THE ROLE OF MEDIATION IN CONFLICT MANAGEMENT: CONDITIONS FOR SUCCESSFUL RESOLUTION *

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1 Background

This paper grew out of a conference on Methodology in International Relations convened at Rice University June 26-28, 1998. The conference was organized by the Division of Social Sciences and the James A. Baker III Institute for Public Policy at Rice, and the Program in Foreign Policy Decision Making at Texas A&M. The objective of the conference was to explore ways in which various methodological traditions address a substantive topic in international relations research. Research designs were to be developed and discussed at the Rice conference, followed by full-blown papers prepared for presentation at the February 1999 International Studies Association Meetings in Washington DC. Ultimately, an edited volume containing these papers is to be published. Five methodological traditions are represented among the papers: rational choice/game theory; dynamic modeling; quantitative approaches; quasi-experimental and simulation approaches; and qualitative/case study approaches.

The unifying focus of the papers is on international conflict management and international conflict resolution research. The papers were to address some or all of the following questions: (1) what are the differences between approaches/procedures/methods/conceptions of conflict management and conflict resolution? How can we systematically distinguish between the two concepts? (2) How can we theoretically and empirically detect which process is underway? (3) What are the conditions/circumstances/strategies for moving from conflict management to conflict resolution? (4) What is the relationship between the conditions/circumstances/strategies of transition from management to resolution of international conflicts and the outcomes of resolution efforts?

The original plan for the present paper grew out of initial discussions within the group charged with developing research designs utilizing quasi-experimental and simulation approaches to the study of conflict management and conflict resolution. Early in these discussions, it was decided that all of the papers would focus specifically on the role of mediation in the process of moving from conflict management to conflict resolution. In fact, a very elaborate research design was developed which involved input from all those present - Phil Schrodt, Jon Wilkenfeld, Charles Taber, Nehemia

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Geva, and Alex Mintz - which would bring together artificial intelligence, automated events data, simulation, and experimental approaches in a single paper. While this soon proved unfeasible for this round of papers, there remains some collaboration among the four researchers, with the intent that they will eventually join forces in a multi-method assault on this broad research question. That is, Wilkenfeld and Geva will design experimental simulation environments in which the role of mediators will be examined in several conflict environments. Schrodt will provide empirical input from real-world cases of mediation beginning with the Arab-Israeli conflict and Yugoslavia, and a test-bed for comparing experimental with empirical results, while Taber will eventually develop an automated negotiation agent capable of participation in the experiments.

A word about the specific paper to be presented below. It is preliminary. Experimental work has some unique requirements which make it difficult to bring to early closure. Three in particular affected the current effort. First, while the research team we assembled had worked together previously on a series of experimental studies having to do with crisis situations, a new conflict scenario was developed specifically for the new line of research focusing on the role of mediation. In addition, the project was in transition from the use of a specific decision support system focusing explicitly on a hostage crisis simulation, to a generalized decision support system capable of incorporating any conflict/crisis scenario and its attendant parameters and utility functions. These experiments were to be the first to utilize this new set of software packages. Finally, we have only one shot each semester at a group of students at the Univesity of Maryland who would make good subjects for our experiments, and hence we were restricted in the degree to which we could develop an elaborate experimental design. For all of these reasons (and several others unique to the experimental environment we used), the results of the experiments run in fall 1998, while providing a good deal of insight into the role of mediation in conflict resolution, should be taken as extremely preliminary.

2 Introduction

Decision makers are frequently overwhelmed by the vast amounts of information which they must consider. Often, they are forced to make partially informed decisions which ignore critical issues because of the complexity of the situation being analyzed. This tendency becomes even more pronounced in international crisis situations, characterized by threat to basic values, finite (often short) time for response, and heightened probability of involvement in military hostilities [Brecher and Wilkenfeld 1997]. These elements all contribute to the possibility that individual decision makers will be overwhelmed with detail and possibly unable to identify optimal outcomes, either individually or collectively. The vast literature on crisis decision making has shown that situations of intense crisis can create a reduced span of attention, cognitive rigidity, and a distorted perspective of time [Holsti 1989]. These factors combine to make utility maximization difficult to attain.

The research reported here attempts to address these structural problems associated with decision making in crisis by focusing on the negotiation process used to manage and resolve conflicts which have reached crisis proportions. The development of decision support systems for crisis negotiation is proposed as a means of reducing complexity and aiding in the evaluation of utilities associated with possible outcomes. With a decision support system in place, we target for investigation the impact of various types of mediation on the outcome of crisis negotiation. We propose that when negotiators are equipped with tools which allow them to make projections and evaluate the utilities associated with alternative proposals, coupled with their greater understanding of the cognitive capacities which adversaries bring to the negotiation table, and with the intervention of mediators, they will increase their ability to resolve conflicts. Such parties should emerge from the experience having achieved mutual benefit, and therefore having laid the foundation for the
long term resolution of the underlying conflict. The experimental design is uniquely capable of facilitating a better understanding of how these elements fit together in an efficient and effective conflict resolution strategy.

This research program builds on our earlier work in the development of a strategic model of negotiation. Originally developed to address the problem of achieving cooperation among autonomous agents\(^1\) in distributed computational settings [Kraus et al. 1995; Kraus 1997], this work led to the application of this model to crisis negotiation and bargaining situations [Kraus and Wilkenfeld 1993a] through the creation of a decision support system for crisis negotiators [Kraus et al. 1992; Wilkenfeld et al. 1995; Wilkenfeld et al. 1999; Santmire et al. 1998]. In the sections below, we will summarize our work to date on the strategic model of negotiation and on the simulation settings in which hypotheses relating to the negotiation process have been proposed and tested. We will then turn to the extensions of this research which form the basis of the current paper.

3 Strategic Model of Negotiation

The strategic model of negotiation is a modification of Rubinstein’s Model of Alternative Offers [Rubinstein 1982; Rubinstein 1985]. We utilize modified definitions from [Kraus et al. 1995].\(^2\) We assume here that there is a set of \(n\) agents denoted by \(A\) that negotiates the division of \(M\) units of a resource. We present a formal definition of an agreement.

**Definition 3.1 Agreement:**

An agreement is a tuple \((s_1, .., s_n)\), where \(s_i \in \mathbb{N}\) and \(s_1 + ... + s_n = M\). \(s_i\) is agent \(i\)'s portion of the resource or task.

The negotiation procedure is as follows. The agents can take actions only at certain times in the ordered set \(\mathcal{T} = \{0, 1, 2\ldots\}\). In each period \(t \in \mathcal{T}\) one of the agents, say \(i\), proposes an agreement to one of the other agents. That agent \((j)\) either accepts the offer (chooses \textbf{Yes}) or rejects it (chooses \textbf{No}), or opts out of the negotiation (chooses \textbf{Opt}). The other agents which neither received nor made an offer may opt out of the negotiation (chooses \textbf{Opt}), or they can choose not to do anything (chooses \textbf{Nop}). We require that the agents always make offers in the same order, and an agent’s negotiation strategy in general is any function from the history of the negotiations to its next move.

We assume that each agent has preferences or utility functions (denoted by \(U\)) over agreements reached at various points in time, and for opting out at various points in time. The time preferences and the preferences between agreements and opting out are the driving force of the model. In situations of incomplete information, we will assume that there is a finite set of agent types characterized by their capabilities (e.g., military power, political influence, alliance partners, commitment, etc.). These characterizations produce a different utility function for each type of agent. We also assume that in such situations each agent has some probabilistic beliefs about the other agents’ types. Thus, while the set of possible types of agents is known, and the utility function of each type is also known, the agent has incomplete information about the precise type of the other agent(s).

\(^1\)In the last few years, there have been several attempts to define the term "agent" (e.g., [Etzioni and Weld 1995; Wooldridge and Jennings 1995; Foner 1993; Moulin and Chaib-Draa 1996; Jennings and Wooldridge 1998]). For example, Etzioni and Weld [Etzioni and Weld 1995] require that an agent be goal-oriented, collaborative, flexible, and capable of independent decision on when to undertake action. In addition, they determined that an agent should be a continuously running process, and able to engage in complex communication with other agents, including people. It should automatically customize itself to the preferences of its user and to changes in the environment.

\(^2\)See [Osborne and Rubinstein 1990] for a detailed review of the bargaining game of Alternative Offers.
In order to find strategies that contribute to the stability of the environment, we use different notions of equilibrium. If there is full information, we employ the notion of (subgame) perfect equilibrium (P.E.) (see [Selten 1975; Rubinstein 1982]) which requires that the agents' strategies induce a Nash equilibrium\(^3\) at any stage of the negotiation. That is, in any step of the negotiation process, no matter what the history is, no agent is motivated to deviate and use any strategy other than that defined in the strategy profile. Subgame perfect equilibrium is essentially a backward induction argument, using the rationality of agents at each stage of the game to decide what a good choice is and then rolling backward [Tan and Werlang 1988]. So, if there is a (unique) perfect equilibrium, and if it is known that an agent is designed to use this strategy, no agent will prefer to use a strategy other than this one in each stage of the negotiations.

When there is incomplete information, there is no proper subgame. In such situations we use the concept of sequential equilibrium (S.E.) instead [Kreps and Wilson 1982]. A sequential equilibrium includes a system of beliefs [Kraus et al. 1995], in addition to a profile of strategies (as in P.E.). At each negotiation step \(t\), the strategy for agent \(i\) is optimal given its current belief (at step \(t\)) and its opponents' possible strategies in the S.E. Each agent's belief (about its opponents' types) is consistent with the history of the negotiation. That is, the agents' belief may change over time, but only consistent with the history. We assume that each agent in a negotiation interaction has an initial probability belief about its opponents' types.

The strategic model of negotiation has been developed as a way of reaching mutual benefit, while avoiding costly and time-consuming interactions which might increase the overhead of coordination. That is, we have provided a model in which agents can avoid spending too much time negotiating an agreement and therefore are better able to stick to a timetable for satisfying their goals.

In the process of developing and specifying the strategic model of negotiation, we have examined bilateral negotiation as well as multi-agent negotiation, single encounters and multiple encounters, situations characterized by complete as well as incomplete information, and the differing impact of time on the payoffs of the participants [Kraus et al. 1995; Kraus and Wilkenfeld 1993b; Kraus and Zlotkin 1992; Schwartz and Kraus 1997; Kraus 1997]. While some combinations of these factors can result in minor delays, the model nevertheless reveals an important capacity for reaching agreement in early periods of the strategic negotiation. In all the situations that we consider the strategic negotiation protocols that we suggest satisfy the following criteria: symmetrical distribution (no central unit or agent), simplicity (process simple and efficient), stability (distinguishable equilibrium point) and satisfiability or accessibility (access to the resource or task completed). If there is complete information, conflict is always avoided.

### 3.1 Decision Support System for Hostage Crisis Simulation

In our previous work, a decision support system (DSS) based on a hostage crisis scenario was used in experiments to test hypotheses pertaining to the negotiation process and crisis outcomes. The scenario was based on the hypothetical hijacking of an Indian airliner by Sikh terrorists and its forced landing in Pakistan. The three parties (India, Pakistan, Sikhs) consider several possible outcomes: India or Pakistan launch military operations to free the hostages; the hijackers blow up the plane with themselves aboard; India and the Sikhs negotiate a deal involving the release of some number of security prisoners in Indian jails in exchange for the hostages; Pakistan and the Sikhs negotiate a safe passage agreement; or the hijackers give up.

Each party to the negotiation has a set of objectives, and a certain number of utility points

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\(^3\)A pair of strategies \((\sigma, \tau)\) is a Nash Equilibrium if, given \(\tau\), no strategy of Agent 1 results in an outcome that Agent 1 prefers to the outcome generated by \((\sigma, \tau)\) and similarly for Agent 2 given \(\sigma\).
is associated with each (see [Kraus and Wilkenfeld 1990a]). Utility points were assigned in order to express a complex set of preferences in such a way that subtle distinctions can be made among them. In combining the range of utility points associated with each objective with the possible outcomes, a matrix is generated which yields a point output total for each outcome. We note that these payoff points are not utility functions (in the decision theory sense), but rather our description of the crisis. Each player will develop his/her set of preferences for the outcomes based on these utility points (see [Doyle 1989]). Time is incorporated into the model both as a reference point for the calculation of utilities and probabilities, and as a differential factor for the three parties. In general, time works in favor of the hijackers, and against India and Pakistan. Time impacts on the probability of success and failure of an operation to free the hostages (whether it is day or night, whether there is time to train a rescue team, etc.), on publicity for the Sikh’s cause (regardless of whether direct press access is granted), and deterioration over time in India and Pakistan’s internal and external images (for more detail on the Hostage Crisis Simulation, see [Kraus and Wilkenfeld 1990b]).

3.2 GENIE: A Decision Support System for Multilateral Crisis Negotiation

The specific implementation of the Hostage Crisis Simulation with the GENIE Decision Support System (DSS) contains a knowledge base and interface modules tailored to the Hostage Crisis scenario described in Section 3.1 above.

Decision Support Systems can play a crucial role in the crisis decision making process such as the one described above by allowing the decision maker to navigate large amounts of information quickly and to explore interrelationships between factors which may influence the decision. A DSS can also facilitate the simultaneous evaluation of multiple positions in crisis negotiation. This can play a decisive role in real time negotiations by allowing the supported parties to rapidly formulate dynamic strategies and quickly evaluate their opponents’ proposals. GENIE falls in the category of support for individual negotiators, in that it is designed to aid one party to a negotiation in determining a successful course of action vis-a-vis the other parties (for a complete description of GENIE and its theoretical base, see [Kraus and Wilkenfeld 1991; Kraus and Wilkenfeld 1993a; Kraus et al. 1995; Wilkenfeld et al. 1995]).

By employing GENIE, a negotiator can explore various negotiation positions simultaneously. It provides the negotiator with a mental picture of the negotiation model through problem structuring and knowledge organization. Its function is to present a complex negotiation model to the user in an easily understandable and organized manner. To achieve this, GENIE uses an interactive outline which presents the types of data in the model as outline topics and allows the user to interactively select the topics of interest. The flexibility which this approach provides allows the negotiator to investigate the consequences of various positions almost instantly. This allows forward, backward, or random evaluation of positions during the formulation of a negotiating strategy. It also allows a negotiator to quickly evaluate opponent proposals during actual negotiations. Simultaneous viewing of a number of negotiating positions facilitates comparative analysis and the optimization of choices.

GENIE was designed in three basic modules. The knowledge base module consists of data on the utility functions of each of the parties to the negotiation, and a series of structural equations which define the relationships among critical variables, thus allowing for the calculation of the utility point totals associated with various outcomes across various time periods. The interface module features a menu-driven interactive outline which combines data management and modeling capability in a screen which enables a negotiator to quickly set parameters for the viewing of
information, allowing the user to form a quick mental picture of the entire simulation. Use of the interface allows the user to brainstorm and experiment with different options to form a personalized strategy for utility maximization. Finally, the display module provides the negotiator with graphic output options, consisting of either a time static bar chart representation of the comparative utilities of various outcomes (different agreements, military operations, etc.), or time series graphs which allow the negotiator to observe changes in utility points associated with various outcomes over time. In all cases, since this is a full-information model, the individual negotiator can compare his/her projected utilities with those of the other two parties for specific outcomes.\footnote{Additional capabilities of GENIE include the projection of mutually beneficial resolutions and calculation of reservation price.}

3.3 Summary of Research Work to Date

At the core of our previous experimental work is the development of a strategic model of negotiation (see above), with an accompanying decision support system (DSS) based on a hostage crisis (see [Kraus et al. 1995; Wilkenfeld et al. 1999]).\footnote{For details of our experimental procedure, see [Santmire et al. 1998].} Four broad sets of research issues were addressed in our previous work.

1. The impact of the use of DSSs on the utility maximizing behavior of crisis negotiators [Holley and Wilkenfeld 1994; Kraus et al. 1992]). Experimental research led to the following conclusions: (a) Average utility scores were higher for DSS users than for non-users, and agreements were reached more frequently by DSS than by non-DSS users; (b) in simulations which ended in agreement as opposed to opting out, the player most closely associated with the mediator role tended to send identical numbers of messages to the other two players.

2. The impact of the dynamics of crisis negotiations on their outcomes ([Wilkenfeld et al. 1995]). Experimental research led to the following conclusions: (a) DSS-supported negotiators are more strongly motivated by utility maximization, while non-DSS-supported negotiators tended to be motivated by upholding principles; (b) DSS-supported negotiators are more successful than non-DSS-supported negotiators in achieving high utility outcomes, (c) the existence of a DSS-supported negotiator among the adversaries is likely to result in higher overall utility scores than when no such negotiator is present, and (d) crisis negotiations in which one of the parties has access to a DSS are more likely to end in agreement than are non-DSS-supported negotiations.

3. The relationship between the level of cognitive complexity of crisis negotiators and the outcomes of crisis negotiations ([Wilkenfeld et al. 1996]). Experimental research led to the following conclusions: (a) negotiators at higher levels of cognitive complexity developed greater proficiency with the DSS, (b) negotiators did not show an overall relationship between cognitive complexity and crisis outcome, either in terms of the achievement of higher utility scores, or in terms or a greater tendency to reach agreement.

4. The mix of cognitive complexity levels among crisis negotiators impacts on the outcome of the crisis ([Santmire et al. 1998]). Experimental research led to the following conclusions: (a) the more homogeneous the cognitive levels of the negotiators, the more likely they were to reach agreement, (b) the more homogeneous the cognitive levels of the negotiators, the more quickly they reached agreements.
4 The Role of Mediation in Conflict Resolution

In this paper, we extend our research program by investigating the conditions under which different types of mediation styles interact with the cognitive makeup of negotiators to produce utility maximization and effective conflict resolution. Experimental data are collected from a combination of sources: subject questionnaires; log files on communications patterns and analytic tool usage; and utilities associated with various outcomes of the simulations.

4.1 Measuring Cognitive Complexity

The measure of general cognitive complexity that we use is the Paragraph Completion Measure (PCM). The PCM was designed to assess the level of complexity in cognitive structures through which the individual relates to the social world. Based on the theoretical work of Harvey, Hunt, and Schroder [Harvey et al. 1961] and Schroder, Driver, and Streufert [Schroder et al. 1967], the instrument usually consists of a set of sentence stems in response to which the individual is asked to generate a short paragraph. The paragraph is then scored according to the structural properties which appear to be required to generate the particular response. Thus, the assessment is of the structural properties of the response rather than its particular content [Schroder et al. 1967].

One of the implications of cognitive complexity scored in this way is that individuals with a low level of cognitive complexity who receive information that is contrary to the schemas or biases that they enter a situation with will be unable to change those schema or biases. Individuals with a high level of cognitive complexity are able to change their schemas or biases in the face of contrary information.

The PCM is generally designed to assess cognitive complexity in the area of social relationships. Thus, the PCM is not a content specific measure. Three types of sentence stems - described below - are generally used: those implying relationships of authority - which imply the conflict between authority and the individual subject to that authority; those implying conflict in relationships among peers - which imply conflict between points of view; and those implying intra-personal conflict in which different alternatives present themselves and a decision among them needs to be made.

One important implication of the theory underlying the PCM is that cognitive complexity in any domain is a progression of understanding in that domain which comes from experience within appropriate training environments. Individuals at lower levels of complexity in a domain either have not yet had the requisite experience or have become arrested in the progression of understanding due to environments which do not facilitate progression beyond a certain level. These individuals are presumed to be unable to understand the reasoning of individuals at levels much higher than their current level. This means that a match between environment and individual is required for the individual to be able to understand how to function in that environment and to grow from interaction with it. In a comprehensive review of literature concerned with the interaction of individual and educational environments, Miller [Miller 1981] found that educational interventions specifically designed to adapt the intervention to individual characteristics were only successful in improving educational achievement when the adaptation was done to cognitive complexity characteristics. This suggests that the CL score for an individual can be increased through training or teaching that is specifically targeted to the cognitive complexity level from which the individual is starting. This is as expected for both general levels of cognitive complexity and for domain specific levels of cognitive complexity.
4.2 Mediated Negotiation and Utility Maximization

Both the theoretical and applied international politics literature deal extensively with the various forms which external or third party involvement in conflicts and crises can take. Such intervention is usually undertaken for the purpose of managing or resolving disputes. At one extreme, armed intervention can be undertaken for the purpose of separating warring factions or tipping the balance of power in favor of one of the adversaries. At the other extreme, a third party might provide good offices to the adversaries in the form of a site at which negotiations to end the dispute can be conducted.

Mediation may be thought of as a form of intervention, whereby an individual acceptable to all parties, usually representing another important international actor like a state, an international organization, or a non-governmental organization, plays a role by focusing the parties on a particular termination agreement, devising a formula to avoid hard issues, providing an agenda, and manipulating timing ([Bobrow 1981]). In this regard, Hopmann proposes that there are five kinds of mediation roles: process facilitator (create conditions conducive to reaching agreement); facilitator of communication, compromise, convergence; facilitator of cognitive change; formulator; and manipulator ([Hopmann 1998]: 231-242).

We propose to examine two distinct characteristics of the mediation process in international crises: (1) What style of mediation is likely to be the most successful in resolving international crises; and (2) What mix of mediation and adversary cognitive complexity levels is most conducive to resolving international crises. While these are clearly not the only two features of the mediation process which have a bearing on negotiation outcomes (for example, mediator power relative to one or more of the adversaries, extent of mediator neutrality, etc.), we believe that they are central to the development of a greater understanding of the process by which conflict moves from management to resolution. We begin with the presentation of a formal model of a fishing dispute, which will be used as the basis for the simulation experiments outlined below.

4.2.1 Scenario

A stock of flatfish straddles the Canadian exclusive economic zone (EEZ) and international waters. This stock has been severely over-fished in recent years, and Canada has taken measures to conserve this stock while allowing minimal fishing in order to maintain some level of employment for its fishers. Spain has fished this same stock of flatfish for many years, and has respected Canada’s EEZ by not attempting to fish within it. Spain is also dependent on fishing in the area outside the EEZ for employment and trade purposes.

The crisis is initiated by Canada’s seizing one of Spain’s vessels in international waters adjacent to its EEZ during the previous fishing season, enforcing Canada’s legislation regarding the conservation of the flatfish fishery. Canada claims to have found fishing gear aboard Spain’s vessel that is in violation of previous agreements (such as fine mesh nets). Canada maintains that continued over-fishing of the flatfish stock, even at the edges of the EEZ, will eliminate the stock completely within a short period of time. Spain claims, however, that its fishing is done in international waters, and that Canada has no right to seize vessels outside its 200-mile EEZ. Spain also charges Canada with the depletion of the flatfish stock.

Canada and Spain have agreed to meet in an attempt to negotiate an agreement regarding the fishery dispute, according to procedures outlined in the United Nations Convention on the Law of the Sea (UNCLOS). Each party must consider six possible ways of ending the crisis.

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6 Although this scenario is loosely based on the Canada/Spain fishing dispute of 1995 (sometimes referred to as the “Turbot Tempest,” we have made a number of changes in order to reduce the complexity of the original situation.
1. An agreement on total allowable catch (TAC) at or below maximum sustainable yield (MSY).
2. An agreement on TAC above MSY.
3. An agreement on limiting the length of the fishing season.
4. Canada enforces conservation measures with military force against Spain.
5. Spain enforces its right to fish throughout the fishery with military force against Canada.
6. Either party sues the other at the International Court of Justice (ICJ), whose ruling, for purposes of this simulation, is binding on all parties.

Each of the parties has the capability to make requests, threats, promises, offers and counteroffers, as well as to comment on the negotiations. If a party chooses to opt out of the negotiation, i.e., resort to military action or refer the matter to the ICJ, success or failure is determined probabilistically. If the negotiation has not ended within 15 periods, then it terminates with a status quo outcome. The specific issues that can be negotiated by the parties during the course of the simulation include the following:

1. The total number of tons of fish to be caught (TAC) by both parties for the next season.
2. The division of TAC between Canada and Spain.
3. Whether the next fishing season will be limited in duration.
4. Whether Spain will continue to restrict its use of fishing gear.
5. Whether Canadian ports will remain open to Spanish fishing vessels for catch processing and ship servicing.
6. Whether, and what amount, Canada pays to keep Spanish ships from operating in the fishery.
7. Whether, and what amount, Spain pays to assist Canada in its pollution control efforts.
8. Whether trade sanctions are implemented or lifted by either party.

### 4.2.2 Language Editor and Coding of Communications

In addition to the GDSS described above, simulation participants also had access to a language editor to facilitate communications during the negotiations. Early in our experimental work, we decided that in order to maintain better control over the experimental environment, users would not communicate in natural language, but rather by constructing messages from "canned" sets of options.

The Language Editor consists of a set of pre-written and formatted messages which the participants in the simulation may choose in order to communicate between themselves and with the mediator, as well as to take actions during the simulation. As such it represents the instrument of negotiation between the parties.

The messages that make up the language editor are divided into two main categories - statements and actions. Statements are the various negotiation communications among the parties (adversaries and mediator). They often contain pull-down boxes to choose an exact number for a given figure (such as the number of tons of fish caught under a proposed agreement) or the particular status
of a World State Parameter (for example, whether ports remain open or closed to the adversary’s fishing vessels). These statements may also be further modified by adding conciliatory or hostile phrases at the subject’s choosing. These negotiation statements are further divided into several different categories. First, offers can be made to the other parties regarding possible simulation-ending agreements as well as the status of World State Parameters. The subjects may also state and/or revise their bargaining minimums through statements in the offers categories. Counters offers to previously made offers may also be sent through the Language Editor. Subjects may also make threats through the Language Editor to either change the status of World State Parameters, opt-out of the negotiations, or refuse to accept a proposed agreement. Parties in the simulation may also choose from a number of promise statements regarding World State Parameters, proposed agreements, and opt-outs. Counters offers to Promises are also included in the Language Editor. Finally, comments on the negotiation, both positive and negative, can be made by the subjects. Action announcements are directed to the Simulation Manager (automated) and are used to declare that an agreement has been reached or an opt-out chosen.

In order to facilitate study of patterns of cooperation and conflict, all the Language Editor messages were coded according to McClelland’s ([McClelland 1972]) World Events Interaction Survey (WEIS) scheme. In short, WEIS coding is a measure of cooperation or conflict for each event between nations. These codes were weighted in order to create a conflict/cooperation continuum using Goldstein ([Goldstein 1992]) scale values. Under this scheme, the two extremes of conflict and cooperation, war and the lending of military assistance, are given values of -10.0 and 8.3, respectively. A perfectly neutral score of 0.0, for example, indicates a statement by one party explaining its policies without praising or condemning its adversary. Applying WEIS coding and Goldstein scale values to the messages in the Language Editor, we are able to track the levels of conflict and cooperation exhibited by the negotiating parties.\footnote{The authors would like to thank Phil Schrod t for his assistance in determining the proper WEIS coding and Goldstein scale values for Language Editor messages.}

As previously noted, there were two types of mediators in this set of experiments. The difference between the two types was the language available to the mediators for use during the simulation. All mediators regardless of type received copies of all messages that the subjects sent to each other. The mediators who were "facilitators of communications, compromise and convergence" (medium level) were able to send messages of a general nature to either party. These general messages might be advice on negotiating style such as use more threats, compromise more, etc. or they might be advice on general type of offer that might be more acceptable such as offer to increase TAC or offer to increase subsidies, but would not specify exact amounts. The "facilitators of cognitive change" mediators (high level) had at their disposal the entire set of language available to the less capable mediator. In addition the more powerful mediator had the ability to suggest specific messages to the subjects. The text of the message that the subject saw would read "As the mediator I suggest that you send the following message to Canada/Spain: (message text drawn from the messages available to the subject)."

\subsection{The Strategic Negotiation Model Applied to the Fishing Dispute}

We assume that the negotiators use the protocol of alternating offers (Section 3) for resolving the conflict. In our preliminary formal analysis of the Fishing Dispute we assume that the only options for the players are to either reach an agreement on the size of TAC or opt out. In particular, an agreement is a number between 1 and 54 where MSY=27. In addition, we assume that the players are risk neutral. Since the expected utility from an ICJ suit is better for both players than the other
options of opting out, i.e., using military force, we assume that when opting out of the negotiations the players choose the ICJ suit. According to the rules of the simulation, there is a time period $\hat{T}$ such that if the negotiation has not ended in time periods prior to $\hat{T}$, then the status quo is implemented.

The utility functions of Canada and Spain satisfy the following assumptions:

A0. **Opting Out vs. Status Quo:** Opting out at period $\hat{T} - 1$ is better for both players than the status quo. Formally, $U^i(\text{ICJ}, \hat{T} - 1) > U^i(\text{SQ})$.

A1. **Agreement’s Cost Over Time:** Canada prefers reaching a given agreement sooner rather than later and Spain prefers reaching a given agreement later rather than sooner. For any $t_1, t_2 \in \mathcal{T}$ and $1 \leq x \leq 54$, if $t_1 \leq t_2$ then $U^{\text{canada}}(x, t_1) \geq U^{\text{canada}}(x, t_2)$ and $U^{\text{Spain}}(x, t_1) \leq U^{\text{Spain}}(x, t_2)$.

A2. **Opting Out Over Time:** Canada prefers to opt out sooner rather than later and Spain prefers to opt out later rather than sooner. For any $t_1, t_2 \in \mathcal{T}$, if $t_1 \leq t_2$ then $U^{\text{canada}}(\text{ICJ}, t_1) \geq U^{\text{canada}}(\text{ICJ}, t_2)$ and $U^{\text{Spain}}(\text{ICJ}, t_1) \leq U^{\text{Spain}}(\text{ICJ}, t_2)$.

A3. **Preferences for Agreements:** Canada would like TAC to be as small as possible, while Spain would like it to be as large as possible, with the exception that agreements of MSY and a little higher (MSY+1; MSY+2) are worse for Spain than MSY-1.

For any $t \in \mathcal{T}$ and $1 \leq x_1 < x_2 \leq 54$, $U^{\text{canada}}(x_1, t) \geq U^{\text{canada}}(x_2, t)$ and if $x_2 \leq 27$ or $x_1 \geq 28$ $U^{\text{Spain}}(x_1, t) \leq U^{\text{Spain}}(x_2, t)$. In addition, $U^{\text{Spain}}(27, t) = U^{\text{Spain}}(30)$.

A4. **Possible Agreement:** In time periods prior to $\hat{T}$ there is at least one agreement that is preferred by both players opting out.

As mentioned above, according to the rules of the simulations, there is a time period $\hat{T}$ such that if the negotiation has not ended in time periods prior to $\hat{T}$, then the status quo is implemented. Thus, in order to find a subgame-perfect equilibrium we can use backward induction. We are able to identify strategies that are in equilibrium in the general case, and then identify the strategies when $\hat{T} = 15$ as in the proposed simulations.

We prove that under assumptions A0–A4, if the negotiation has not ended during prior periods, then an agreement will be reached in the period prior to that in which the status quo is implemented, i.e., in period $\hat{T} - 1$. This is because both players prefer opting out in $\hat{T} - 1$ to the status quo. Assuming it is i’s turn to make an offer at period $\hat{T} - 1$, if player j receives an offer that is worse to it than opting out, it will opt out. To prevent this, i should offer j an agreement that j prefers to opting out. It should choose one that it also prefers over opting out. Thereke is such an agreement according to our assumptions. Among the agreements that both prefer to opting out i can choose the one that is the best for itself.

In time periods prior to $\hat{T} - 1$ the player whose turn it is to make an offer should offer an agreement that is better for both players than opting out or possible future agreements. Among these agreements it can choose the one that is best for it. However, since in our scenario Spain gains over time more than Canada loses over time, and for agreements above MSY the loss for Canada for each MSY unit is much larger than the gain of Spain from one unit, it may be the case that there will not be an agreement in a given time period that is better for both players than an agreement they may reach in the future.

In particular, the player whose turn it is to make an offer should look first for agreements that are better for both players than opting out. According to our assumptions, there is such an
agreement. Then, it should take into considerations future possible agreements. In particular, if it is Canada’s turn to make an offer, then it is clear that Spain will not opt out, since it prefers opting out later rather than sooner. However, Spain will not agree to any agreement that is worse to it than the one it can get in the future. Also, Canada should not propose any agreement that is worse for it than the one it can obtain in the future.

If it is Spain’s turn to make an offer, it should try to prevent Canada from opting out, since Canada prefers to opt out sooner rather than later. Only if the future agreement is at least as good as opting out now for Canada, Spain can require that the agreement that it proposes is better than the future possible agreement.

In our proposed simulation \( \hat{T} = 15 \). The application of our formal results to the specific scenario depends on who makes the offer at time period 14. If it is Canada’s turn to make an offer at time period 14, then it will offer \( TAC = 1 \). This is because the expected utility for Spain from opting out at time period 14 is 456 and any agreement is better for Spain than opting out. Canada, which prefers that the allowable catch will be as small as possible, chooses the smallest agreement 1 which will be accepted by Spain. The utility for Canada from 1 at period 14 is 665 and the utility for Spain is 550. In time period 13, it is Spain’s turn to make an offer. Spain should offer an agreement that will be better for Canada than opting out and to both countries than 1 at the next time period. Since Spain gains 10 over time and each unit of an agreement is worth 10 to it, and Canada is losing 5 over time and loses 5 per TAC unit, the utility for both players from 2 at period 13 is exactly the same as from 1 at time period 14. Any other agreement will give one of the players smaller utility than 1 at period 14. Thus, Spain will offer 2 which will be accepted by Canada if the negotiation has not ended in prior time periods. Using this reasoning, in each time period (backward) the offer that is made is increased by 1. Therefore, at the first time period Canada will offer 15 and the offer will be accepted by Spain. Thus an agreement will be reached in the first time period. Canada’s utility will be 665 and Spain’s 550.

The reasoning for the case where it is Spain’s turn to make an offer in period 14 follows the same patterns as the Canadian case above, and it is not included here for space reasons. In this case, Spain will offer 27 to Canada in the first period, and Canada will accept the offer. Canada’s utility will be 605 and Spain’s will be 670.

### 4.3 Mediating International Crises

#### 4.3.1 Mediator Type

The strategic model of negotiation, as applied to the Fishing Dispute, has been employed as the basis for the construction of a decision support system. Unlike the Hostage Crisis DSS described in Sections 3.1 and 3.2 above, in this case we have developed a Generalized Decision Support System (GDSS) which allows the experimental designer to input any scenario and its accompanying utility functions and parameters. The GDSS consists of two separate Java programs: a development tool and a GDSS applet. The GDSS development program guides the investigator through the process of defining the components of the negotiation situation. Then the program writes a data file which is read by the GDSS applet to create a GDSS for the specific negotiation simulation. This ensures a dynamic DSS while providing for cross-platform availability and easy distribution of the GDSS to many different experimental environments.

For purposes of the present set of investigations, we have developed a research design which focuses on the first three categories of Hopmann’s typology of mediator roles (see Section 4.1 above):

1. **Process Facilitator.** Often referred to as good offices, process facilitation usually involves
the provision of venue conducive to reaching agreement, including logistical support, agenda setting, and general atmospherics ([Hopmann 1998]:231-233). In our experimental environment, process facilitation is operationalized by providing each negotiator with access to a decision support system capable of calculating the utility values associated with various proposed outcomes of the crisis, as well as a communications package supporting the exchange of information and messages between the negotiators. In this formulation, mediation is passive, in the sense that once these facilities have been provided, mediation plays no further role in the course of the crisis negotiation.

2. **Facilitator of Communications, Compromise, and Convergence.** In addition to serving as process facilitator, the second level mediator also provides services designed to circumvent impasses resulting from the reluctance of parties to make the first concession or from their desire to make the first and firmest commitments ([Hopmann 1998]: 232). Once communications have begun, the mediator tries to encourage and sustain a reciprocal process intended to lead ultimately to convergence on a mutually beneficial outcome. In operational terms, such a mediator is capable of making general suggestions about negotiation style, tactics, strategies, and goals.

3. **Facilitator of Cognitive Change.** In addition to serving as process facilitator, and as a facilitator of communications, compromise, and convergence, the facilitator of cognitive change (not to be confused with our use of cognitive complexity throughout this paper) can try to influence the parties to change their preferences by seeing the problem in a new light ([Hopmann 1998]: 234). As Hopmann indicates, the goal is to create a problem-solving atmosphere which will facilitate the search for new solutions to the problem. In operational terms, the facilitator of cognitive change will make specific suggestions about which offers might be sent by the parties in order to produce a positive outcome to the negotiation.

In addition to this formulation of mediation types, we also propose two types of outcomes to crisis negotiation: agreement and opt out. In the Fishing Dispute scenario, agreements pertain either to Total Allowable Catch (TAC) at, below, or above Maximum Sustainable Yield (MSY), and agreement on limiting the length of the fishing season. Opting out involves military force initiated by one of the two parties, or one party suing the other at the International Court of Justice (ICJ). Two key hypotheses will be tested using the above operationalization of mediation style:

**Hypothesis 1** Increasing the level of mediation in the crisis is associated with a higher probability of reaching agreement (as opposed to opting out).

**Hypothesis 2** Increasing the level of mediation in the crisis is associated with greater mutual benefit, as reflected in smaller differences in the utility point outcomes for the adversaries.

It will be noted that while Hypothesis 1 attempts to capture the extent to which individual benefit is achieved as a result of the negotiation, Hypothesis 2 assesses the extent of mutual benefit. Individual benefit is achieved when agreement is reached rather than opting out. Greater mutual benefit is achieved as the gap between the utility points received by the two parties narrows.

4.4 **Experimental Design**

Preliminary experiments based on the fishing dispute simulation and the hypotheses discussed above were run in the fall 1998 semester at the University of Maryland. Participants were sophomores enrolled in an interdisciplinary residential honors program in international studies.
Prior to pre-simulation training, the participants were asked to complete a Paragraph Completion Measure (PCM), in order to measure their Cognitive Level (CL). CL scores for traditional college students generally range between 1 and 3 on a scale of 1 to 7. The range of scores for these subjects was between .8 and 2.28. Since in this instance, we were not testing hypotheses pertaining to the degree of dispersion in scores between the two adversaries, all participants were placed in homogeneous groups, with differences in CL scores of no greater than .5.

All participants then attended a 3-hour training session that consisted of three parts: (a) a presentation about the simulation - how it works, the rules, the scenario, the objectives, and the items that could be negotiated - and instructions for using the software packages necessary for the simulation (the Generalized Decision Support System and the Language Editor); (b) a 15 to 20-minute period during which the participants could practice on the computer and ask questions; and (c) a quiz that assessed proficiency with the GDSS.

About one week after the training session, participants returned for the simulation. Before starting the simulation, all participants were encouraged to ask any questions they had about the simulation or the computer programs they would be using. Then, the rules governing the simulation were reviewed. The participants were assigned to the roles of Thule (Canada) and Ultima (Spain) randomly within their groups. A maximum of 15 10-minute periods was allowed for the simulation. At the end of the simulation, an evaluation was administered to gather data on motivation, strategy, and sources of any frustration experienced. As noted, the software kept track of the number of times various features were accessed and used, what types of projections were run, and the types of communications exchanged.

A total of 70 students participated in 35 simulations: 13 simulations had only mediation of the process facilitator type, 11 had mediation of the communications, compromise, and convergence facilitator type, and 11 had mediation through the facilitation of cognitive change.

4.5 Results

Table 1 presents the findings pertaining to Hypothesis 1. Recall that "opt out" includes the following outcomes: an International Court of Justice (ICJ) suit filed by Canada or Spain, and military action initiated by Canada or Spain. "Agreement" includes an agreement regarding Total Allowable Catch (TAC) at, below, or above Maximum Sustainable Yield (MSY), and an agreement on limiting the fishing season. While the trend is not strong, it is clearly the case that the results are pointing in the opposite direction than that hypothesized. That is, although the results are not statistically significant, as the level of mediation increases, the proportion of disputes ending in agreement decreases slightly.

<table>
<thead>
<tr>
<th></th>
<th>Opt. Out</th>
<th>Agreements</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Facilitator</td>
<td>3</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>(Low Mediation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convergence Facilitator</td>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>(Medium Mediation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog. Chng. Facilitator</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>(High Mediation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>10</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>

Table 1: Level of Mediation and Negotiation Outcome
Regarding Hypothesis 2, we are asking a somewhat different question. Regardless of whether or not the level of mediation impacts on the achievement of agreements versus opting out, does mediation nevertheless have an impact on the gap in utility points between the two parties. That is, one way to conceive of mutual benefit is by positing that the range of utility points between the two parties to the negotiation narrows. As we can see from Table 2, as the level of mediation increases, there is a gradual increase in the gap in utility points between the two parties, although again these findings are not statistically significant. As was the case with Hypothesis 1, these findings run counter to the direction hypothesized.

<table>
<thead>
<tr>
<th>Process Facilitator (Low Mediation)</th>
<th>Utility Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convergence Facilitator (Medium Mediation)</td>
<td>258</td>
</tr>
<tr>
<td>Cog. Chng. Facilitator (High Mediation)</td>
<td>283</td>
</tr>
</tbody>
</table>

Table 2: Average Difference in Utility Points

So overall, our preliminary findings appear to point to a rather paradoxical set of conclusions. It would appear that not only does mediation not help in the attainment of individual and mutually beneficial outcomes in terms of the achievement of agreements and in utility points, but in fact a slight trend in the opposite direction can be discerned. How might we begin to account for these seemingly counterintuitive findings?

To this point, we have not been concerned with the issue of cognitive complexity and its possible impact on the outcome of negotiation. Initial investigation reveals that there is no relationship between individual cognitive complexity levels and the utility points associated with outcomes. But since our previous research ([Santmire et al. 1998]) has suggested that both cognitive level by itself, and the grouping of subjects by cognitive level, have an impact on negotiations and outcomes, we decided to explore this matter further. One explanation for the inverse relationship between level of mediation and achievement of agreement is based on the fact that these particular subjects were at a cognitive level where they were likely to challenge unsubstantiated external authority. Since our experimental design had not included any material which would have prepared the subjects in such a way that they would see a mediator as a valid source of external authority, it should not be surprising that in both comments during the simulation and in post-simulation surveys, the subjects indicated that they were not accepting of the mediators. Since they were challenging the mediators, the more specific the mediator was in telling them what to do (heavy mediation), the more challenging their behavior was and therefore the less likely they were to adopt the mediator's suggestion and reach a mutually beneficial agreement.

The cognitive grouping explanation has to do with the relative cognitive levels of the different subjects within a simulation. In this design, in order to hold cognitive level constant, we had formed only homogeneous groupings. But among our mediators (graduate students), not only was there considerable disparity in cognitive levels, but because of their small numbers and schedules, it was not always possible to match their cognitive levels with those of the two subjects in their particular simulation. Hence, some simulations were homogeneous with respect to mediators, and some were heterogeneous.

The results of this extended analysis are presented in Table 3. 8 For the 11 cases in which the

8Note that since not all of the simulations analyzed had medium or high levels of mediation and therefore involved
mediator and the negotiators were homogeneous with respect to cognitive complexity levels, seven terminated in agreement and four in opt out. These results are consistent with our earlier studies. However, the cases in which heterogeneity existed between mediator and negotiators showed more complex outcomes. For the seven cases in which the mediator was at a higher cognitive level than the negotiators, all ended in agreement. On the other hand, among the five cases in which the mediator was at a lower cognitive level than the subjects, three of the five ended with an opt out. These results are approaching significance at the .05 level.

<table>
<thead>
<tr>
<th></th>
<th>Opt Out</th>
<th>Agreement</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterogeneous High</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Homogeneous</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Heterogeneous Low</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7</td>
<td>16</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 3: Cognitive Levels of Mediators and Negotiators

These results suggest that having a mediator with a cognitive level higher than that of the other negotiators may be a key to successful mediation. This would also make sense from a cognitive theory standpoint. Those at higher levels of cognitive complexity generally find it easier to understand two different positions and to see where the common ground is between them. Individuals at lower cognitive levels are unable to do this and thus would make poor mediators, which would lower the effectiveness of mediation.

These preliminary findings clearly suggest that our next set of experiments should be designed to focus in more sharply on issues having to do with the particular mix of cognitive levels among negotiators and mediators. With this in mind, a third hypothesis is proposed for future analysis.

**Hypothesis 3** Adversaries who are homogeneous in terms of cognitive complexity are more likely to reach agreements when a mediator is above their common cognitive complexity level than when the mediator is at or below their level.

5 **Significance of Research**

In this paper, we have extended our research on a strategic model of negotiations by explicitly investigating the impact of mediation on crisis processes and outcomes, and, implicitly, on the question of how we move from conflict management to conflict resolution. We present a formal model of a fishing dispute as the basis of experiments designed to evaluate the impact of different types of mediation on crisis outcomes, and to compare situations of homogeneity in cognitive complexity between adversaries and mediators to situations of heterogeneity between adversaries and mediator.

We expect to shed light on the internal dynamics of the negotiation process, particularly as it is played out in the high stress environment of an international crisis. As we have noted, such situations are fraught with the increased danger of escalation to violence as a means for resolving disputes, and hence the ability to identify those circumstances most conducive to both individual and collective utility maximization, as reflected in the achievement of agreements, is a positive development.

human mediators, the n for Table 3 is considerably smaller than for Table 1.
Our work on mediation, and on the question of the proper match between mediator and adversary cognitive complexity, will help us identify those circumstances under which mediation is likely to be effective. Here we hope to make contributions to the resolution of conflict in the post-Cold War international system, in which the United States, as a hegemonic state in terms of power and influence, will increasingly be called upon to provide its services for the mediation of international disputes (Bosnia, the Middle East, etc.). Other countries and regional organizations, in particular the UN, NATO, and the countries of the EU, will also become increasingly involved as potential mediators of international and regional disputes. In this role, it will be critical that we assess the situation accurately, evaluate the types of negotiators likely to represent the parties, and attempt to send out mediators who will be able to best lead the parties to mutually beneficial outcomes. Not only will we have to answer the question of whether to send a generalist or an issue-specific expert, but we will also need to determine the dimension along which the mediator’s cognitive complexity should range, and its match with those of the adversaries is most likely to bring success.

We have noted that although this research design is rather complex, it in fact addresses only a limited portion of the negotiation process. However, we believe that the experimental procedures we have outlined, coupled with the ability to create controlled experimental environments through the use of a generalized decision support system, greatly enhance our capacity to understand the dynamics of the conflict and crisis situations we are examining. The use of experimental designs to study political processes at the international level is still in its early developmental stages, and we hope that quite aside from the specific preliminary research findings discussed in this paper, our work will also contribute to the greater awareness of the power of an experimental approach in the study of political behavior at the international level.

References


