Political Psychology, Vol. 19, No. 4, 1998

The Impact of Cognitive Diversity on Crisis Negotiations

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This paper reports on a series of experiments designed to assess the impact of grouping decision makers by level of cognitive complexity on the outcomes they attain in crisis negotiations. The participants—University of Maryland undergraduates who took roles in a simulated international hostage crisis—used a computer decision support system and a controlled network environment for communications. The goal of the experiments was to better understand the dynamics that lead certain types of groupings to have greater success in negotiations, and that lead certain groups of adversaries to achieve more mutually beneficial outcomes such as compromise and agreement. The findings point to a positive relationship between the level of homogeneity in cognitive complexity among decision makers and the achievement of positive outcomes in crisis negotiations.

KEY WORDS: crisis; negotiation; cognitive complexity; experiments; simulation; decision support systems; utility.

To what extent does the behavior of a group in a crisis negotiation, and the result of that negotiation, depend on the relative homogeneity of cognitive complexity

Published by Blackwell Publishers, 350 Main Street, Malden, MA 02148, USA, and 108 Cowley Road, Oxford, OX4 1JF, UK.

within the group? This question is the focus of our current study, the latest in a series of investigations into the relationship between cognitive complexity and negotiation behavior. Previously we considered the relationships between individual levels of cognitive complexity and negotiation behavior and between this behavior and outcomes achieved (Wilkenfeld, Kraus, Santmire, Holley, & Santmire, 1996). We have also conducted experiments with decision support system (DSS) software to learn how such software can aid in decision making in complex negotiations (Wilkenfeld, Kraus, & Holley, in press; Wilkenfeld, Kraus, Holley, & Harris, 1995).

Underlying the present set of experiments are two interrelated expectations that arise from the results of our previous research (summarized below). The first expectation is that similarity in cognitive complexity among decision makers (homogeneity) will facilitate the understanding of each other's offers and counteroffers, and hence such groups will be likely to reach mutually satisfying outcomes. Conversely, groups of decision makers with diverse levels of cognitive complexity (heterogeneity) will experience difficulty in understanding one another's positions and hence will have a lower probability of reaching mutually satisfying outcomes. The second expectation is that decision makers with virtually identical levels of cognitive complexity (ultrahomogeneity) may experience frustrations in the negotiation process that are likely to lead to a diminution in their ability to achieve mutually satisfying outcomes. Both diverse groups and identical groups of decision makers are expected to reach mutually beneficial outcomes—in this case, agreements—with lower frequency than groups of moderately dissimilar decision makers.

Our areas of expertise include negotiation and decision theory in social science in general and political science in particular, cognitive schema theory within psychology, and intelligent systems and distributed artificial intelligence in computer science. Our overall objective is to develop a better understanding and theoretical model of the dynamics of negotiation, so that we will be in a better position to elaborate the conditions under which agreement and compromise are more likely to emerge than disagreement, conflict, and ultimately violence. By adopting an experimental approach, we hope to better identify complex interpersonal factors using controlled environments where we will have some confidence in the influence of these factors on negotiation behavior and outcomes.[1]

The experiments reported below were characterized by several features that tend to set them apart from other experimental work being conducted in foreign policy analysis (see, e.g., Geva & Mayhar, 1997; Mintz, Geva, Redd, & Carnes,

[1] Although this paper does not attempt a comprehensive literature review in any of the fields contributing to the design of our experiments, we have been aided in our review of relevant works by several bibliographic articles, including Thompson (1990) on negotiation behavior, Druckman (1994) and Kagel and Roth (1995) on experimental work on negotiation, Holsti (1989) on crisis decision making, Kraus and Wilkenfeld (1993) on strategic models of negotiation, and Ghiaseddin (1987) on the design of effective DSSs.

1997; Tetlock & Belkin, 1996). First, the focus was exclusively on behavior in crisis, with a particular emphasis on shortness of time and high level of threat. Second, the participants had access to an elaborate DSS, which, when properly used, could provide information on the utilities associated with various outcomes and hence enhance their ability to maximize utility, even under conditions of incomplete information. Third, all communications among the participants took place in a controlled network environment, allowing for complete analysis of the types of tools they consulted as well as the content and form of the interactions during the negotiation. Together, these features provide a rich environment in which experiments can be run and their results assessed. Only a portion of the results from the current round of experiments are reported below.

Crisis Decision Making

It is widely contended that negotiations during crisis differ substantially from more routine negotiations, in that they are characterized by decision makers' perceptions of high threat to basic values, short time for response, and a heightened probability of involvement in military hostilities (Brecher, Wilkenfeld & Moser, 1988; Brecher & Wilkenfeld, 1997). Under such circumstances, decision makers are often unable to access the information necessary to make utility-maximizing decisions, or they are unable to properly evaluate the information in the amount of time available for decisions. Hence, decisions are often made on the basis of previous experience, long-held beliefs, and analogies to seemingly comparable situations, rather than with cold analytic calculation. As a consequence, suboptimal outcomes are likely to result. Although all decision-making environments have the potential for suboptimality, international crises are particularly dangerous because they can quickly escalate to violence and war. 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 (for reviews of the crisis decision-making literature, see Brecher, 1993; Holsti, 1989; Holsti & George, 1975).

Theoretical approaches to crisis decision making can be roughly divided into two groups, based on the types of explanatory variables used by the researchers. "The effects of crises may depend on many factors: *individual difference variables* (self-image as effective coper, track record of performance in previous crises) and *situational variables* (the reversibility and severity of existing threats)" (Tetlock & McGuire, 1986; italics added). One group of scholars, best exemplified by the work of Margaret Hermann, looks at the personal characteristics of decision makers to explain crisis outcomes. A second group of scholars, exemplified by Daniel Druckman, looks at the situational characteristics of the crisis to explain crisis outcomes.

Hermann believed that models of decision making should include national attributes, regime factors, decision structures and processes, situational variables,

and external relationships (Hermann, 1980). She also concluded that "personal characteristics and orientations to foreign affairs of political leaders are worth including in this integrative effort" (Hermann, 1980). More recently, Hermann and Kegley (1995) have published research on the effects of the personal characteristics of leaders in crisis situations on the likelihood of war. In addition, Suedfeld and Tetlock (1977) concluded that "information processing complexity, both as a personality characteristic and as an interactive function of personality and environmental variables, is a source of varied and powerful hypotheses and can be investigated by a quantifiable and methodologically rigorous procedure." Suedfeld has been involved in several research endeavors in the area of crisis, including research on changes in cognitive complexity before surprise attacks (Suedfeld & Bluck, 1988), the role of change in conceptual complexity for success in revolutionary leaders (Suedfeld & Rank, 1976), and the role of cognitive complexity in communication during international crises (Suedfeld & Tetlock, 1977). Here, we attempt to develop the role of personal characteristics in a model of crisis decision making while holding constant the situational variables that also affect crisis decision making. The individual difference variable (or personal characteristic variable) that we focus on is the level of cognitive complexity exhibited by each individual.

Scholars who study the situational characteristics of crises believe that the environment in which negotiations take place affects the way negotiators behave and thus affects the outcomes of the negotiations. Such environmental variables include the physical location of the negotiations, the context of the negotiation, the structure of the negotiation, the issues involved in the negotiation, the structure of the negotiation teams, the immediate situation, parties to the negotiation, external events, publicity associated with the negotiations, and the structure of the domestic constituency that must agree to the outcome of the negotiations. These variables are thought to affect the flexibility of negotiators, the amount, timing, and kind of concessions negotiators are willing to make, and the negotiating strategies they use (see, e.g., Druckman, 1995). In our experiments, situational variables were kept fixed.

Decision Support Systems

As noted earlier, a key component of the current research program is an assessment of the impact of the use of sophisticated software tools on the ability of decision makers to make effective decisions. DSSs can play a critical role in the crisis decision-making process by allowing the decision maker to navigate large amounts of information quickly and to explore interrelationships between factors that may influence the decision. A DSS can also facilitate the simultaneous evaluation of multiple positions in crisis negotiations, thereby allowing the parties to rapidly formulate dynamic strategies and quickly evaluate their opponents' proposals (Wilkenfeld et al., 1995). DSSs have been designed to provide support

for the entire negotiation group (Grey, Vogel, & Beaulair, 1990; Sycara, 1993), support for a mediator in a negotiation (Jarke, Jelassi, & Shakun, 1987; Kersten, 1985), and support for individual negotiators (Bui, 1992; Matwin, Szpakowicz, Koperczak, Kersten, & Michalowski, 1989; Samarasan, 1993). In previous work, our interest has been in how the systematic use of such tools in high-pressure decision-making contexts can facilitate utility maximization for an individual negotiator (see Wilkenfeld et al., 1995). Use of the DSS allows us to collect data on exactly what type of information each individual chooses to access, and what tools each individual uses to access that information. We also focus on the types of communications exchanged by participants in crisis negotiation. The use of language generators and network-based communications in controlled experimental environments allows us to carefully monitor negotiations as they transpire, and to collect content-analytic data after the negotiation has ended. This unique environment (described below) allows us to test a variety of propositions related to the types of communications exchanged during crisis, and to relate these back to the types of outcomes achieved.

Research Design

Our overall research program has several objectives: (a) to identify the types of individuals most likely to achieve utility maximization in crisis negotiation situations; (b) to identify the pairings or groupings of types of individuals most likely to achieve utility maximization in crisis negotiation situations; (c) to identify the types of strategies that are most successfully used, and to identify who is using them (i.e., types of individuals as well as their groupings and pairings); (d) to identify the types of tools that are most likely to facilitate such utility-maximizing outcomes for a given type of individual; and (e) to identify the circumstances under which DSS software can assist decision making in difficult negotiations, and how this varies across types of individuals. This paper reports only results for the second of these objectives (see below for previous results concerning the other objectives). Although the current goals of this research program apply only to crisis decision making, the same software and approach could be used to compare crisis and non-crisis decision making.

As discussed above, the underlying premise of this research project is that grouping decision makers by level of cognitive complexity has an impact on the process of crisis decision making and on crisis outcomes. For the purposes of exploring this proposition, we designed experiments that would allow us to measure the level of cognitive complexity for each participant, and then to manipulate the variation in cognitive complexity in each group and observe the impact of that manipulation on the outcome of the crisis negotiation. In the sections below, we discuss the four instruments used to conduct these experiments: the Paragraph Completion Measure of cognitive complexity, the hostage crisis model, the GENIE DSS, and the language editor. This discussion is followed by the presentation of

the hypotheses tested, the experimental procedures used, and the results of a series of experiments.

Instruments

The Paragraph Completion Measure and Conceptual Level Score

The Paragraph Completion Measure (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 (1961) and Schroder, Driver, and Streufert (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 that 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 (Hunt, Butler, Noy, & Rosser, 1978; Schroder et al., 1967).

In this framework, individuals with low levels of cognitive complexity are termed concrete, and individuals with high levels of cognitive complexity are termed abstract:

> "Concrete" is defined as being equal to minimal differentiation; "abstract" is defined as equal to maximal differentiation and integration. Greater concreteness (as opposed to abstractness) implies (Harvey & Schroder, 1963): (a) fewer differentiations, incomplete integration; (b) a tendency toward bifurcated evaluation; (c) dependence on external criteria of validity, e.g., authority, precedent; (d) greater intolerance for ambiguity, e.g., quick judgments in novel situations, susceptibility to salient (and potentially false) cues; (e) inability to change set, stereotyping in attempted solutions of complex problems; (f) greater resistance to change when stress is low, greater likelihood of collapse when stress is high; (g) poor delineation between means and ends, hence a paucity of different routes toward the same goal; (h) poorer capacity to act "as if," empathize, simulate a hypothetical situation; (i) less well-defined self, consequently, less perception of self as a causal agent (external vs. internal control). (Streufert & Streufert, 1978)

Theoretically, in any situation in which there is conflict between different perspectives on a given issue, the perspectives represent polar opposites on some conceptual dimension. Structural analysis of the relationship between these perspectives in an individual response is used to determine the degree of cognitive complexity of the individual generating the response.

At low levels of cognitive complexity, each position is seen as separate and opposite. Generally, at this level, one position is evaluated as correct or right and

the other as wrong. Thus, the two positions are seen as irreconcilable or inconsistent with each other. This is a score 1 level of cognitive complexity.

As individuals become more cognitively complex, the position of others can increasingly be seen as valid although no way of resolving the contradiction is seen as possible, and the individual pursues his or her own solutions within particular situations. This is a score 3 level of cognitive complexity.

Increased levels of cognitive complexity lead to more generalized resolutions of the conflict. Medium-high levels of cognitive complexity result in a relativistic approach to the conflict, suggesting that individuals will have different and justifiable points of view on the issue depending on their experience with the area in question. This is a score 5 level of cognitive complexity.

The highest level of cognitive complexity with regard to the original area of conflict is reached when different interpretations of the event or issue can be integrated with each other in a manner that allows each its own perspective and finds new ways to find functional relationships between them. This is a score 7 level of cognitive complexity.

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 with which they enter a situation will be unable to change those schemas or biases, and that 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 are generally used: those implying relationships of authority (i.e., the conflict between authority and the individual subject to that authority); those implying conflict in relationships among peers (i.e., conflict between points of view); and those implying intrapersonal conflict in which different alternatives present themselves and a decision among them needs to be made. The level of cognitive complexity is assessed by presenting the respondent with a set of sentence stems or other stimuli that present an implicit conflict between two perspectives on an issue of relevance to the domain within which cognitive complexity is to be assessed. The respondent is asked to write a brief description of his or her approach to or understanding of the issue presented in the stem. Paragraphs for each stem generally require 2 to 3 minutes to complete.[2]

Each response is then read by a trained rater who ascertains the existence of alternative perspectives of the area tapped by the stem, the decision rules used to decide among the alternatives, and the interrelationships constructed among the alternatives. These are the considerations used to determine the index of cognitive

[2] The following stems were used for the set of experiments reported here: "I think rules . . . ," "When I am criticized . . . ," "When I am uncertain . . . ," "When I am told what to do . . . ," and "When someone disagrees with me . . ." More details about the instructions are available on request.

complexity for that response. Typically, five or six sentence stems are used and the average of these individual stems constitutes the conceptual level (CL) score. The scores range from 1 (corresponding to the least cognitively complex level) to 7 (the most cognitively complex level).[3] The intermediate scores (2, 4, and 6) are transitional levels of cognitive complexity exhibited by individuals moving from one level of cognitive complexity to another.

Schroder et al. (1967) and Hunt et al. (1978) cited several studies that have used the PCM and provided reliability data for the instrument over a variety of samples. These studies reported interrater reliabilities ranging between .74 and .93, with a median reliability of r = .86 (Hunt et al., 1978). This is a satisfactory reliability for statistical analysis using the instrument.[4] Internal estimates of reliability range from .60 to .75 (Gardiner & Schroder, 1972), which is good for an instrument with a small number of items. This level of interitem reliability suggests that the more items are used for the total CL score, the better.

Gardiner and Schroder (1972) did a survey of validity data showing that CL scores tend to correlate positively with greater independence, flexibility, and complexity of thought; CL scores correlate negatively with authoritarianism and dogmatism. More recent studies show that the CL score is curvilinearly related to reasoning about capital punishment, with more extreme positions on either side of the issue associated with cognitive simplicity and more moderate positions associated with higher levels of cognitive complexity (de Vries & Walker, 1988).

Vannoy (1965) conducted a factor analytical study of a variety of assessments of cognitive complexity. His analysis showed that the PCM did not correlate highly with other assessments of complexity and that the CL score appeared on its own factor, suggesting that it was measuring something different than other measures. The other measures he was using tended to be assessments of the differentiation of constructs rather than measures of integration. This study suggested that integrative complexity as assessed by the PCM is unique to this instrument, but contributes a statistically significant proportion of the communal variance of assessments of cognitive complexity.

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

[3] Several attempts have been made to construct objective or machine-scorable assessments of conceptual levels. None of these has proven reliable, possibly because objective instruments are susceptible to the interpretation of the reader and susceptible to faking. They also assess the content of the response, not its structure. Because it is possible to arrive at the same content from different structures, valid assessments of structure from content-oriented methods are difficult (Harvey, 1967; Harvey & Hoffmeister, 1971; Tuckman, 1966).

[4] All scoring for these experiments was done by a trained psychologist who uses the PCM on a regular basis and has an established reliability for scoring as high as that achieved by Harvey (Harvey et al., 1961).

experience or have become arrested in the progression of understanding because of an environment that does 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 (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 predicted by theory for both general levels of cognitive complexity and domain-specific levels of cognitive complexity.

An additional implication of the theory underlying the PCM is that individuals may exhibit different levels of cognitive complexity in different domain-specific areas. The PCM is a measure of a general level of cognitive complexity likely to be exhibited in all areas. In areas where an individual has more experience or knowledge, the individual is likely to exhibit a higher level of cognitive complexity than his or her general level.[5] Also, an individual may exhibit a lower level of cognitive complexity in situations or areas that are highly stressful to the individual.

One question asked about the PCM is whether it is a simple duplication of IQ or other general ability measures. Because the test is written, the possibility exists that it is simply another measure of verbal fluency. Theoretically, it should not be duplicative of IQ, as it assesses the structure of thought as well as its content. IQ, however, is also to some extent a measure of progression of understanding, in that items are written for a progression of skills over time. Hunt et al. (1978) summarized a number of studies in which correlations between CL scores and IQ or achievement measures were calculated in populations ranging from sixth grade public school students to university students. Correlations ranged from .15 to .43, consistent with the low to moderate correlation predicted by theory.

Cognitive complexity (as it is understood here) is a trait that can change over time, but does not do so rapidly. Cognitive complexity is not a trait that arises from lack of information, but rather is a trait such that those with higher levels of cognitive complexity are better able to deal with lack of information than those

[5] Cognitive complexity is specific to content domains. The PCM as developed by Harvey et al. (1961) and Schroder et al. (1967) measures cognitive complexity for the content domain of general social relationships. Because we expect some difference between the domain of general social relationships and the domain of international relations, we decided to attempt to develop a version of the PCM that would measure cognitive complexity in the international relations domain. This international version of the PCM, currently under development, has the potential for being a better predictor of behavior in international negotiations than the more general version.

with low levels of cognitive complexity. Cognitive complexity is a trait that measures the ability of individuals to integrate disparate or even contradictory information. This type of complexity requires but is not the same as differentiated complexity. The more cognitive complexity an individual exhibits in a differentiated sense, then the more fine differences between different pieces of information they can appreciate. This supports integrative complexity, but is not the same as the ability to integrate all of those pieces of information together into a whole.

CL scores for traditional college students generally range between 1 and 3. The scores for the students who participated in this experiment ranged from 0.60 to 2.34 (mean, 1.62; standard deviation, 0.29). The scores and level of variation in our experiments are similar to what one would expect of a population of college students. The variance in this population is typical for this measure and is not as small as it appears because it is relative to the scale of the measure (Gardiner & Schroder, 1972; Vannoy, 1965).

Scoring cognitive complexity can be done by either administering a test or scoring archival material. Although both Suedfeld and Tetlock have used archival materials instead of administering a PCM, the reasons for choosing one over the other are generally practical ones and are not based on any theory that either an administered test or the rating of archival materials is necessarily preferable. If the respondent is a politician or policy maker, then it is not practical to get the access and the time to administer a PCM. On the other hand, if the respondents are paid volunteers or students, then time and access allow for the administration of the PCM, but archival material is generally unavailable.

The Hostage Crisis Model

A hostage crisis situation was chosen as a typical case of multiparty crisis negotiation. The scenario is based on the hypothetical hijacking of a commercial airliner en route from Europe to India and its forced landing in Pakistan. The passengers are predominantly Indian and the hijackers are known to be Sikhs. India is holding 800 Sikh security prisoners, and the Sikh hijackers are demanding their release (see Kraus & Wilkenfeld, 1990; Kraus, Wilkenfeld, Harris, & Blake, 1992).[6] The three parties must consider several possible outcomes: India or Pakistan launch military operations in attempts to free the hostages; the terrorists blow up the plane with the hostages and themselves aboard; India and the Sikhs negotiate a deal involving the release of some number of security prisoners in exchange for the hostages; Pakistan and the Sikhs negotiate a safe passage agreement; and the Sikhs give up.

[6] The original specification of the model was based on a Middle East setting involving Israel, Egypt, and Palestinian terrorists. However, this was changed to the India-Pakistan-Sikh model to minimize bias during the course of the simulation.

In the simulation setting, actors negotiate a variety of issues relevant to the crisis until an agreement is reached or a player opts out of the negotiations, either by launching a military operation or blowing up the plane. The success of such opting out is determined probabilistically.

The values of the different outcomes for each actor depend on many factors. Each actor has a list of objectives to pursue during the crisis. These objectives are arranged in a preference ordering by assigning utility points to each. Each player can earn up to 1,000 utility points. However, as some of the objectives are directly at odds with objectives of the other players and some are even slightly contradictory with each other, in practice, a player can never score a perfect 1,000. Table I presents a list of objectives for each of the three crisis actors, as well as the utility points associated with each objective. The point scores and objectives were determined after observation of international crises and consultations with experts. All point values, impacts of actions, objectives, etc. are predetermined in the simulation software, and the users can determine what these values and impacts are by looking at the information provided in the DSS.[7]

Certain actions taken and decisions made during the course of the crisis have an impact on the number of points awarded for each objective. These include the following: Pakistan granting press access to the Sikhs; Pakistan sharing logistic information with the Indians; Sikh decisions to kill or release hostages during the negotiation; Pakistan's behavior in the event India launches a military operation; and India's behavior in the event Pakistan launches a military operation.

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 Sikhs and against India and Pakistan. Time affects the probability of success or failure of an operation to free the hostages (whether it is day or night, whether there is time to train a rescue team, etc.), the extent of publicity for the Sikhs' cause (regardless of whether direct press access is granted), and the extent of deterioration in India's and Pakistan's internal and external images (for more detail on the hostage crisis model, see Kraus & Wilkenfeld, 1990; Wilkenfeld et al., 1995).

The GENIE Decision Support System

DSSs offer individuals and/or groups important information management and analytical tools. The GENIE DSS was designed to support players in the hostage crisis simulation. Because it was designed to be used by crisis decision makers who

[7] The hostage crisis simulation and the GENIE DSS are based on a strategic model of negotiation (Kraus et al., 1995) and a set of utility functions that make the assumption that a negotiated agreement terminating the crisis generates greater mutual benefit than other outcomes of the crisis. That is, even though successfully launching a military operation or blowing up the plane—that is, opting out—may result in greater benefit for a single player (although the success of such events is probabilistic), the greatest mutual benefit derives from agreement.

Table I. Objectives

Indian Objectives	
Safe return of the passengers	180 points
Acceptable level of casualties among military	45 points
Maintenance of status quo in relations with Pakistan	50 points
Maintenance of status quo in relations with the major powers	80 points
No concessions to terrorists	100 points
No negative effect on Indian public opinion	100 points
Restrict publicity for terrorist cause	80 points
No damage to India's external image	50 points
Credibility of India's deterrence against terrorism maintained	140 points
India's overall strategic interests unchanged	140 points
Experience in counterterrorism operations augmented	35 points
Total	**1,000 points**
Sikh Objectives	
Release of prisoners held in India	180 points
Safe passage for terrorists	100 points
Message of Sikhs—publicity	320 points
Damage to Indian deterrence against terrorism	75 points
Damage to Indian relations with Pakistan	25 points
Damage to Indian relations with major powers	50 points
Damage to Indian external image	100 points
Damage to Indian internal image	75 points
Enhanced position of terrorist group in Sikh movement	75 points
Total	**1,000 points**
Pakistani Objectives	
Pakistani demonstration of control	375 points
Pakistani internal image	100 points
India is not strengthened	50 points
India is not weakened	25 points
No strengthening of terrorists	50 points
Maintenance of status quo with major powers	50 points
Maintenance of status quo within region	275 points
Maintenance of status quo with India	25 points
Maintenance of status quo with Sikhs	50 points
Total	**1,000 points**

have little or no experience with the use of computers as analytic tools, GENIE's interface is menu-driven and mouse-supported. The interface presents the user with a main menu bar with five choices: Scenario, Outcomes, Messages, Actions, and System (see Figure 1).

The Outcomes choice is the central decision-making mechanism of GENIE. Its menu includes the interactive outline, graphs and analytical tools which will be described in detail below.

Interactive outline. GENIE is designed to provide the user with a clear mental picture of the hostage crisis model. GENIE combines its data management and

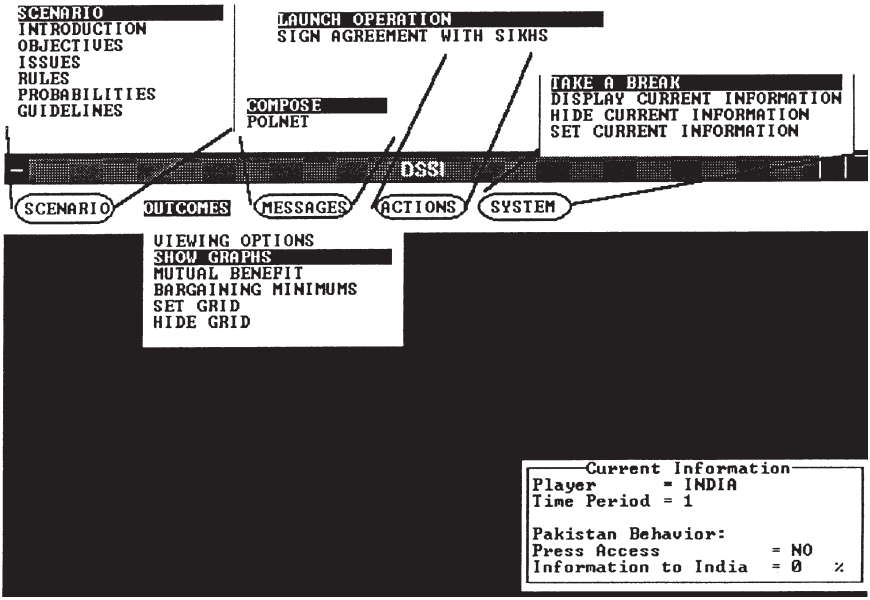

Figure 1. DSS Menus

modeling capability in one mouse-supported screen (Outcomes), which enables a user to quickly set parameters for the viewing of information. This screen not only provides quick access to information items, but also allows the user to form a mental picture of the entire simulation. With this outline, the user can then brainstorm and experiment with different options to form a personalized strategy for utility maximization (see Figure 2).

GENIE's interface allows a user to define one or more hypothetical states for the world and then to investigate possible future actions based on these states. The user can explore outcomes resulting from his or her own actions as well as those of his or her opponents. A user can also switch viewpoints to see things from the point of view of one or more of his or her opponents. This is possible because the model, by design, permits full information about the other actors' preferences and the probability of success for attempts to opt out. The system provides a model-specific interactive outline with information categories that a user can select to see graphic information about the scenario.

The interactive outline screen (see Figure 2) is organized into three main categories: viewpoints, information items, and world states. All of the model visualization capabilities of the system are contained within these three categories.

The viewpoints section allows the user to specify one or more points of view for the subsequent queries. Having chosen the viewpoint(s), the user can select and obtain information about possible endings to the crisis. Once the viewpoint(s) and ending(s) are chosen, the user can then choose actions that can affect point values.

```
                                   Viewing Options
 View Point(s):
  √ India                                  Time Period(s): 1   - 1
    Pakistan                               Press In Period: 1
    Sikh                                   Averages        :No

Information About:                         Pakistan Behavior
   Deal (India & Sikh)                        Press In     √ Press Out
    agreement to release:                   Information to India:
    0     0     0     0     0                  100%      75%      50%
   Agreement (Pakistan & Sikh)                 25%     √ 0%
   Blowing up the Plane                     Military Position:
   Sikhs Surrender                             Help India     √ Fight India
   India Operation                             Neutral
   Pakistan Operation
                                           India Behavior
                                            Military Position:
 ShowGraph   MutualBenefit                     Help Pakistan  √ Neutral

                                           Sihk Behavior
  Save          CANCEL                     Hostages:
                                            √ Not Kill      Kill: Number     0
                                            √ Not Free      Free: Number     0
```

Figure 2. Viewing Options Screen

Here, the user specifies what actions have been taken by which parties during the crisis. These parameters are time,[8] whether and when press access has been granted, whether and what level of logistical information has been granted by Pakistan to India, Pakistani behavior in the event of an Indian operation, Indian behavior in the event of a Pakistani operation, and whether the Sikhs have killed or released hostages. The behavioral variables constitute aspects of the model that are negotiable among the parties.

During strategy formulation, a decision maker may want to find out whether it is worthwhile to expend energy to change the behavior of another actor. For example, in the hostage crisis scenario, the Sikhs could decide that India is not willing to deal and Pakistan will not agree to safe passage, leaving them no choice but to blow up the plane. In this case they should try to influence the behavior of the other actors so that at the time of the action, they (or their cause) receive maximum benefit. Influencing the state of the world could mean waiting a certain amount of time or convincing Pakistan to allow press coverage. GENIE lets the user select multiple values for a given parameter and then simultaneously view the selected outcomes based on the different states. This provides the user with a powerful tool to evaluate the effect of differing behavior on the value of the ending of the crisis.

Display module. GENIE provides the user with two different graphic output options. The user can select information about endings for one specified time period. This results in the display of bar graphs representing the utility point totals associated with that ending from the selected viewpoints, given the selected world

[8] Time is measured in 10-minute time periods, each representing 6 hours.

states (see Figure 3). If the ending is an opt-out ending, then the probabilities associated with the ending are also shown.

Users also have the ability to use expected utility to assess the value of military operations. Expected utility provides a method of evaluating the outcome of risky choices. Users may also look at the value of endings across time; this graph is a line graph as opposed to a bar graph (see Figure 4).

In addition to these graphic functions, GENIE provides two analytical functions: mutually beneficial resolutions and bargaining minimums. Successful negotiation requires that an agent identify actions that will be most beneficial to him or her, while taking into account the possible actions and reactions of his or her opponents. The mutually beneficial resolutions option allows an agent to select outcomes to investigate, and then displays information for those outcomes with high-ranking payoffs. Despite this capability in the DSS, users do not automatically move toward mutually beneficial endings to the crisis. Because we are holding situational variables constant, differences in negotiation outcome would be expected to reflect individual characteristics and their composition in groups.

The bargaining minimums feature helps a negotiating agent to compare the payoff obtained from a negotiated settlement with that obtained from opting out of

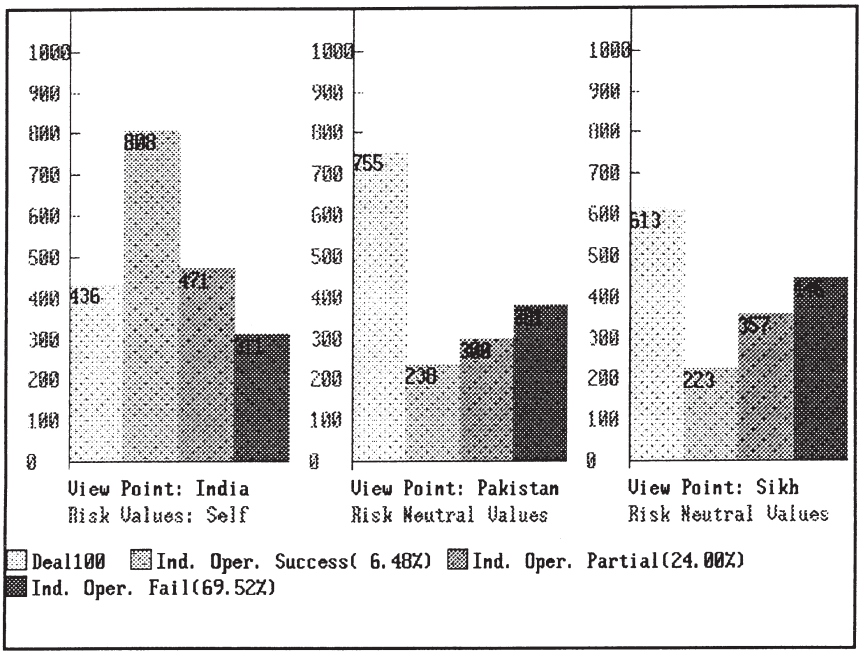

Figure 3. DSS Bar Graph Display

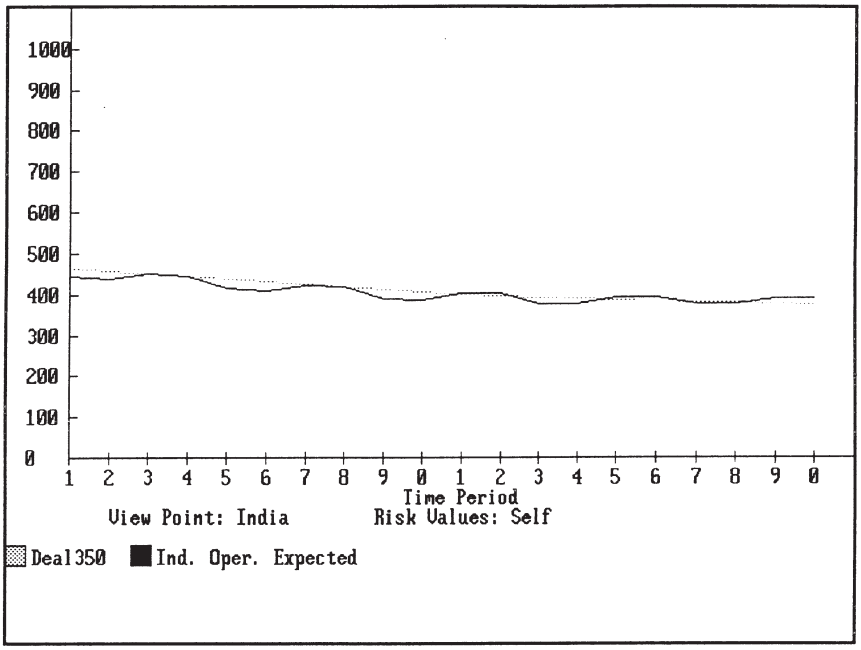

Figure 4. DSS Line Graph Display

the negotiation. It automatically calculates a player's reservation price[9] and finds the optimal time period for a player to opt out of the negotiations. It also determines a negotiated settlement that has an equivalent or higher payoff than opting out in the optimal time period.

The Language Editor

All communications among the three parties during the negotiation take place through the use of a language editor. This menu-driven program allows players to choose a recipient, select from different categories of messages, select a message, and then (if appropriate) add threats or promises to the message. The language editor enables the use of a wide variety of negotiating tactics because many different messages are available to the player.[10] The message sets are different for each of the different roles (Wilkenfeld, Kraus, & Holley, 1998).

[9] In game theory, the reservation price is used to denote the price below which a seller will not sell, or above which a buyer will not buy.

[10] For example, one possible message that could be sent from the Indians to the Sikhs is "You are not bargaining in good faith; we are withdrawing our promise to persuade Pakistan not to launch an operation."

The language editor provides good experimental control by restricting the types of messages that can be sent. As messages are sent, they are recorded in data files, which facilitates analysis of the messages at a later date. Each message is a communication similar to an e-mail from one negotiating party to another. A copy of a message may be sent to the third negotiating party. The fact that face-to-face communications are missing imparts a sense of reality. It is not typical in this kind of crisis that actors would be conducting negotiations in a face-to-face environment. It is difficult to estimate the impact of one's communications in this environment, but this is also quite difficult in real life. (For more details, see Kraus & Wilkenfeld, 1990, 1993; Wilkenfeld et al., 1995.)

Summary of Previous Results

At the core of our previous experimental work is the development of a strategic model of negotiation, with an accompanying DSS (see Kraus, Wilkenfeld, & Zlotkin, 1995, Wilkenfeld et al., 1998). DSSs can play a crucial role in the crisis decision-making process by allowing the decision maker to navigate large amounts of information quickly and to explore interrelationships between factors that may influence the decision. A DSS can also facilitate the simultaneous evaluation of multiple positions in crisis negotiations. This can play a decisive role in real-time negotiations by allowing the supported parties to rapidly formulate dynamic strategies and quickly evaluate their adversaries' proposals. Thus, a central theme of this research is that the use of a DSS by a crisis decision maker can facilitate the identification of utility-maximizing strategies on the part of an individual actor. Related to this is the notion that groups of decision makers so supported by a DSS are in a good position to achieve mutually satisfying outcomes to crises.

Previous experiments, conducted from 1991 to 1996 with University of Maryland undergraduates as participants, addressed three broad groups of issues:

1. *The impact of the use of DSSs on the utility-maximizing behavior of crisis negotiators.* This initial set of experiments (Holley & Wilkenfeld, 1994; Kraus et al., 1992) focused on the following two research questions:

   (a) Does the use of a sophisticated computer-based DSS increase the likelihood of higher payoffs to the individual negotiators? Experimental results indicate that regardless of their roles in the simulation—in this case, the Indian government, the Pakistani government, and Sikh hijackers—the average utility scores achieved at the conclusion of the simulation were higher for DSS users than for non-users. In addition, the achievement of agreements was a more prevalent outcome for DSS users than for non-users.

   (b) Do the communications patterns exhibited by participants in a simulation that ended in a negotiated agreement differ from those exhibited by participants in simulations that ended in non-agreement (i.e.,

violence)? The key to differentiating between crisis negotiations that ended in agreement and those that evolved to violence lies in the communications patterns exhibited by those playing the role of Pakistan in the simulation—the role most capable of mediation. Agreement outcomes were typified by a virtually identical number of messages sent by Pakistan to the other two parties, whereas non-agreement outcomes showed Pakistan sending three times as many messages to India as it did to the Sikhs. Thus, we concluded that by maintaining open communications channels with each of the other parties, Pakistan was able to play a central role in bringing about a peaceful resolution of the crisis.

2. *The impact of the dynamics of crisis negotiations on their outcomes.* This set of experiments (Wilkenfeld et al., 1995; see also Wilkenfeld, Kraus, & Holley, 1995) continued the exploration of research questions pertaining to the impact of the use of a DSS on negotiation processes and outcomes:

   (a) Are DSS users more likely than non-DSS users to identify utility maximization as their primary objective in a crisis negotiation situation? Research findings supported the contention that DSS users were most strongly motivated by utility maximization, whereas non-DSS users tended to be motivated most strongly by upholding principles. These latter crisis decision makers appear to have been overwhelmed by the vast amount of information available to them and the difficulty of calculating the utility of different actions under the pressures of the negotiation. They were thus led to rely on deeply held principles. The DSS users were able to calculate utilities quickly and efficiently and were, therefore, able to act as utility maximizers.

   (b) Will DSS users achieve higher utility scores than non-DSS users? Not only does access to the DSS encourage the actors to be motivated by utility maximization as a goal, but they will be more successful than their non-DSS counterparts in actually achieving higher utility scores as outcomes.

   (c) Will the presence of a DSS-supported user among adversaries in a crisis situation produce higher overall utility scores than in groups in which none of the adversaries have such access? In addition to facilitating the achievement of utility maximization for the individual DSS user, our results also show that the existence of a DSS-supported user among a group of adversaries is likely to result in a higher overall utility score for the group (i.e., a mutually beneficial resolution to the crisis).

   (d) Are negotiations in which a DSS user is present more likely to end in agreement than negotiations in which no such user is present?

Results confirm the greater tendency for crisis situations in which one of the adversaries has access to a DSS to terminate in agreement rather than some type of violent outcome. In these cases, access to this decision support tool by an individual decision maker in the group helps in the identification of a mutually beneficial outcome, which in this case is identified with the achievement of agreement.

3. *The relationship between the level of cognitive complexity of crisis decision makers and the outcomes of crisis negotiations.* This set of experiments (Wilkenfeld et al., 1996) was designed to assess the impact of cognitive complexity of decision makers on their behavior in crisis negotiation situations and on the outcomes that they attain. These experiments were designed to study the relationship between cognitive complexity and negotiation behavior, in an effort to better understand the dynamics that lead certain persons to have greater success in negotiations, and that lead certain groups of adversaries to achieve more mutually beneficial outcomes. The underlying assumption is that the greater the level of cognitive complexity that an individual brings to the crisis negotiation situation, the more likely it is that his or her process of arriving at decisions will result in utility maximization. Individuals at higher levels of cognitive complexity will be better able to cope with the crisis environment than will those at lower levels. In particular, the perceived shortness of time for response, combined with truncated and restricted communications among the parties, will frustrate negotiators at the lower levels of cognitive complexity and will generate suboptimal outcomes to negotiations.

   The results of this series of experiments are best summarized as follows:
   (a) Participants at higher levels of cognitive complexity developed greater proficiency with the DSS and were able to master more of the query tools it contains.
   (b) The participants did not show an overall relationship between cognitive complexity and crisis outcome, either in terms of the achievement of higher scores in the crisis simulation, or in terms of a greater propensity to reach agreement as opposed to violent crisis termination. We speculate about the difficulty which participants with low cognitive complexity have in taking on the roles of others with assigning utility to probabilistic events and that no participants, no matter how high their level of cognitive complexity, were complete masters of their own destinies in the negotiation. Examination of roles revealed that for those participants who represented actors with similar characteristics and motivations to their own in such situations, there was a strong positive relationship between level of cognitive complexity and the achievement of high utility scores in the simulation.

(c) Whether considered individually or grouped by cognitive complexity level, participants showed no propensity for those at higher levels to be more likely than others to achieve termination of the simulation through agreement. However, we did find that prior exposure to the principles of international politics and negotiation resulted in a much greater propensity to reach agreements and to solve international crises nonviolently.

Hypotheses

As noted above, the research we are reporting here constitutes a portion of a large research program. The hypotheses that we present are limited to those that explore the manner in which grouping decision makers by cognitive complexity affects the outcome of the negotiations.[11]

We hypothesize that large disparities in cognitive complexity levels among individual negotiators will have a negative effect on the overall group's ability to reach an agreement in a crisis situation. This is a direct result of poor comprehension of each other's goals and strategies—in effect, an inability to see a situation from the perspectives of the other parties, leading to difficulties in making proposals that are likely to be acceptable to the others. Mutual benefit is made more difficult to reach, whereas frustration leads both to lengthier periods of negotiation before agreements are reached and to a higher probability of ultimately opting out (i.e., using violence).

One might expect that the greater the similarity in cognitive complexity among individuals, the easier it would be for them to comprehend each other's goals and strategies, and therefore the more likely they would be to come to mutually beneficial agreements. This is true of homogeneous groupings but not of ultrahomogeneous groupings. In the ultrahomogeneous groupings, the individuals are so similar in the goals they set and the strategies they pursue that they either move relatively swiftly to an agreement, or else they become frustrated when their proposals are not immediately accepted and opt out. In other words, the ultrahomogeneous participants will be so close in their reasoning about the problem that they will come to the same conclusion about the best solution and act on that conclusion, resulting in a fairly quick agreement. In cases of opting out, participants will be very close in their solutions, but will differ on small details and will be unable to understand why the other participants do not see what they consider to be the obvious solution. Therefore, they opt out because of frustration. Thus, we

[11] Findings on hypotheses concerning cognitive complexity and the use of the DSS, and on behavior during the negotiation, will be presented in future papers. We will also present our findings on a domain-specific PCM for international relations in a future paper. For details about the effect of use versus non-use of the DSS on negotiation outcomes, see Wilkenfeld et al. (1995). For details about the effects of cognitive complexity on the ability to use the DSS and the outcomes achieved, see Wilkenfeld et al. (1996).

have the relatively curious possibility that regardless of outcome—agreement or opting out—that outcome will be reached relatively quickly.

To summarize, our hypotheses suggest a positive relationship between the ability of negotiators to understand each other's goals and strategies, and their ability to successfully negotiate mutually beneficial agreements. The ability to understand each other is in turn related to the level of heterogeneity of cognitive complexity in the group of negotiators. In the GENIE DSS, for any set of actors, mutually beneficial agreements yield greater utility point totals than the expected utility associated with an individual attempt to opt out of the negotiation. Therefore, we expect that groups will try to achieve such agreements in their attempts to resolve the crisis situation. Our hypotheses suggest that groups that can communicate effectively will be more likely to actually achieve such agreements than groups that cannot communicate effectively.[12] Homogeneity, ultra homogeneity, and heterogeneity of crisis decision groups refers to the mix of cognitive development levels of the individual decision makers, and will be operationalized in the section on Experimental Design below. The specific hypotheses are as follows:

Hypothesis 1a: Groups of negotiators who are heterogeneous in their levels of cognitive complexity will be less likely to reach agreement than negotiators who are homogeneous.

Hypothesis 1b: Heterogeneous groups will take more time to reach an agreement than homogeneous groups.

Hypothesis 1c: Heterogeneous groups will take less time to opt out of negotiations than homogeneous groups.

Hypothesis 2a: Groups of negotiators who are ultrahomogeneous in their levels of cognitive complexity will be less likely to reach agreement than negotiators who are homogeneous.

Hypothesis 2b: Ultrahomogeneous groups will take less time than homogeneous groups to conclude the simulation, regardless of whether the simulation ends in an agreement or opting out.

Experimental Design

Experiments based on the hostage crisis simulation and the hypotheses discussed above were run during the spring 1996, fall 1996, spring 1997, and fall 1997 semesters at the University of Maryland. Participants were juniors and seniors enrolled in either an advanced course in international negotiations or an advanced course in foreign policy analysis. Training and administration procedures for all participants were identical.

[12] See footnote 7. Mean points are as follows: total, 1806 for agreements vs. 1078 for non-agreements; India, 568 for agreements vs. 491 for non-agreements; Pakistan, 711 for agreements vs. 298 for non-agreements; Sikh, 527 for agreements vs. 288 for non-agreements.

Before pre-simulation training, the participants were asked to complete a PCM (see above). This is the tool that was used to measure the CL score. CL scores for traditional college students generally range between 1 and 3. On the basis of their CL scores on the PCM, participants were placed in ultrahomogeneous, homogeneous, or heterogeneous groups of three. Ultrahomogeneous groups had less than a 0.1 difference in their CL scores, which is less than the measurement error in the scores. Thus, in effect these groups included individuals with identical levels of cognitive complexity. Homogeneous groups had differences between 0.1 and 0.5 in their CL scores, which is greater than the measurement error in the scores. Thus, these individuals were similar but not identical in terms of their levels of cognitive complexity. Heterogeneous groups had differences greater than 0.5 in their CL scores, or more than twice the measurement error in the scores. Thus, these individuals were quite different in their levels of cognitive complexity.

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 necessary for the simulation (the DSS, the language editor, and the network communication package); (b) a 15- to 20-minute period during which the participants could practice on the computer and ask questions; and (c) a quiz that tested DSS proficiency.

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 India, Pakistan, and the Sikhs randomly within their groups. A maximum of 3 hours 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.

The students were motivated to do well in the simulation because a portion of their midterm grade was tied to their successful completion of the simulation. In both courses, students were expected to participate in both crisis and non-crisis negotiation simulations as a part of the learning experience for the course. In both courses, one of the goals was for students to learn about negotiations in a variety of different situations.

Results

Data were collected on 52 runs of the hostage crisis simulation. The breakout of those cases for the three types of groupings and by outcome is summarized in Table II.

The homogeneous groups clearly achieved the highest percentage of agreements among the three types of groups. They achieved a mutually beneficial agreement 75% of the time, as opposed to 50% of the time for the ultrahomogeneous groups

Table II. Group Type and Outcome of Negotiation

Group Type	Agreement	Opt Out	Total
Ultrahomogeneous	6	6	12
Homogeneous	15	5	20
Heterogeneous	7	13	20
Total	28	24	52

and 35% of the time for the heterogeneous groups. As suggested by our hypotheses, both ultrahomogeneous groups and heterogeneous groups are less likely to achieve agreements than homogeneous groups. This occurs because both ultrahomogeneous groups and heterogeneous groups have communications problems that homogeneous groups do not have.

Statistical analysis of the raw data further supports this claim. A χ^2 test was used to generate the probabilities that we would observe our results if the null hypothesis (that the three types of groups generate the same proportions of outcomes) were true. The low probabilities in Table III suggest that the null hypotheses are false and that the different groupings do indeed lead to different outcomes.

In further support of our results, there is very little correlation either between cognitive complexity and self-rated computer abilities ($r = .17$, $p = .1$) or between crisis outcomes and self-rated computer abilities ($r = .11$, $p = .1$). Hence, cognitive complexity does not devolve simply to computer skills, nor are computer skills an overriding factor in determining crisis outcomes.

The second set of hypotheses made two related arguments concerning the elapsed time to conclusion of the hostage crisis (hypotheses 1b, 1c, and 2b). The unequal makeup of heterogeneous groups will mean that even when they do manage to reach agreement, such an outcome will take longer to reach than for the homogeneous groups, which presumably have an easier time of communicating their preferences and offers to each other. On the other hand, these same heterogeneous groups will move toward an opt-out outcome (military operation or blowing up the plane) more quickly than their homogeneous counterpart groups, with the latter deliberating at great length until it is absolutely clear that the negotiation has stalled. Finally, the ultrahomogeneous groups will move quickly toward an outcome, regardless of whether this is to be an agreement or opting out.

The average times, in terms of mean number of periods to conclusion, for all three types of groups are shown in Tables IV and V. These results include a control for the semester in which the results were generated, because the mean time to conclusion varies widely from semester to semester. We believe that this is due to experiments being run at different times of year and in different relationships to other major time commitments (such as midterm exams).

Table III. Null Hypothesis Test Results

Null Hypothesis	Probability of Observing Results in Table 2 if the Null Hypothesis Were True
Both ultrahomogeneous and heterogeneous groups achieve outcomes in the same proportion as the homogeneous groups	.000
The ultrahomogeneous groups achieve outcomes in the same proportion as the homogeneous groups	.045
The heterogeneous groups achieve outcomes in the same proportion as the homogeneous groups	.000
The heterogeneous groups achieve outcomes in the same proportion as the ultrahomogeneous groups	.180

Table IV. Mean Number of Periods to Conclusion

Group Type	Time to Conclusion	Time to Agreement	Time to Opt Out
Ultrahomogeneous	10.35	10.64	10.07
Homogeneous	11.45	11.08	12.56
Heterogeneous	11.55	12.58	11.00

Table V. Results of *t* Test (One-Tailed *P* Values) That Ultrahomogeneous and Heterogeneous Means Are Different From Homogeneous Means

Group Type	Time to Conclusion	Time to Agreement	Time to Opt Out
Ultrahomogeneous	na	.31	.02
Homogeneous	na	na	na
Heterogeneous	na	.04	.02

Note. na = not applicable

As our hypotheses suggested, the ultrahomogeneous groups concluded more quickly than the homogeneous groups, regardless of whether they reached agreement or opted out.[13] Furthermore, heterogeneous groups were quicker to opt out than the homogeneous groups and slower to reach agreement than the homogeneous groups. These results held across all four semesters during which these simulations were run.

[13] The only *t* test where this is not supported is the test that the ultrahomogeneous mean time to agreement is slower than the homogeneous mean time to agreement. This may be due in part to the nature of the simulation, because a certain minimum time is required for participants to communicate their intentions.

Summary of Findings and Conclusions

This examination of the impact of grouping decision makers by their level of cognitive complexity on outcomes has generated several potentially important experimental findings.

Clearly, homogeneous groups are more likely to generate mutually beneficial agreements than either ultrahomogeneous groups or heterogeneous groups. We were able to reach this conclusion without having to take account of the characteristics of individuals assigned to different roles, which we found necessary in our previous work (Wilkenfeld et al., 1996). In other words, the level of homogeneity of cognitive complexity within the group appears to be a more important factor in producing mutually beneficial outcomes than the cognitive complexity levels of individual actors themselves. The abilities to communicate effectively and to clearly comprehend adversaries' goals and objectives are both enhanced by similarity in cognitive levels. However, our results also show that although some ultrahomogeneous groups can move even more quickly than homogeneous groups toward crisis conclusion, some of these ultrahomogeneous groups are more likely to fail to reach agreements that might have been achieved (albeit more slowly) by the homogeneous groups.

Although the relatively small number of deviant cases for each of the three groupings precludes statistical analysis at this point, some interesting observations are possible. In the ultrahomogeneous groups, where agreements were unexpected, there was a much greater emphasis on DSS use or on the need for cooperation in the groups reaching agreement than in those opting out. These two emphases may be the result of participants being at particular levels of cognitive complexity. In the homogeneous groups, where opting out was unexpected, the player opting out commented that he felt that at least one of the other parties was unwilling to negotiate. This feeling may be explained by the opting-out player's high sensitivity to control issues (as noted on the authority stems of the PCM) relative to players in other homogeneous groups. In the heterogeneous groups, where agreements were unexpected, there was an emphasis on cooperation and the need to reach an agreement that was not found in the heterogeneous groups for which the outcome was opting out. Again, this emphasis may be related to the level of cognitive complexity of the individuals involved.

In the homogeneous triads that were unable to conclude agreements (25% of the cases), why did this outcome occur despite expected utility scores favoring agreement and a mix of cognitive complexity levels that should have facilitated it? Conversely, what was distinctive about the heterogeneous groups that managed to reach agreement despite a mix of cognitive complexity scores that should have made it difficult for these decision makers to work effectively together? In both instances, is it the mix of scores, the overall level of these scores, or the scores on individual components (or some combination of these three) that produce these unexpected outcomes? Finally, what are the characteristics of some ultrahomogeneous

groups that allow them to quickly come to agreement versus others that eventually opt out of the negotiations? A further set of experiments currently under way, with larger sample sizes, may allow statistical analysis of such deviant cases.

We have also taken some preliminary steps in understanding, at least in relative terms, how long negotiations may take given different kinds of grouping by cognitive complexity. This may be useful either in providing adequate time for negotiations or in knowing how much time remains before negotiations are likely to break down.

Despite the finding of a significant impact on crisis outcome that can be attributed to the particular mix of capabilities of individual negotiators, the practical utility of these findings is nevertheless somewhat limited, because it is not likely that the time constraints usually associated with international crises will allow for careful evaluation of one's adversaries in a negotiation so that the most appropriate negotiators in terms of cognitive levels can be assembled. Notwithstanding this difficulty, either knowing in advance about the cognitive levels of one's adversaries or being able to estimate them during the course of the negotiation will allow a skilled negotiator to attempt to adapt his or her approach, in both substance and style, to that which will most likely lead to a mutually beneficial outcome.

ACKNOWLEDGMENTS

The research reported in this paper was supported by National Science Foundation grant IRI-9423967 and by U.S. Institute of Peace grant SG-35-95. Portions of this paper were presented at the 1996 annual meeting of the International Studies Association and at the 1997 annual meeting of the American Political Science Association. The authors acknowledge the helpful comments and suggestions of Daniel Druckman, Peter Suedfeld, Judith Torney-Purta, Margaret Hermann, and Keith Shimko. The second author is also affiliate faculty at the University of Maryland Institute for Advanced Computer Studies.

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