a certain degree of robustness against changes in parameters such as Susceptibility. For example, when we doubled its average to 0.01, we found alternative IV attracting support from the absolute majority in about 80% of 20 runs. The only difference was that the speed of opinion convergence greatly increased.

¹³ In many runs most of the agents had become indifferent to V and VI, because both of the air strike options had become connected to the same state "Missiles Destroyed (3)" in their cognitive structures. This is a major difference from the real ExCom deliberation, where a selection between

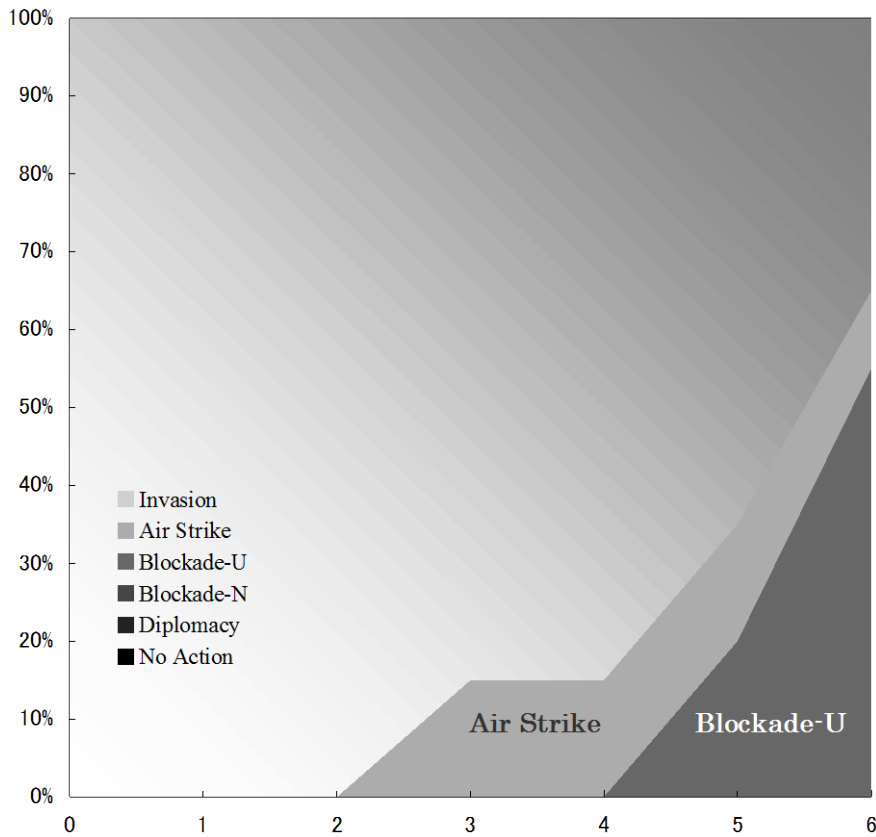


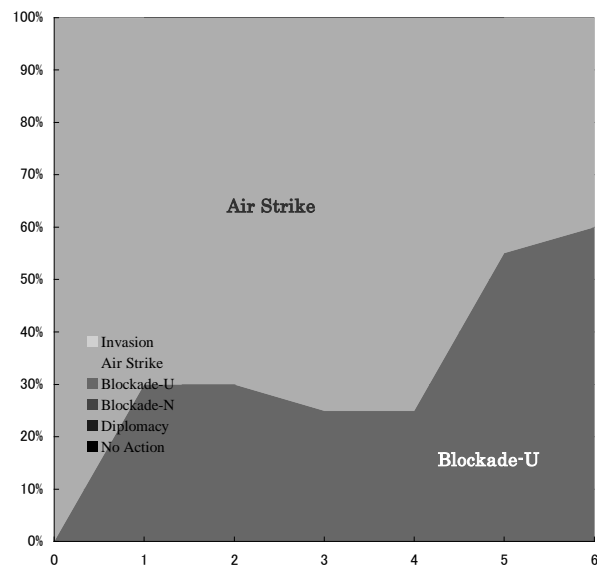
Figure 4-2 Changes of Frequency Distribution of Absolute Majority Opinions

Although there is no doubt that a major factor in the ExCom eventually adopting the blockade with ultimatum approach was that many members leaned toward this alternative, it is also a fact that, as Table 1-2 indicates, it remained something less than the absolute majority opinion until the last day of the deliberation. In this sense, the simulation results shown above suggest a rather stronger and clearer tendency toward alternative IV than found in reality. Note that, at the start of the simulation, there are only four Discussants whose cognitive structures include the connection between this alternative and ‘Missiles Withdrawn (4)’ (see Appendix). This figure is less than the number of the Discussants who relate ‘Invasion’ to ‘Castro Overthrown’. In that the minority’s cognition becomes widely shared through group discussion, the simulation results also have some counterintuitiveness.

Besides the group level opinion formation, the simulation captures the reality at the individual

the two options did occur, and this is why we treat the two options as one category in Figure. 4-2 and the following figures.

level as well. Examples are illustrated in the three panels in Figure 4-3, which, in the form of time-series changes of frequency distribution, displays the opinion changes of J. F. KENNEDY, D. G. ACHESON, and D. RUSK respectively. What can be found in the latter two panels are contrasting personalities; a persistent personality of the retired secretary of state who remained a strong advocate of a quick strike on the one hand, and a rather inconsistent personality of the incumbent secretary who frequently changed his attitude on the other hand. J. F. KENNEDY also captures the president who continued to waver between an air strike and a blockade until the day of announcing his policy. As the first panel reveals, the frequency at which J. F. KENNEDY supports either of the air strike options (V or VI) at the end of the discussion is 40%. That is, as for the president himself, who obviously had the last say in the ExCom, the simulation suggests that there was a substantial probability that he would have leaned toward some sort of air strike against Cuba.



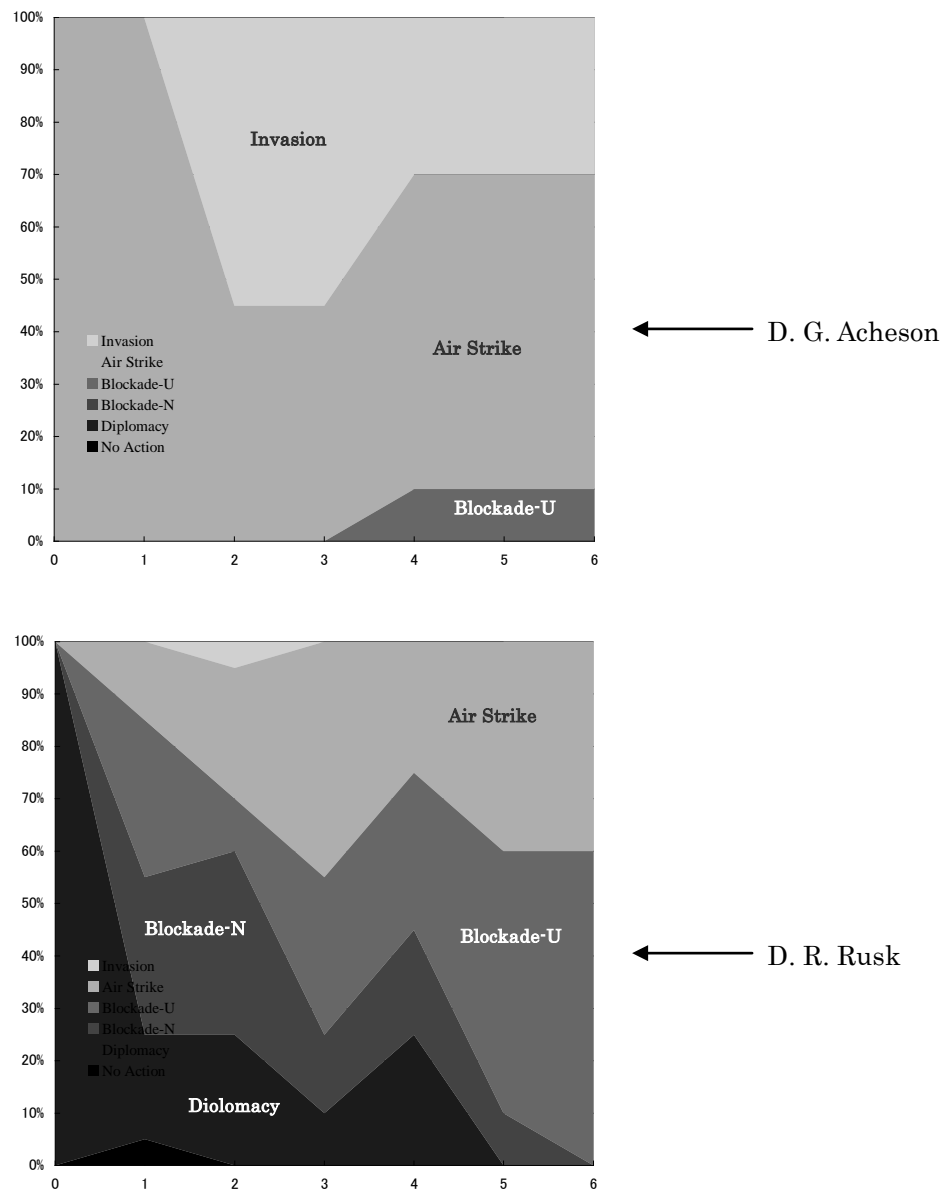


Figure 4-3 Examples of Individual Opinion Changes

4.2 Altering Conditions in the Model

Individual Influence on the Group. The above results raise a further question: to what extent is the convergence of opinions to ‘Blockade with Ultimatum Approach’ attributable to one particular individual? Would the decision on the blockade option have been inconceivable without any of the frequently referred individuals such as the Kennedy brothers and McNamara (see section 2)? To answer these questions, we examined how the absence of a particular member affected the group opinion formation.

The result is rather complex in that while one's absence had great impact on the discussion process, another's absence did not make almost any difference. The latter example is shown in Figure 4-4, which displays the result of 20 runs of simulation where J. F. KENNEDY was excluded from the group. The basic tendency remains the same; in most runs alternative IV attracted support from the absolute majority of the agents. Rather, its frequency slightly increased. A similar result also emerged when we excluded R. F. KENNEDY.

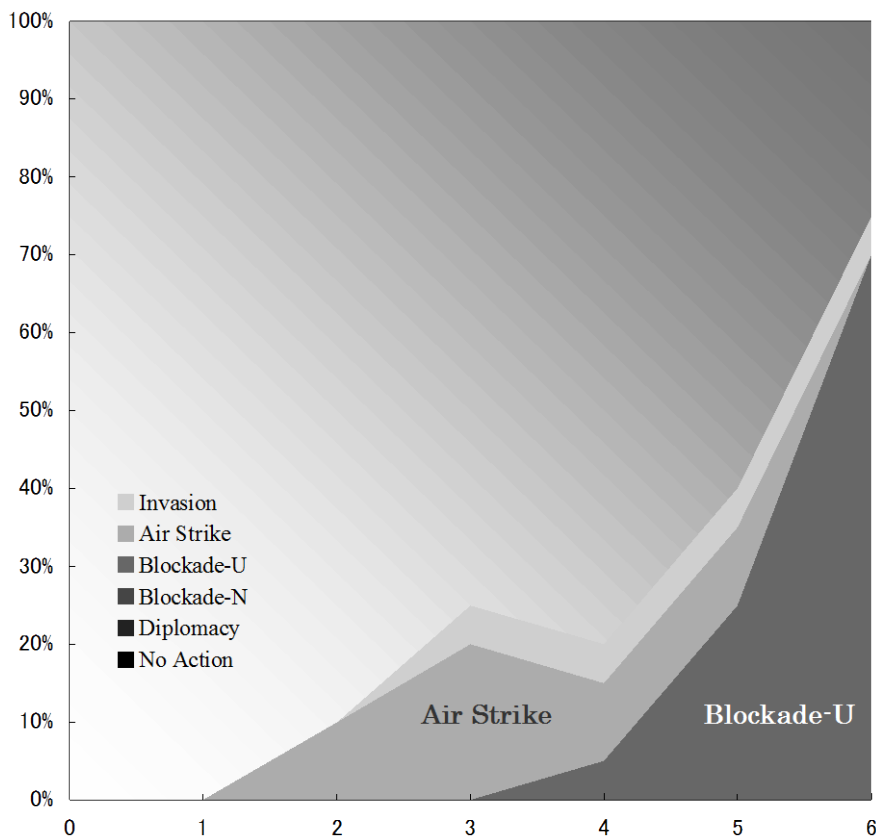


Figure 4-4 Opinion Formation in the virtual ExCom without J. F. KENNEDY

In contrast, as Figure 4-5 reveals, the absence of R. S. MCNAMARA made a big difference to the group opinion formation; it decreased the frequency of alternative IV becoming dominant among the members to nearly half of that from when he was present in the deliberation. Compensating for that decrease, there was a great increase in the probability that the members' opinions would lean toward more aggressive military options including invasion. From these observations, it can be drawn that Secretary of Defense McNamara, irrespective of his intention, played a role of some kind of embankment *vis-à-vis* the 'hawks' who insisted on aggressive options, thus helping form the consensus around the blockade option.

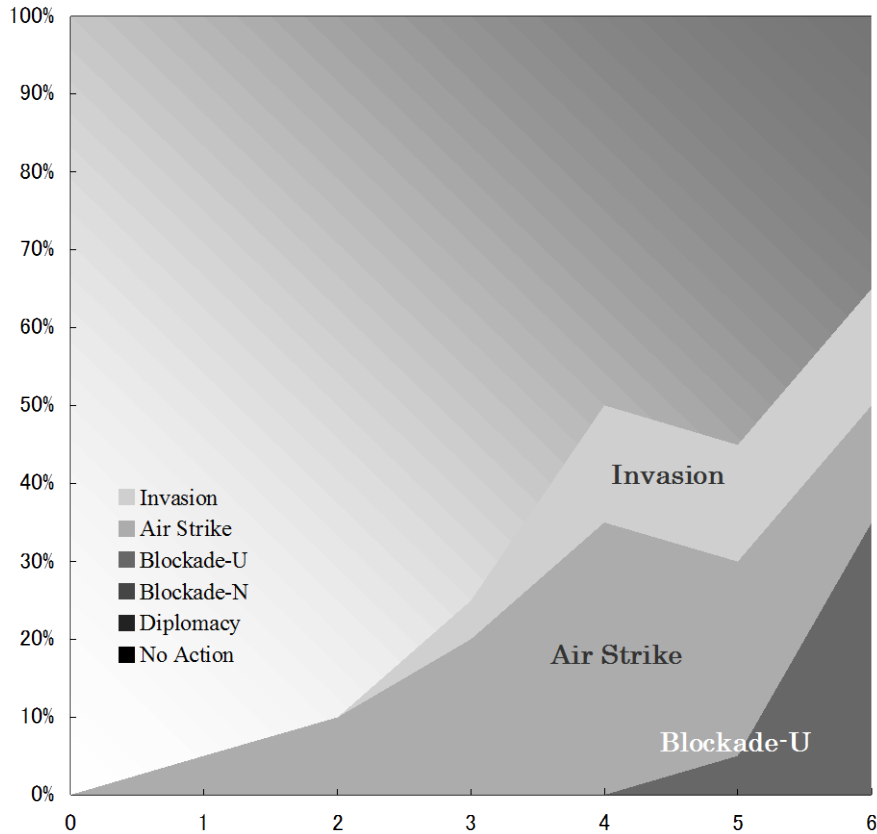


Figure 4-5 Opinion Formation in the virtual ExCom without R. S. McNamara

Radically Different Outcome: Risky Shift. The simulation we will briefly mention here shows a qualitatively different behavior from the preceding ones. It is a hypothetical experiment where one of the Discussants is replaced by an agent who has a different cognitive structure. Specifically we replaced R. S. McNamara by an anonymous hardliner, who is determined to pursue his/her country's security by any means, including an overthrow of a foreign government. At the formal level, this agent has the same cognitive structure as that of R. F. Kennedy. He/She preferred to directly eliminate the root of the problem, Castro, by means of a quick invasion, just as the attorney general indicated on the first day of the deliberation (May and Zelikow, 1997, p. 66, p.99).

As Figure 4-6 shows, the simulation result under this condition offers an example of what is called 'risky shift' (e.g. Stoner, 1961, Wallach and Kogan, 1965, Stoner, 1968), where opinions of the whole group are rapidly converging to the most aggressive and the most risky alternative of the seven options, 'Invasion of Cuba (VII)'. This rather extreme result depends on the initial values we

gave to the weights of the connection VII→(5) for some agents such as D. G. ACHESON, J. MCCONE, and M. D. TAYLOR, whose orientation toward quick elimination of Castro the added agent obviously activated. Albeit this, the result is interesting because it suggests that a completely different decision could have resulted in the ExCom with a slight difference in its condition (e.g. membership), although the causal relationship between them is not anything linear.

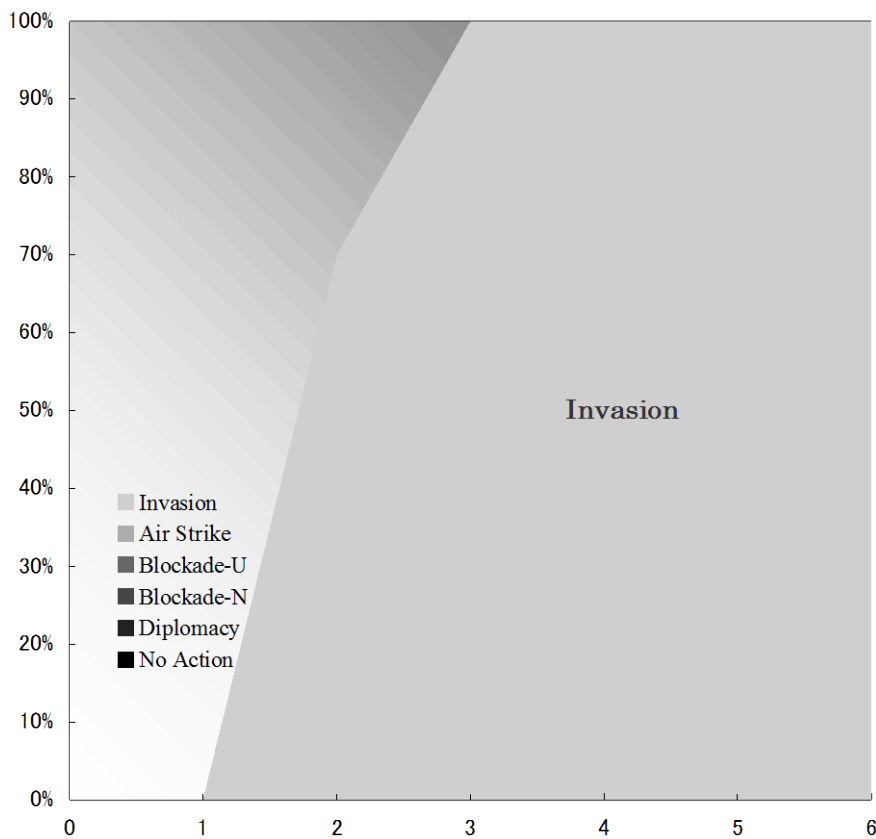


Figure 4-6 Opinion Formation in the virtual ExCom with a Determined Hardliner

5 Conclusions

From the simulation in this study, we find some interesting results. First, the ExCom model, which recognizes a decision-making process as a dynamic interaction of cognitive structures of multi-agents, produces a behavior that is highly similar to the reality. As Figure 4-3 shows, we confirmed that each members' changing opinions were highly consistent with the actual situation and thus confirmed the robustness of our model. Second, we find that the convergence on 'Blockade with Ultimatum Approach (option IV)' was not necessarily explained by the Kennedy brothers' diplomatic sense or morals, but by the result of mere discussion among members. That is, we can

predict the result if we know those members' initial cognitive structures and put them into our model for discussion. Third, we also find that the result of the simulation was quite counter intuitive because option IV was not a majority opinion in the first stage of discussion. Fourth, even though all agents are made as equal in our model, the result was similar to the reality. This means that Robert Kennedy, who once recollected that ExCom members had all spoken as equals without rank, was indeed correct. Fifth, our model explains that the US decision could have changed depending on several conditions. It predicts that a majority opinion would converge on other options such as invasion even if we altered only one constituent of the ExCom. This complexity, generated by the interactions among multi-agents, tells us again the limitations of the reductionism pointed out in section 2. The most noteworthy factor is the role played by McNamara. If McNamara had not been there, or if the Secretary of Defense at that time had been a person who had a hawk-minded cognitive structure, a riskier option would have been a high probability. That is, our model shows that even if there were some necessary conditions to prevent the ExCom from generating the *groupthink* syndrome, there was a high possibility that a 'good-quality' policy would *not* have been selected during the Cuban Missile Crisis.

Let us indicate the significance of our research. Although the number of studies using computer simulation in the area of political science has been increasing, there have not been any models developed similar to ours, which both focus on the dynamics of cognitive structures of individuals and simulate the decision-making process of the real incident. The simulation was made possible since we analyzed the primary sources elaborately and imported the findings of studies of group discussion in the area of psychology. Namely, our study is a result of the collaboration of history, psychology, and computer simulation. John L. Gaddis, who is the leading expert on the study of the Cold War, asserts that the methods for studying history are closer to that of 'hard' natural science represented by complexity than political science or economics, and implies the intersection point of history and computer simulation (Gaddis, 2002). Our study shows one of the possibilities of analyzing the complexity of history by using computer simulation, which is a recent trend in natural science. Moreover, due to the fact that we showed a formalization of a dynamic process of policy-making among multi-agents, we can say that we have contributed to the theory of decision-making in this paper. Our model can be used as a strong analytical tool to verify group dynamics, such as the ExCom meetings.

Lastly, we point out that as long as our model is a computer simulation, it can carry out experiments. The counterfactual thought such as, 'if there had been several Japanese ministers who opposed a war with the US, the Pacific War would have been avoidable' or, 'if JFK had been alive, the Vietnam War would also have been avoidable' can be conducted by our model if there is sufficient data, such as that used in order to analyze the Cuban Missile Crisis in this paper¹⁴.

¹⁴ As the textbook of counterfactual thought, see Tetlock and Belkin (1996). In this book, Lebow

Moreover, predicting the future is also within our field of vision. From this standpoint, it needs scarcely be said the effectiveness and potentialities of our study.

Bibliography

- Allison, G.T. (1971) *Essence of Decision*. Boston: Little, Brown.
- Allison, G.T. and Halperin, M.H. (1972) 'Bureaucratic Politics: A Paradigm and some Policy Implications', *World Politics* 24 (Suppl.): 40-79.
- Allison, G.T. and Zelikow P. (1999) *Essence of Decision 2nd ed.* NY: Longman.
- Allyn, B.J., Blight, J.G. and Welch, D.A. (1992) *Back to the brink; Proceedings of the Moscow Conference on the Cuban Missile Crisis, January 27-28, 1989*. Lanham, Maryland; UP of America.
- Allyn, B.J., Blight, J.G. and Welch, D.A. (2002) *Cuba on the brink: Castro, the missile crisis, and the Soviet collapse*. Rowman & Littlefield Publishers.
- Anderson, P. (1968) *The President's Men*. NY: Doubleday.
- Asch, S. (1951) 'Effects of Group Pressure upon the Modification and Distortion of Judgment', in Guetzkow, M. H. (ed) *Groups, Leadership, and Men*. Pittsburgh: Carnegie Press.
- Axelrod, R. (ed) *Structure of Decision*. NJ: Princeton UP.
- Blight, J.G. and Welch D.A. (1989) *On the Brink; Americans and Soviets Reexamine the Cuban Missile Crisis*. NY: Hill and Wang.
- Bendor J. and Hammond, T.H. (1992) 'Rethinking Allison's Models', *American Political Science Review*, 86 (2), 301-322.
- Bernstein, B.J. (1992) 'Reconsidering the Missile Crisis: Dealing with the Problems of the American Jupiters in Turkey', in Nathan J.A. (ed) *The Cuban missile crisis revisited*. NY: St. Martin's Press.
- Caldwell, D. (1977) 'Bureaucratic Foreign Policy-Making', *American Behavioral Scientist*, 21, 87-110.
- Chang, L and Kornbluh, L (eds) (1998) *The Cuban Missile Crisis, 1962; A National Security Archive Documents Reader*. The New Press: NY.
- Davis, J.H. (1973) 'A Theory of Social Decision Schemes', *Psychological Review*, 80, 97-125.
- Deutsch, M. and Gerard H.B. (1955) 'A Study of Normative and Informational Social Influences on Individual Judgement', *Journal of Abnormal and Social Psychology*, 51, 629-636.
- Gaddis, J.L. (2002) *The Landscape of History; How Historians Map the Past*. Oxford: Oxford UP.
- Herek, G., Janis, I.L. and Huth, P. (1987) 'Decision Making During International Crises', *Journal of*

and Stein carry out the counterfactual thought experiment on the Cuban Missile Crisis. They discuss what correspondences the Soviet Union would have made had the United States selected other options (Lebow and Stein 1996).

- Conflict Resolution*, 31, 203–226.
- Haas, M.L. (2001) 'Prospect Theory and the Cuban Missile Crisis', *International Studies Quarterly*, 45, 241-270.
- Halperin, M.H. (1972) 'The decision to deploy the ABM; Bureaucratic and domestic politics in the Johnson administration', *World Politics* 25 (1): 62-95.
- Hastie, R., Penrod, S. and Pennington, N. (1983) *Inside the Jury*. Cambridge: Harvard UP.
- Hastie, R. and Pennington, N. (1991) 'Cognitive and Social Processes in Decision Making', in Resnick, L., Levine J.M., and Teasley S.D. (eds) *Perspectives on Socially Shared Cognition*. Washington D.C.: American Psychological Association.
- Hastie, R. and Stasser G. (2000) 'Computer Simulation Methods for Social Psychology', in Reis, H.T., and Judd, C.M. (eds) *Handbook of Research Methods in Social and Personality Psychology*. Cambridge: Cambridge UP.
- Hilsman, R. (1967) *To Move a Nation; The Politics of Foreign Policy in the Administration of John F. Kennedy*. Garden City, NY: Doubleday.
- Hutchins, E. (1991) 'The Social Organization of Distributed Cognition', in Resnick, L., Levine, J.M. and Teasley, S.D. (eds) *Perspectives on Socially Shared Cognition*. Washington D.C.: American Psychological Association.
- Janis, I.L. (1982) *Groupthink 2nd ed.* Houghton Mifflin Company.
- Jervis, R. (1976) *Perception and misperception in international politics*. Princeton, NJ: Princeton UP.
- Kameda, T., Tindale R.S., and Davis J.H. (2003) 'Cognitions, Preferences, and Social Sharedness: Past, Present, and Future Directions in Group Decision-Making', in Schneider, S.L., and Shanteau J. (eds) *Emerging perspectives on judgment and decision research*. Cambridge: Cambridge UP.
- Kennedy, F.R. (1969) *Thirteen Days: A Memoir of the Cuban Missile Crisis*. NY: W. W. Norton.
- Krasner, S. (1972) 'Are Bureaucracies Important? (or Allison Wonderland)', *Foreign Policy*, 7, Summer, 159-179.
- Lebow, R.N. (1992) 'The Traditional and Revisionist Interpretations Reevaluated: Why Was Cuba a Crisis?', in Nathan, J.A (ed) *The Cuban missile crisis revisited*. NY: St. Martin's Press.
- Lebow R. N. and Stein, J.G. (1996) 'Back to the Past: Counterfactuals and the Cuban Missile Crisis', in Tetlock P. and Belkin A. (eds) *Counterfactual Thought Experiments in World Politics*. Princeton, NJ: Princeton UP.
- May, E.R. and Zelikow, P.D. (1997) *The Kennedy tapes: inside the White House during the Cuban missile crisis*. Cambridge, Mass: Belknap Press of Harvard UP.
- May, E.R. and Zelikow, P.D. (2002) *The Kennedy tapes: inside the White House during the Cuban missile crisis; Concise ed.* Norton, NY.

- McAuliffe, M.S. (1992) *CIA documents on the Cuban missile crisis, 1962*. Washington D.C.; History Staff, Central Intelligence Agency.
- Nathan, J.A. (1992) *The Cuban missile crisis revisited*. NY: St. Martin's Press.
- Preston, T. (2001) *The President and His Inner Circle; Leadership Style and the Advisory Process in Foreign Affairs*. Columbia UP.
- Schlesinger, A.M. (1965) *A Thousand Days: John F. Kennedy in the White House*. London: Andre Deutsch.
- Sorensen, C.T. (1969) *The Kennedy Legacy*. NY: Macmillan.
- Stasser, G. (1988) 'Computer Simulation as a Research Tool: The DISCUSS Model of Group decision Making', *Journal of Experimental Social Psychology*, 24, 393-422.
- Stasser, G. and Vaughan S.L. (1996) 'Models of Participation in Face-to-Face Unstructured Discussions', in Davis, J.H. and Witte, E. (eds) *Understanding Group Behavior: Consensual Action by Small Groups*. Hillsdale: Erlbaum.
- Stern, S.M. (2003) *Averting the Final Failure: John F. Kennedy and the Secret Cuban Missile Crisis Meetings*. Stanford: Stanford UP.
- Stoner, J.A.F. (1961) 'A Comparison of Individual and Group Decisions Involving Risk', Unpublished Master's Thesis, Massachusetts Institute of Technology, School of Industrial Management.
- Stoner, J.A.F. (1968) 'Risky and Cautious Shifts in Group Decisions: The Influence of Widely Held Values', *Journal of Experimental Social Psychology*, 4, 442-459.
- Tetlock P. and Belkin, A. (1996) *Counterfactual Thought Experiments in World Politics*. Princeton, NJ: Princeton UP.
- Wallach, M.A. and Kogan N. (1965) 'The Roles of Information, Discussion, and Consensus in Group Risk Taking', *Journal of Experimental Social Psychology*, 1, 1-19.
- Foreign Relations of the United States 1961-1963, Vol.11*. (1996) United States Government Printing Office.
- 'White House Tapes and Minutes of the Cuban Missile Crisis [ExCom Meetings, October 1962]', *International Security*, (1985), 10 (1), 170-203.