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e-Mediation: Evaluating the Impacts of an Electronic Mediator on Negotiating Behavior

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Abstract

In this article, the results of three experiments designed to evaluate the impact of an electronic mediator on negotiating behavior are reported. The mediator is a web-based tool that serves three mediation functions: diagnosis, analysis, and advice. The diagnosis provides information about progress toward or away from agreements. The analysis identifies the possible sources of problems in each of several areas of negotiation. The advice is linked to the source of the problem and based on empirical research. In all of the experiments, role-playing negotiators attempted to reach agreement on seven issues discussed in a simulation of a conflict that resembles the pre-war conflict between the United States and Iraq. The first experiment consisted of a comparison between the e-mediation support technology and a condition in which negotiators reflected separately about the negotiation without the technology. Results indicate that access to the technology produced significantly more agreements and resulted in more positive perceptions of the outcomes than the reflection condition. However, perceptions of the between-round periods were more positive for reflection-condition negotiators. In the second experiment, we compared the e-mediation technology with a condition in which negotiators only received the advice in paper form. Access to the technology resulted in more agreements than advice-only, although the differences were smaller than those obtained in the first experiment, and perceptions of outcomes were more positive for advice-only negotiators. The third experiment compared two forms of e-mediation (separate and joint) with a scripted live mediator. Results show that joint e-mediation out-performs live mediation on some measures; both these conditions resulted in more agreements, and more integrative statements, than separate e-mediation. The live mediator was perceived more favorably than both the separate and joint e-mediators. Possible explanations for these results are discussed along with an agenda for further research on e-mediation.

Key words: electronic mediation, experimental evaluation, impasse resolution, mediator functions, negotiating flexibility, outcomes, perceptions

In this article, we report the results of three experiments designed to evaluate the impacts of an electronic negotiation support system (NSS) on negotiating behavior. The NSS is defined in terms of functions performed by mediators. Negotiating behavior is construed in terms of negotiators' flexibility. Each of these concepts – flexibility and mediation functions – is discussed in turn followed by a description of the NSS and experimental-simulation procedures.

Negotiator Flexibility

Negotiating outcomes turn on conditions for flexible negotiating behavior. By flexibility, we refer to movement from initial positions or the discovery of new solutions to the issues that divide disputants. (This is a central concept in the literature on negotiation. For example, Druckman and Mitchell (1995) discuss various definitions and indicators of negotiating and mediating flexibility.) These conditions refer to aspects of the issues, parties, process, and situation including the larger context within which the negotiation takes place. With regard to issues, it has been found that smaller issues (Deutsch *et al.*, 1971) and prominent outcomes (Benton and Druckman, 1973) produce faster settlements while making underlying values explicit leads to impasses (Druckman *et al.*, 1988). On parties, it has been found that better agreements occur when fewer parties negotiate (Druckman, 1997) and when the parties are equal in power and relatively weak (Beriker and Druckman, 1996).

The focus of these completed studies has been on negotiated agreements or settlements rather than long-term resolutions of the conflict. Increased flexibility leads to more agreements. Thus, the experiments reported later focus on negotiating outcomes defined in terms of number of agreements on the issues rather than resolutions of conflicts. (For a discussion of the distinction between settlements and resolutions, see Druckman, 2002.) Nor do our experiments explore additional variables hypothesized to influence flexibility. Rather, we apply the research-based knowledge on flexibility to develop a diagnostic NSS tool that captures the progress of an ongoing negotiation. The experiments are designed to evaluate the impact of the tool on negotiating outcomes and perceptions.

Some tactics used by negotiators during the bargaining process lead to progress (e.g., firm posture early, flexible postures later) while others decrease the chances for getting an agreement (e.g., placing the burden of making concessions on the other). Strong time pressures in the form of fixed deadlines have been shown to speed the process toward agreement, while media exposure has the opposite effect. (Many of the findings on process and situation are reviewed in Druckman, 1994.) Third parties can play an important role in creating many of these conditions and, thus, increasing the chances for agreement. In their review of the mediation literature, Wall and Lynn (1993) showed that the structure (role definition), activities or approach taken, and timing of mediation influence the flexibility of negotiators. In these experiments, we focus primarily on the impacts of mediator approaches and activities on negotiation flexibility defined in terms of agreements. These approaches are delivered in the form of an NSS tool. More agreements are hypothesized to occur when negotiators have access to (and use) the tool than when they do not. Both the NSS tool and the experiments are discussed in the later sections.

Mediation Functions

Mediation practice – which includes approaches and activities – can be understood in terms of the functions usually performed by this role. These include diagnosis, analysis, and advice. The diagnostic function consists of monitoring the progress of negotiation or related interactions intended to settle or resolve disputed issues (Zartman and Berman, 1982;

Druckman, 1978). Monitoring provides a long view of unfolding developments, including trends in escalating and de-escalating dynamics. It also answers the question of where the process is at now, providing valuable information for the timing of interventions (Winham, 1977). Analysis can focus on the process itself or consist of a search for underlying sources of the conflict. A goal of process analysis is to reach a settlement through negotiation. A goal of source analysis is to aspire toward a resolution of the conflict. Kressel *et al.* (1994) showed that these goals may be manifest in the styles used by mediators, referred to as a difference between a settlement-oriented and a problem-solving style.

Advice usually develops from the results of monitoring and analysis. It can consist of procedural, tactical, relational, or substantive recommendations. The relative emphasis placed on these forms of advice depends on the mediator's approach. Settlement-oriented mediators focus their efforts on procedures and tactics, whereas resolution-oriented mediators are likely to concentrate more on relationships and substance. (See also Pruitt, 1981, for various distinctions among third-party roles.) In these experiments, the three functions – diagnosis, analysis, and advice – are provided to negotiators by the electronic NSS described following a more general discussion of electronic communication.

Electronic Communication

The advances made in electronic communication provide opportunities for enhancing the three mediation functions. These include speeding the task of online monitoring of progress in negotiation, facilitating the performance of complex analyses of process dynamics and sources, and making connections between the analyses and advice as well as serving as a vehicle for delivering the advice to the negotiators.

Existing computer applications assist in providing these or similar functions in varying degrees. With regard to monitoring, the work on persistent conversations is relevant (see Erickson and Herring, 1999). This consists of technologies that manage long-term conversations and contacts. It enables users to keep track of conversational content and status, as well as the identity, contact information, and expertise of their conversational partners (Whittaker *et al.*, 2002). Related monitoring technologies have been shown to facilitate communication and collaboration in negotiation settings (Bajwa and Lewis, 2002). They can also provide information for analyses of the disputed issues.

With regard to analysis, three frameworks have been applied to complex negotiation problems, decision analysis (Ulvila, 1990), expert models and rule-based systems (Kersten, 1993), and cognitive mapping (Bonham, 1993). These approaches contribute to the understanding of assumptions and viewpoints in negotiation. Various solution models provide advice that may be useful in negotiation. These include optimization models that search for integrative solutions (Wierzbicki *et al.*, 1993), computer-aided "discover and design" analyses that move a process away from "create and claim" bargaining to joint problem solving (Samarasan, 1993), and tools that facilitate the development of shared negotiation cultures (Shakun, 1999). However, none of these technical support tools encompasses the three mediation functions; none utilizes research findings in implementing the functions. These gaps are filled by the NSS software discussed next.

A Negotiator Support System

The earlier version of the NSS software, referred to as *Negotiator Assistant*, is described in detail in Druckman *et al.* (2002). The key features of the software are summarized in this section. It consists of suites of forced-choice questions grouped into five categories, parties, issues, delegation activities, situation, and process. Some questions prompt *branching* to new sets of questions. For example, the choice between depicting the process as bargaining or problem solving branches to different question streams emphasizing tactics for bargaining or information search activities for problem solving (see Table 1). Other questions, referred to as *flipper questions*, take into account case-specific contingencies. For example, a response to the question, "How involved is the President in these talks?" triggers a follow-up question, "Was the involvement early or late in the negotiation?" Since late involvement is assumed to have more impact on the outcome than early involvement, the choice of "late" serves to multiply the weight for the initial question, increasing its value or contribution to the diagnosis for that category. Sample process questions are shown in Table 1.

From the answers to the questions, algorithms are used for ascertaining flexibility on the assumption that prospects for an agreement are improved when parties are flexible, that is, when they are willing to move from initial positions or search and find new

Table 1. Sample questions in negotiation support system (NSS)

Negotiation process questions
Party 1: Questions
66. What is your delegation's approach to these negotiations? Strategic game (go to questions 67–72) Problem-solving debate (go to questions 73–78)
67. Have a few concessions (tough posture) or many concessions (soft posture) been made by your party? Or has it alternated? Few concessions Alternated – few and many Many concessions
68. On the following questions indicate the frequency of: Appeals to reason that justify your position? Often Occasionally Never
73. Has a formula been developed to frame the discussion of details or trade-offs? Yes No
75. For the following indicate the frequency: Focus on the issues of relationship between the parties? Never Occasionally Often

solutions to the issues that divide them. When all questions have been answered in a category, or across all categories, the program generates a diagnostic grid which shows the results of the processing of answers in the form of flexibility estimates. The estimates lead also to projections of the possible outcome of the negotiation at the time the diagnoses were made. The diagnoses reflect the state of the negotiation for each of the five categories, i.e., an issues diagnosis, a process diagnosis, and so on, as well as across the categories.

A comparison of diagnoses with the actual outcomes obtained in nine past negotiation cases provided evidence for validity. The diagnoses made in eight of the nine historical cases corresponded to the actual outcome (see Druckman *et al.*, 2002). Further, the diagnoses can be used to evaluate alternative "theories" of negotiation. This is done by comparing the results of different diagnoses (process versus issues, parties versus situation) with obtained outcomes in historical cases. The question asked is whether the process or issues diagnosis corresponds more closely with the actual outcome.

The knowledge bases for the program come from research on factors that influence flexible negotiating behavior. For example, experimental findings on issue size (Fisher, 1964; Deutsch *et al.*, 1971), the interplay between values and interests (Druckman *et al.*, 1977), prominent outcomes (Benton and Druckman, 1973), and within-party differences (Evan and MacDougall, 1967; Jacobson, 1981) inform the questions in the issue category. Theory and research on orientation toward negotiation (Organ, 1971), tactics (Schelling, 1960), formulae and frameworks (Zartman and Berman, 1982), and linkages (Jensen, 1979) inform the questions on process. The questions are weighted in terms of their relative importance as influences on flexibility. Many of the weights are derived from effect sizes calculated in a meta-analysis of bargaining experiments (Druckman, 1994). The scores (answers to questions) and weights are combined in a general linear model, which is depicted also in the form of a vector sum of the flexibility vectors of each party (see Druckman *et al.*, 2002, Figures 1 and 2). A sensitivity analysis, reported also in Druckman *et al.* (2002), shows the relative contributions of each question to the diagnosis for each category; since the number of choice options varies and the weights differ, some questions make a larger contribution than others. The resulting diagnosis is displayed on a grid, as shown in Figure 1. Agreement cells are C (joint maximum flexibility) and E (joint moderate flexibility). Capitulation cells (asymmetrical flexibility) are A and I. The other cells are thought to result in no agreement, with cell G indicating joint intransigence or no movement. We turn now to a description of the enhancements made to the NSS software to include the other mediator functions of analysis and advice.

Electronic Mediation

The NSS software described in Druckman *et al.* (2002) and summarized above was expanded to include the mediator functions of analysis and advice. These functions are implemented following the diagnosis. Specifically, when the diagnoses and projections shown on the grid indicate an impasse in any category, the program provides an analysis of the source

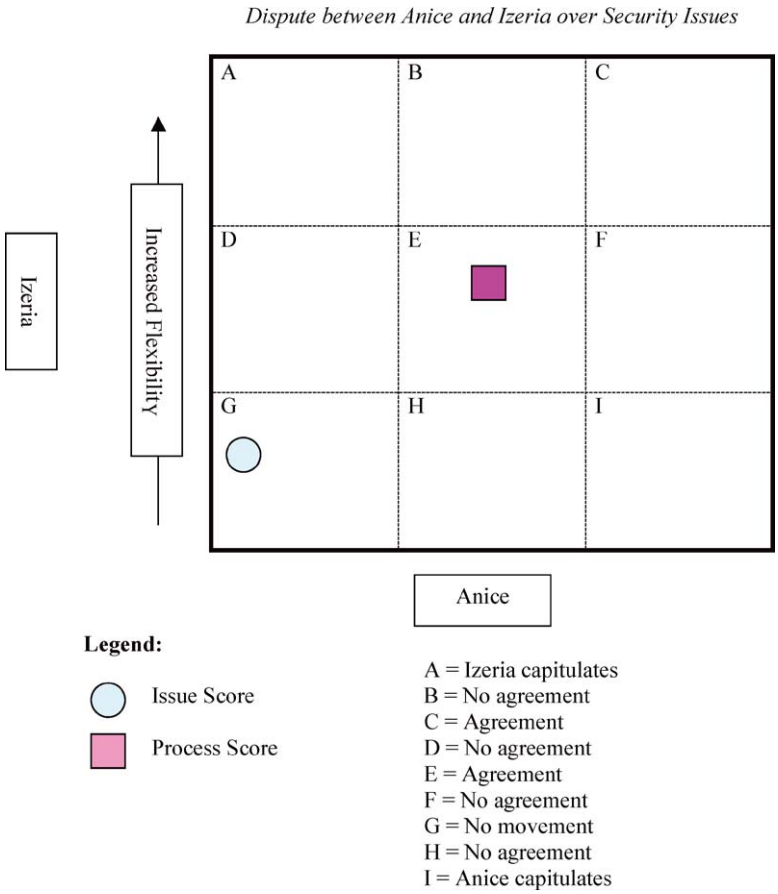

Figure 1. Grid for diagnosis. (Anice and Izeria are fictitious nations in the simulation.)

of the impasse and a link to advice on how to resolve it. An example of an analysis of an impasse on issues is shown in Table 2. The columns of the chart consist of the eight questions, the problematic answers, the numbers of the answers, and the kind of advice provided to deal with the problems. For example, when no available compromise outcome is the source of the problem, the negotiator is advised to consult information exchange and linking/logrolling.

The negotiator is encouraged to consult as many impasse windows as needed to address the identified problems. Nine impasse windows have been developed to date; examples of three windows are shown in the boxes below. The advice contained in these windows is relevant to problems that arise on issues or process, the two categories used in the experiments reported in the sections to follow. Each suggestion is derived from the same body of research findings that underwrites the questions asked in each of the sections, examples of which are shown in Table 1.

Table 2. Impasse windows (for issues)

Issue questions	Problem answers	Answer code	Click on these links for advice
1. Depict the differences among the negotiating parties for this issue	Differences are large	1	Information exchange, differences
2. How complex is this particular issue?	Issue complexity is high	1	Fractionation, information exchange
3. For this issue is there an attractive outcome that can be achieved by equal compromises on the part of all parties?	No available compromise outcome	2	Information exchange, linking/logrolling
5. Is there an outcome that, while perhaps favoring one party more than the others, stands out as a plausible agreement?	No available plausible (though unbalanced) outcome	1	Information exchange, integrative agreements
7. Characterize the extent to which this negotiating delegation agrees to the position taken on this issue	Large differences within delegation	3	Conceptual framework, differences
8. For this issue to what extent are the party's values or ideologies at stake?	Values/ideologies very much at stake	1	Differences, information exchange

Sample Impasse Window 1: Linking/Logrolling

- Come to agreement in small steps, perhaps on related items, and link them together for a better agreement.
- Identify and discuss which issues are the highest priorities for each side. Trade-off priorities so that parties concede on their own low-priority elements in order to secure favorable terms on high-priority elements.

Sample Impasse Window 2: Fractionating the Issues

- Divide large complex issues into component parts and address them separately.

Sample Impasse Window 3: Integrative Agreements

- Tell what is most important for you and ask what is most important for everybody's benefit.
- Get an accurate picture of your compatible, key interests, and avoid discussing incompatible interests.

Neither the theoretical (knowledge bases) nor technical (algorithms for calculation) aspects of the software are described to the negotiators in the experiments. They are encouraged to concentrate on the three functions served by the NSS, diagnosis in the form of a grid, analysis in the form of identifying sources of impasses, and the advice that is linked to

the analyses. Most users find it easy to implement, and all of the experimental negotiators acquired sufficient experience during training to access each of the functions. The value of the software, however, depends on the results of assessments of its impact on negotiating behavior. The experiments were designed to compare conditions that alter the availability of the functions (all three functions, advice only, none of the functions/reflection), the form of delivery of the functions (computer versus live mediator), and the way the NSS is used by the negotiators (separately or jointly). These conditions were compared – in various combinations – in three experiments conducted at the University of Minnesota and at the University of Maryland. The experiments are described following a presentation of the simulation scenario used for the entire set.

The Simulation

An original simulation was constructed to address the experimental questions. The scenario captures contemporary issues leading up to the 2003 war in Iraq. Student role-players were familiar with these issues and prepared to defend the positions assigned to them. Seven unresolved issues were included in the scenario. Based on pilot testing, we learned that this set of issues was difficult to resolve, increasing the chances of impasses and the need for mediation. We also learned that three rounds of negotiation provided sufficient time to discuss them, allowing for the possibility of at least partial settlements. Further, the experience with the scenario and participation in the negotiation allowed the role-players to answer the questions posed by the NSS, particularly those questions in the sections on issues and process. These judgments led us to conclude that the simulation met the requirements for evaluating the NSS. Additional check on perceptions of the scenario were made with post-negotiation questions reported in the sections on results.

Students from the University of Minnesota (Experiment I) and the University of Maryland (Experiments II and III) participated in the simulation. These two universities were used for three reasons: (a) availability of appropriate student populations (political science students recruited from classes), (b) access provided by membership on the faculty (J. Druckman at Minnesota) or collaboration with the simulation laboratory at Maryland (D. Druckman) (1), and (c) taken together, the two locations provided a sufficient number of participants for the three experiments. The participants attended very similar large research-oriented state universities.

The scenario is a bilateral dispute over security issues between the Republic of Anice and the Republic of Izeria. The exercise was divided into several parts: an overview of the simulation, background information for each of the two representatives, information and an overview of the issues, instructions for using the NSS (or for implementing one of the other, non-NSS, conditions), a form for recording outcomes, a form for preparing a memorandum, and a post-negotiation questionnaire. Each of these parts is summarized briefly in this section.

The structure of the simulation was described in the overview along with the following timeline for tasks:

Time (min)	Task
20	Study the scenario
10	Tutorial on the NSS (for NSS condition negotiators)
10	First round of negotiation
17	Consult the NSS (reflect, receive advice, or meet with a consultant), and prepare for the second round
13	Second round of negotiation
10	Consult the NSS (or reflect, receive advice, or meet with a consultant), and prepare for the third round
15	Third round of negotiation
10	Record the negotiation outcome and write the justification memorandum
10	Complete a questionnaire

The total time was 1 h and 55 min for those in an NSS condition or 1 h and 45 min for those in non-NSS conditions. Each dyad was asked to remain in the room for the full length of time as scheduled.

The background information provided the rationale for each of the three types of issues in contention, weapons inspection, military border deployment, and terrorism. The information provided on each issue consisted of a definition of the issue (from each party's perspective), intelligence reports about what each knows about the other's intentions, and what each party aspires to on each issue. The weapons inspection issue was divided into two parts, number of weapons inspectors and period of inspection. The border deployment issue consisted of three parts, number of border troops, period of border deployment, and amount of special budget allocation. The terrorism issue was presented in terms of number of anti-terrorism troops and period of anti-terrorism deployment. Thus, each of the three issues was divided into a quantity of inspectors or troops and time period. The positions were represented along scales ranging from very low (preferred by Izeria) to very high allocations (preferred by Anice).

Negotiators in the NSS conditions were given detailed instructions on how to use the software. They focused exclusively on two of the five categories of questions, the issues and process categories. This was done for two reasons: they were the most relevant categories for this scenario and time constraints prevented obtaining diagnoses on the other three categories. In using the program, the negotiators, either separately or together (depending on the experimental condition), progressed from answering questions to viewing the diagnostic grid to accessing the chart of sources of impasses to opening the advice windows.

Forms for recording the outcomes were divided into the three issues. For each part of an issue the negotiators were asked, first, whether they settled the issue. If they did, they were asked to circle the agreed number on the scale. If they did not, they were asked to indicate how far they were willing to move from their initial position on the scale to get an agreement. An example of the format for the weapons inspection issue is shown in Figure 2.

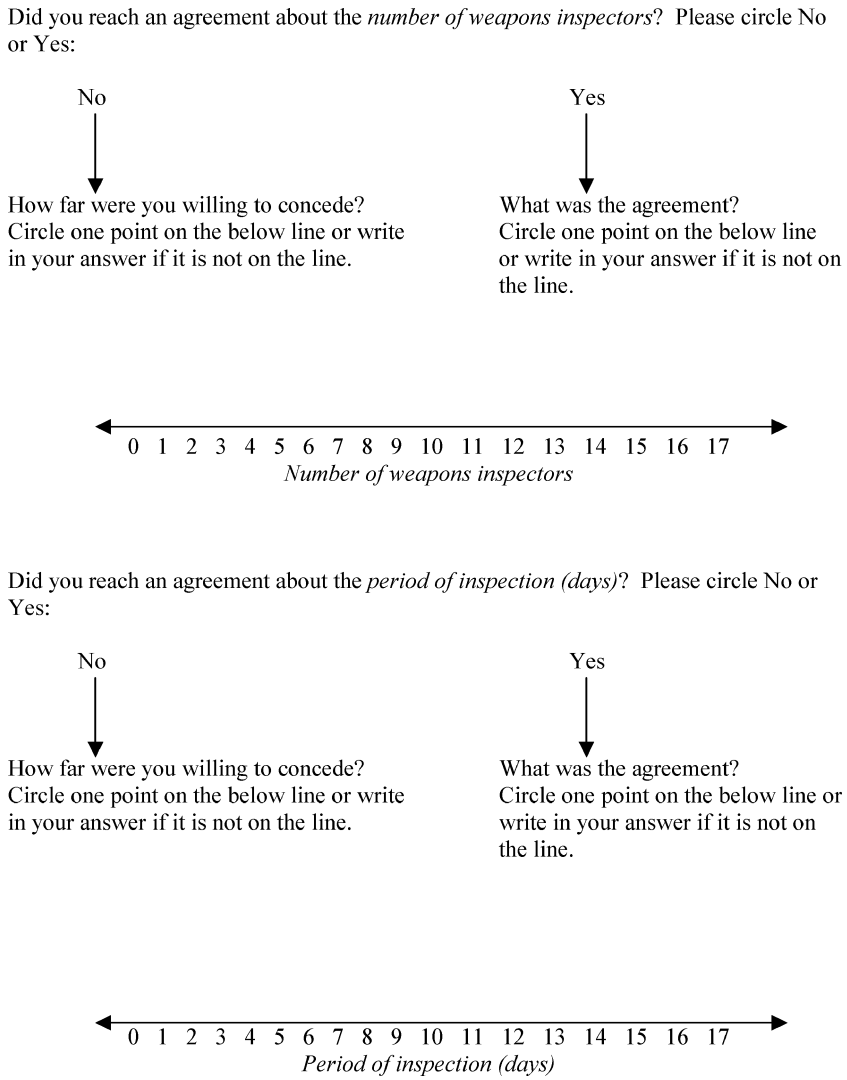

Figure 2. Recording negotiation outcomes (example – weapons inspection issue).

These entries provided the outcome data for the experiment: Number of agreements or impasses by condition is the primary dependent variable used in all the experiments; data on yielding from initial positions are provided by the second question. These are perhaps the most commonly used indicators of outcomes in bargaining experiments (e.g., Druckman, 1994).

They were then asked to write an official memorandum to their president, justifying the outcome. The purpose served by this task was to strengthen the role-players' motivation,

their deliberative thinking, and to encourage them to articulate their decisions (e.g., Sieck and Yates 1997). It is also regarded as a simulated version of a task typically engaged in by diplomats. To further encourage them, a cash award was offered for the best justification across all the participants in the three experiments. The memoranda written by the negotiators who participated in the third experiment were coded into the categories of integrative and distributive statements. The conditions of this experiment were compared for the relative frequency of integrative statements as discussed later in the section on the results of Experiment III.

Finally, all negotiators were asked to complete a post-negotiation questionnaire. Four types of questions were asked: One set was designed to check the experimental manipulations; these included questions about role identification, whether the issues are realistic, commitment to defending positions, importance of getting a fair outcome, and practicality of implementing the agreements. Another set was designed to assess possible intervening variables or perceptions that may be influenced by the experimental conditions and, in turn, affect the outcomes; these questions included perceived fairness of the process and outcomes, satisfaction with the outcome, willingness to compromise, and extent to which differences were reconciled.

A third set was intended to gauge perceptions of the between-rounds period where the experimental interventions occurred; these included questions about the extent to which the NSS (or reflection, advice) was helpful in facilitating the negotiation, in planning ways to overcome disagreements, and as being essential for resolving the issues.

A fourth set of questions was designed to probe for differences among the role players. A number of individual-level variables have been hypothesized to influence behavior in interactive situations with implications for negotiation. These include measures of risk-taking (Kowert and Hermann, 1997), gender (McDermott and Cowden, 2001), and need for closure (Kruglanski *et al.*, 1993). Each of these variables was assessed. Since the negotiation scenario used in this experiment involves politically charged issues, it is possible that political ideology, party identification, and stance on the war with Iraq would matter. These questions were also asked. This information permitted an evaluation of possible alternative explanations for the outcomes. Taken together, the various outcome and perceptual variables provide a comprehensive evaluation of impacts of the NSS.

Overview of the Experiments

Three experiments, embedded within the simulation scenario, were conducted. The first experiment consisted of a comparison of an NSS and reflection condition. Both tasks were done separately by the negotiators. Sixty-eight undergraduates from the University of Minnesota were assigned randomly to a role (Anice or Izeria representative) in one of the two conditions. Seventeen dyads participated in each condition. The only difference between the conditions was the task assigned to negotiators between rounds.

Negotiators in the NSS condition used the program to produce diagnoses, analyses and advice as needed. They were also encouraged to take notes that would assist them during the next (second or third) round. Following the introductory and background material on the

scenario, the negotiators in this condition received a tutorial on the operation of the NSS. It consisted of three parts: First, they were given a list of technical terms that appear in the online survey. Such terms as "strategic game," "problem-solving debate," and "logrolling" were defined. Second, the diagnostic grid was explained. They were shown how answers to questions in the issues or process section led to the diagnosis and, then, asked to interpret the hypothetical result. Third, the analytical functions were explained by example. The negotiators were shown how problematic answers to the questions with the issues or process section were identified. The computer-generated chart linking these answers to advice accessed through impasse windows was then illustrated. They were encouraged to ask questions. The session was concluded when each negotiator indicated he or she understood the process and procedures for eliciting a diagnosis, identifying problematic answers, and obtaining advice. Additionally, the experimenter unobtrusively monitored the use of the NSS during the between-rounds sessions. He observed each negotiator, noted any problems, and offered responses to questions asked. This procedure contributed to the procedural consistency across negotiators and dyads in using the NSS. None of the negotiators in the various NSS conditions indicated problems with the mechanics or interpretation of the outputs from the system.

Negotiators in the reflection condition were asked to reflect silently on the way the talks proceeded in the last round and consider ideas for moving them forward in the next round. They were encouraged to take notes that could be used in the next round. In both conditions, the opposing representatives were not allowed to communicate with one another during the between-round activity. The same time periods were used in both conditions (see the timeline for tasks ealier) and they were reminded periodically of the amount of time remaining before the next round would begin.

The second experiment consisted of a comparison of an NSS with an advice-only condition. Thirty-six undergraduates from the University of Maryland were randomly assigned to a role and condition: Nine dyads participated in the advice-only condition and nine in the computer condition. The NSS condition was identical to the one conducted for the first experiment. The advice condition consisted of providing the negotiators with the nine impasse windows in paper form. Instead of reflecting between rounds, they were asked to peruse the advice and apply it in the next round as appropriate. Neither the diagnostic nor the analysis functions provided by the NSS was made available to the negotiators in this condition. This comparison was intended to assess the impact of advice per se apart from the other mediation functions delivered by the NSS software. In many other respects, the conditions were similar to those designed for the Minnesota experiment. Differences between the experiments include the form of payment for participation (monetary at Minnesota, course credit at Maryland) and timing (the war was underway during the Minnesota experiment).

The third experiment was also conducted at the University of Maryland with the same political science subject population. It consisted of a comparison of three conditions: an NSS condition identical to those designed for the earlier experiments (referred to as NSS separate), an NSS condition in which the negotiators used the software together (referred to as NSS joint), and a condition in which a live mediator was scripted to perform the three functions represented by the NSS software. This comparison was intended to ascertain the

relative effects of two versions of the NSS and whether each improves outcomes over a live mediator. Subjects were assigned randomly to role and condition, with 10 in the NSS separate and live-mediation conditions and 13 in the NSS joint condition. All were given class credit for participation. The NSS separate condition was the same as that used in Experiments I and II. The procedures used in the NSS joint and live mediation conditions are described.

The NSS joint condition consisted of having both negotiators perform the mediation functions together. They took turns in answering the questions from the issues and process sections of the NSS. However, the person not answering a question was given an opportunity to express his or her opinion. When the answers were in conflict, an alternation procedure was used to decide which answer would be used in the diagnosis. Direct communication was minimized; the experimenter entered the answers to each question and managed the progression from diagnosis to analysis to advice.

The live-mediation condition followed the procedures used in the NSS separate condition. The mediator reproduced the online survey in hard copy, allowing each negotiator to fill it out at the beginning of each between-round session. As in NSS separate, the negotiators performed the tasks separately. A random procedure was used to decide on the order of mediation for the two negotiators. The mediator used the NSS algorithms to produce a diagnosis and then followed the NSS rules for performing the analysis of problematic answers and linked advice. Every attempt was made to perform the functions in the same manner as the computer, the only difference being the medium. The same set of tasks was performed in each of the two between-round periods.

Data collected from each experiment were analyzed separately. The results from each are presented and discussed in sequence followed by a comparison of the findings across the three studies.

Results – Experiment I

In this experiment, an NSS condition (17 dyads) was compared to a condition where negotiators reflected separately between the rounds (17 dyads). The results are presented in five parts. First, negotiators' perceptions of their roles, the issues, and other aspects of the simulation are analyzed. Second, the outcomes obtained by dyads in the two conditions are compared. Third, agreements by issue are analyzed for individual negotiators. Fourth, perceptions of the process, including the break periods, and outcomes are compared. And, finally, results obtained on several individual-level variables are presented.

Perceptions of the simulation

Six questions were asked about the negotiators' perceptions of various aspects of the simulation, including their roles and the issues. These variables are not expected to be influenced by the experimental conditions. Random assignment should insure no differences in these perceptions between the conditions. Indeed, the results shown in Table 3 indicate no differences

Table 3. Experiment I – Participants' perceptions of the negotiation scenario

Measure	NSS	Reflection
Identify with role	4.82	4.77
Realistic issues	5.65	5.47
Committed to defending position	5.24	5.41
Importance of obtaining a favorable outcome	5.71	5.82
Practicality of implementing agreement (if reached)	5.03	5.14
Support war with Iraq	2.97	2.62

Note: Table entries are mean scores on seven-step scales.

between the conditions on these perceptual variables: role identification, extent to which the issues are realistic, commitment to defense of positions, importance of obtaining a favorable outcome, practicality of implementing agreements reached, and support for the war in Iraq. Further, although not reported in the table, there were no significant between-condition differences on a variety of other political and demographic variables including college major, age, gender, ethnic identity, and political party affiliation. This suggests that random assignment was successful.

The relatively high scores – indicating strong role identification, commitment and so on – also suggest that participants took the exercise seriously. Another indicator of seriousness is the percentage of participants who took notes during the break periods. Eighty-two percent of reflection condition negotiators and 74% of the NSS condition negotiators recorded their thoughts or strategies on paper. Thus, the negotiators in both conditions were actively engaged in the task.

Outcomes by dyad

We next look at overall outcomes by dyad. Average dyadic outcomes by condition are shown in Table 4. The average in each of the three categories – agree, impasse, and conflicting – ranges from 0 to 7, as there were 7 issues. "Agree" means both participants in the dyad recorded an agreement on the issue. "Impasse" means both participants recorded no agreement. "Conflicting" means that each member of the dyad reported a different outcome. (In the dyads, where negotiators disagreed on their reporting of the outcomes, we entered

Table 4. Experiment I – Average outcomes by dyad

Outcome	NSS ($N = 17$)	Reflection ($N = 17$)
Agree	5.88	4.00***
Conflicting	0.47	0.59
Impasse	0.65	2.41***

Note: Table entries are the average number of dyads reporting each outcome (out of seven). *** $p < .01$ for one-tailed t-tests.

Table 5. Experiment I – Outcomes on issues by dyad*

Outcome	NSS ($N = 17$)	Reflection ($N = 17$)
Agree	82%[b]	65%[b]
Conflicting	6%	6%
Impasse	12%[a]	29%[a]

Note: Table entries are percentage of participants recording agreements. *Each issue had the same result. [a] $p < .11$ for one-tailed differences of proportions tests. [b] $p < .14$ for one-tailed differences of proportions tests.

their decisions without making an adjustment. This would seem realistic, as parties to a negotiation can in fact disagree about the outcome.)

The table indicates that, on average, NSS dyads reported reaching agreement on 5.88 of the issues, compared to 4.0 of reflection dyads. And the reflection dyads, on average, had impasses on 2.41 of the issues, compared to just 0.65 for NSS dyads. These differences are highly significant, as shown in the table. In only a few cases, members of the dyad reported conflicting outcomes.

The dyadic data can also be analyzed by issue. The percentage of dyads recording each type of outcome for each issue is shown in Table 5. Since the results were the same for each of the seven issues, the table applies to all the issues. That is, this table could be reproduced separately for each of the issues and it would look like Table 5 in each case. It is noted, however, that each dyad did not have the same result across all the issues – for example, even though different dyads reached agreements on different issues, it turns out that the agreement percentages are the same for each issue. The differences are in the expected direction, although they do not reach conventional levels of statistical significance.

Most of the agreements were asymmetrical, favoring Anice's position. Izerian representatives moved more on average across the issues, in both the agreement and non-agreement dyads: In fact, the difference is substantial – more than three times (for example, from an initial position of 4 on the scale to 12) from Izeria's initial position compared to less than two times for Anice (for example, from a position of 12 on the scale to 9). More interesting perhaps is the impact of the conditions on position movement. The data show a trend in the direction of more Izerian movement in the NSS than the reflection condition (28% more Izerian movement in the NSS condition versus only 2% more movement for Anice). Although not statistically significant, this trend suggests that the computer may have provided a necessary "nudge," moving Izeria close enough to the Anician resistance point to get an agreement. Whether these results indicate that the parties had different resistance points or maximum positions or that the Anician position were easier to defend, in part because they were similar to the American position in the US–Iraq pre-war conflict, remains to be investigated. Conceivably, in other circumstances or scenarios (e,g., equal-power parties), the computer may be more helpful in providing advice that can be used to extract equal concessions or more integrative solutions.

Outcomes by negotiators

We next look at the outcomes by individual negotiators rather than by dyads. This is done for two reasons: individuals within the dyads differed to some extent in their reporting (i.e., the "conflicting" outcome in the dyad results) and our unit of analysis for subsequent perceptual results is the individual negotiator, making these data relevant for subsequent correlational analyses. Although this analysis inflates the Ns, we report them for the aforementioned reasons.

The percentage of negotiators who recorded an agreement is shown by issue and condition in Table 6. (2) Clearly, there are significant differences, of very similar magnitude, for every issue. In total, the participants in the NSS group reported reaching an agreement 91% of the time, whereas participants in the reflection condition reported 64% agreements. These results are similar to those reported for dyads in Table 5.

The last row of the table reports the number of agreements recorded for the average participant in each condition (out of seven possible agreements). Again, we see a large difference with over six agreements on average for the NSS group and just over four for the reflection group. This row is analogous to the dyadic data shown in Table 4.

Perceptions of the process and outcome

Results on perceptions of process and outcome are reported in Table 7. There are no significant differences between the conditions in perceptions of the process. Although the NSS helped negotiators reach agreement, it did not lead them to think that the *process* of negotiation was fairer or more legitimate than those in the reflection condition. However, when we examine outcome perceptions, significant differences occur. NSS negotiators, on average, perceived the outcome to be relatively fairer, more legitimate, more satisfactory,

Table 6. Experiment I – Percentage of participants who recorded an agreement by issue

Issue	NSS	Reflection
Number of weapons inspectors	88% (33)	68%** (34)
Period of weapons inspection	88% (32)	65%*** (34)
Number of border troops	88% (33)	68%** (34)
Period of border deployment	91% (33)	66%*** (32)
Amount of special budget allocation	91% (33)	65%*** (31)
Number of anti-terrorism troops	97% (34)	59%*** (34)
Period of anti-terrorism deployment	94% (31)	57%*** (30)
Total agreements over all issues	91% (229)	64%*** (229)
Average number of agreements (by participant)	6.12 (34)	4.29*** (34)

Note: With the exception of the last row, table entries are percentage of participants recording agreements with Ns in parentheses. $^{***}p < .01$; $^{**}p < .05$ for one-tailed differences of proportions tests. The last row reports the average number of agreements (out of seven possible) by participant. $^{***}p < .01$ for one-tailed *t*-test.

Table 7. Experiment I – Perceptions of the negotiation process and outcome

Measure	NSS ($N = 34$)	Reflection ($N = 34$)
Fairness of process	5.18	5.0
Legitimacy of process	5.24	4.94
Fairness of outcome	5.0	4.50*
Legitimacy of outcome	5.21	4.65**
Satisfied with outcome	4.97	4.38**
Extent of reconciliation of initial differences	5.0	4.51*

Note: Table entries are mean scores on seven-point scales. $^{**}p < .05$; $^{*}p < .10$ for one-tailed t-tests.

Table 8. Experiment I – Perceptions of the between-rounds periods

Measure	NSS ($N = 34$)	Reflection ($N = 34$)
Computer (reflection) helpful in evaluating ongoing negotiation	3.47	4.56***
Computer (reflection) helpful in planning ways to overcome disagreements	3.56	4.74***
Computer (reflection) essential in resolving issues	2.79	4.41***

Note: Table entries are mean scores on seven-step scales. $^{***}p < .01$ for two-tailed t-tests.

and leading to more reconciliation of differences than negotiators in the reflection condition. Perhaps reaching agreements lead negotiators to have more positive perceptions of the outcome. Thus, actual outcomes and perceptions of those outcomes are affected more than perceptions of the negotiating process.

Although no differences were obtained between the conditions in perceptions of the overall process, differences were obtained on specific aspects of the process. The reflection period participants had, on average, a much more positive evaluation of the between-round break periods than those in the NSS condition. Reflection period negotiators regarded the break period as being relatively more helpful in evaluating the negotiation, in planning, and in helping to resolve the issues than those who used the computer software (see Table 8). (These are two-tailed tests, as the results go in the opposite direction of expectations.) Thus, perceptions of this aspect of the process did not correspond to, and would not predict, outcomes or the evaluation of those outcomes. Relatively negative perceptions of the NSS process used during the break periods occur along with positive perceptions of the outcomes.

Individual-level variables

As noted earlier, a number of individual-level variables have been hypothesized to influence behavior in interactive situations with implications for negotiation. These include risk-taking, gender, and need for closure. Since the negotiation scenario used in this

experiment involves politically charged issues, it also is possible that political ideology, party identification, and stance on the war with Iraq would also matter.

The question of interest, coded from self-report questions, is whether these variables relate to the outcomes (number of issues resolved) of the negotiation. Analyses based on a negative binomial count model show no significant differences on any of these variables. Only gender shows a trend in the direction of females recording fewer agreements than males ($p < .12$); otherwise, no other variable approaches significance. Thus, negotiation outcomes are strongly influenced by the experimental conditions, which were shown to be highly significant (see Table 4), and not by negotiators' self-reported attitudes or political preferences, which were non-significant.

Discussion

The results of this experiment indicate that the e-mediation aid does assist negotiators to reach agreements. The differences between the NSS and reflection conditions on obtained and perceived outcomes were substantial: Negotiators in the NSS condition reached significantly more agreements and had more favorable perceptions of those agreements. Taken together with the earlier validity assessments, we have impressive evidence for the utility of this aid. The earlier analyses of nine cases of international negotiation showed considerable correspondence between the actual outcomes obtained and the outcomes projected from the computer diagnoses (Druckman *et al.*, 2002). That evidence attests to its value as a diagnostic tool. The results obtained from this experiment attests to it value as a mediation aid, although they do not indicate whether the NSS performs better than a live mediator or which mediation function is most important.

Differences between the conditions in negotiating outcomes cannot be explained in terms of alternative explanations. Negotiators in the two conditions did not differ in their perceptions of the simulation task with regard to their role, the issues, or the seriousness with which they enacted their roles. Nor did background variables such as risk-taking, need for closure, political ideology or gender influence the outcomes. These findings are generally consistent with earlier results, showing that individual-level variables have little impact on negotiating behavior (e.g., see Plous, 1987). The negotiators in this experiment responded primarily to their randomly assigned experimental condition: If this condition consisted of the NSS, most dyads reached agreements on most of the issues; if it consisted of a reflection period, many dyads did not resolve the issues or reached an impasse.

The results on perceptions of the process present a different picture. No differences between the conditions were obtained on perceptions of process fairness or legitimacy. Significant differences were obtained, however, on their perceptions of activities during the between-rounds break period: Reflection negotiators thought that the break period was more helpful in evaluating the negotiation, in planning, and in resolving the issues than NSS negotiators. This is an interesting finding because it raises a dilemma. The negotiators viewed the computer program as being less helpful than having no program but, in fact, the program helped them resolve more issues and led to more favorable perceptions of the

outcome. Thus, the computer software seemed to enhance flexibility but may be difficult to implement because it is not held in high regard.

One explanation for this finding is that negotiators may feel that they lose a certain degree of control over the process to the computer. Unlike facilitators or passive mediators, the computer uses information to draw conclusions that lead to the generation of particular kinds of advice for moving the process forward. This may also be a problem for other internet technologies that take some control away from users. Further probes of experimental negotiators would reveal the extent to which this is a problem.

Another explanation is that the cognitive demands made by the computer are strenuous: They must answer questions, understand the diagnoses, and consider what to do with the advice offered; none of these demands are made in the reflection condition. This is similar to the demands made on disputants when they are encouraged to engage in problem solving rather than concession exchanges. The promise of a better outcome resulting from problem-solving or information-searching processes may not produce particularly favorable perceptions of the process. Kressel and his colleagues (1994) call attention to the vigorous cognitive demands made on disputants who engage in problem-solving processes. As a result of these demands, it may be difficult to persuade them to use this approach. Like problem solving, e-mediation can promise better outcomes. The challenge is to persuade negotiators that the outcomes justify the process, whether that process is problem-solving or e-mediation. Similar to exercise, the investment of time and effort may be justified by the outcome (reduced conflict, improved health). This issue is explored further in conjunction with the results obtained in the next two experiments.

It would be useful to ask about the relative importance of the three mediation functions represented by the computer software: Which function contributes most to the outcomes, the diagnosis, analysis, or advice? A first step is taken in the next experiment. The advice function is separated from the diagnosis and analysis functions of the support system.

Results – Experiment II

In this experiment, we compared the NSS condition (9 dyads) to a condition in which negotiators received only the advice given in the impasse windows on paper (9 dyads). As in Experiment I, none of the perceptual questions intended to check the manipulation (role identification, realistic simulation, commitment to defending positions, support for the war in Iraq, etc.) approached significance.

Outcomes by dyad and by negotiators

Average outcomes by dyad are shown in Table 9. More agreements and fewer impasses were reached by the negotiators in the NSS condition, although the differences do not reach conventional levels of statistical significance ($.15 < p < .10$). When the results are analyzed by individual negotiators, however, the difference between the conditions in number of agreements is significant (4.94 [NSS] versus 3.33 [advice], $p < .05$; see

Table 9. Experiment II – Average outcomes by dyad

Outcome	NSS ($N = 9$)	Advice ($N = 9$)
Agree	4.89	3.22
Conflicting	0.11	0.22
Impasse	2.00	3.56

Note: Table entries are the average number of dyads reporting each outcome (out of seven).

Table 10. Experiment II – Percentage of participants who recorded an agreement by issue

Issue	NSS ($N = 18$)	Advice ($N = 18$)
Number of weapons inspectors	67%	44%*
Period of weapons inspection	67%	44%*
Number of border troops	67%	56%
Period of border deployment	67%	56%
Amount of special budget allocation	72%	67%
Number of anti-terrorism troops	75%	33%***
Period of anti-terrorism deployment	78%	33%***
Total agreements over all issues	71%	48%***
Average number of agreements (by participant)	4.94	3.33**

With the exception of the last row, table entries are percentage of participants recording agreements with Ns in parentheses. The last row reports the average number of agreements (out of seven possible) by participant. $^{***}p < .01$; $^{**}p < .05$; $^{*}p < .10$ for one-tailed t-tests.

Table 10). Moreover, significantly higher percentages of negotiators reached agreements on most of the issues: for example, a 75–33% split for NSS versus advice on the anti-terrorism troops issues; a 67–44% split on the weapons inspection issues. Seventy-one percent of the issues were resolved by NSS-condition negotiators, compared to 48% for the negotiators in the advice condition ($p < .01$) (see Table 10).

Perceptions of the process and outcome

The perceptual data present a different picture. On several questions, negotiators in the advice condition had more positive perceptions than those in the NSS condition. As shown in Table 11, they thought that the outcome was more legitimate ($p < .05$) and fair ($p < .10$). They also viewed the process as being somewhat fairer ($p < .10$) and had more confidence in their decision making ($p < .05$). NSS-condition negotiators were less satisfied with the outcome and with the legitimacy of the process but thought that they reconciled their initial differences more than negotiators in the advice condition. However, these differences did

Table 11. Experiment II – Perceptions of the negotiation process and outcome

Measure	NSS ($N = 18$)	Advice ($N = 18$)
Fairness of process	4.61	5.56*
Confidence in decision making	4.67	5.56**
Fairness of outcome	4.56	5.22*
Legitimacy of outcome	4.94	5.83**

Note: Table entries are mean scores on seven-step scales. $^{**}p < .05$; $^{*}p < .10$ for one-tailed t-tests.

not reach statistical significance ($p < .13$, $p < .17$, $p < .13$, respectively). In contrast to the results from Experiment I, there were no differences between the conditions on the negotiators' perceptions of the between-rounds break periods. (3)

Discussion

The results obtained from this experiment suggest that the e-mediation technique improves outcomes over a condition in which negotiators receive advice without computer intervention. Conceivably, the dyadic differences would have reached higher levels of statistical significance with a larger number of negotiating dyads in both conditions. Similar in some ways to the results of the first experiment, perceptions of the process and outcomes are mixed. The trend across the questions favors the advice-only condition. Negotiators in this condition evinced more confidence in their decisions and viewed the process and outcome as being fairer. They also viewed the outcome as being more legitimate although they did not think that they reconciled their differences better.

One way of interpreting these findings is that, like the reflection condition in the first experiment, advice has some positive effects on perceptions. But it also reduces the size of the difference in outcomes shown between NSS and a reflection (no advice) condition in Experiment I. As advice is one of the three mediation functions performed by the computer, it may be expected to have some positive impacts on negotiation. Just how strong those impacts are, awaits the results of a replication with a larger number of dyads. Together, results from both experiments underscore advantages of the e-mediation technique but raise a puzzle about why perceptions of the process and outcomes contradict obtained outcomes. This finding may have implications for the use of new technologies and is a topic for further research. Additional research is also needed to compare and evaluate the effects of the three mediation functions.

Another comparison of interest is between the e-mediator and a live, non-electronic, version of the mediation functions. This comparison would address the issue of whether the impacts of the mediation are due to the delivery system (the NSS) or to the mediation functions per se. The live mediator would be scripted to perform the same functions, and provide the same advice, as the electronic version. Does a live mediator produce better or worse outcomes than his/her electronic counterpart? Also of interest is whether perceptions

of the between-round break periods improve when a live mediator intervenes. This condition is included in the third experiment discussed next.

A second avenue to explore would consist of varying the way that negotiators use the e-mediation software. Two formats may be especially interesting, interactive and empathic. In the interactive format, negotiators respond to the survey questions together, producing a joint diagnosis and analysis. Conceivably, the interaction could reveal other differences, which make it more difficult to reach agreements. Or, the exercise could reveal common perceptions that lead to more agreements on the issues. The next experiment shows which of these results occur. In the empathic format, negotiators separately answer the questions from both their own and the other's presumed perspective. The key would seem to be whether the empathic exercise produces understanding, leading to more agreements or unveils misunderstanding that has the effect of enhancing the conflict. These ideas can be framed as competing hypotheses ripe for arbitration by further experiments on e-mediation.

Results – Experiment III

In this experiment, we compared three conditions: NSS-separate (same condition as in the previous experiments, 10 dyads), NSS-joint (13 dyads), and a live mediation implementing the three functions (10 dyads).

Outcomes by dyad

The outcomes by condition are shown in Table 12. The differences among the conditions are significant by Kruskal–Wallis one-way ANOVA (KW = 7.82, $p < .02$). Multiple comparisons based on the Kruskal–Wallis statistic showed that significantly more agreements (and fewer impasses) were attained by negotiators in the NSS-joint than in the NSS-separate condition. The number of agreements (and impasses) attained by negotiators in the live-mediation condition fell between the NSS conditions, but did not differ significantly from either of those conditions (see Siegel and Castellan, 1988, Section 8.3 for the procedure.)

Similar results are shown in Table 13 for percentage of negotiators reaching agreement by issue. The largest difference among the conditions was obtained for the two weapons inspection issues, with all negotiating dyads reaching agreements in the NSS-joint condition compared to only 60% in the NSS-separate condition ($p < .006$ by difference of

Table 12. Experiment III – Number of agreements (maximum score is 7)

Outcome	NSS/separate ($N = 10$)	NSS/joint ($N = 13$)	Live mediation ($N = 10$)
Agree	4.80**	6.38**	5.50
Conflicting	0.50	0	0.40
Impasse	1.70**	0.62**	1.10

** $p < .02$ for separate vs. joint mediation on agreements and impasses by Kruskal–Wallis multiple comparisons.

Table 13. Experiment III – Percentage of dyads who recorded an agreement by issue

Issue	(1) NSS/separate	(2) NSS/joint	(3) Live mediation	Statistical results
Number of weapons inspectors	60%	100%	80%	(1) vs. (2): $p < .006$; (2) vs. (3): $p < .05$
Period of weapons inspection	60%	100%	80%	(1) vs. (2): $p < .006$; (2) vs. (3): $p < .05$
Number of border troops	80%	92%	70%	(2) vs. (3): $p < .10$
Period of border deployment	60%	92%	80%	(1) vs. (2): $p < .03$
Amount of special budget allocation	70%	85%	70%	NS
Number of anti-terrorism troops	80%	92%	80%	NS
Period of anti-terrorism deployment	70%	92%	80%	(1) vs. (2): $p < .10$
Total agreements over all issues	69%	93%	77%	(1) vs. (2): $p < .001$; (2) vs. (3): $p < .004$

Note: Table entries in the far right column show the probability levels for significant comparisons by the difference of proportions test.

proportions test). NSS-joint dyads also had a higher percentage of agreements than those in the live-mediation condition (80%; $p < .05$). On the number of border troops issue, NSS-joint dyads had a higher percentage of agreements (92%) than those in the live-mediation condition (70%; $p < .10$) and on the border-deployment period issue, NSS-joint dyads had a higher agreement percentage (92%) than those in the NSS-separate condition (60%; $p < .03$). NSS-joint dyads had a higher agreement percentage (92%) than NSS-separate dyads (70%) on the period of anti-terrorism deployment ($p < .10$). With regard to agreements across all seven issues, NSS-joint dyads had considerably more agreements (93%) than those in the NSS-separate (69%; $p < .001$) and those in the live-mediation condition (77%; $p < .004$). Thus, the NSS-joint condition negotiators reached more agreements overall (as well as on selected issues) than dyads in both of the other conditions.

Perceptions of the process and outcome

The perceptual data are shown in Table 14. On each of the three questions asked about the helpfulness or value of the between-rounds intervention, negotiators in the live-mediation condition rated the mediator as being very helpful and essential, whereas those in the NSS conditions viewed the computer as being only somewhat helpful ($p < .001$ for each question). These results are similar to those obtained in the comparison between an NSS-separate and a reflection condition in Experiment I. However, perceptions of compromise present a different picture than the between-rounds perceptual data. Negotiators in the NSS-joint condition indicated that they were more willing to compromise than those in the live-mediation condition ($p < .06$).

Integrative and distributive statements

An additional analysis was performed on the memoranda written by negotiators after the third and final round of negotiation. Recall that negotiators were asked to prepare an "official

Table 14. Experiment III – Perceptions of computer (NSS) and mediator

	(1) NSS/separate	(2) NSS/joint	(3) Live mediation	Statistical results
Computer (mediator) helpful for evaluating negotiations	4.05	4.04	5.80	$F = 14.9^{***}$ (1)–(3) difference*** (2)–(3) difference***
Computer (mediator) helpful for overcoming disagreements	4.15	4.27	5.55	$F = 7.5^{***}$ (1)–(3) difference*** (2)–(3) difference***
Computer (mediator) essential for resolving issues overall	3.55	3.15	5.15	$F = 12.3^{***}$ (1)–(3) difference*** (2)–(3) difference***
Willingness to compromise on initial positions	3.65	4.50	3.50	$F = 3^{*}$ (2)–(3) difference*

Note: Table entries for columns (1)–(3) are mean scores on seven-step scales. Table entries in the far-right column show the F ratios and Bonferroni multiple comparison test results, indicating which pair or pairs of conditions account for the statistically significant ANOVA result on each question. $^{***}p < .01$; $^{*}p < .10$.

memorandum" to their president justifying the outcome. Each sentence of a memorandum was coded as being distributive, integrative, or neither. A distributive statement contained phrases such as, "we won," "they lose," "our national interest was served," or "this was a good agreement for us because . . . " An integrative statement contained such phrases as, "we both gained by the agreement," "reasonable trade-offs made on the weapons-inspection issue", or "we showed flexibility on this issue for the sake of the relationship." The number of integrative statements coded was divided by the total number of statements made in both categories. The ratio varied between 0 (highly distributive) to 1 (highly integrative). The difference among the conditions was highly significant ($F = 16.65$, $p < .001$). Significantly fewer integrative statements were made in the NSS-separate condition (0.30) than in the NSS-joint (0.63) and live-mediation (0.78) conditions ($p < .001$ for both comparisons by Bonferroni multiple comparisons). The difference between the NSS-joint and live-mediation conditions was not significant.

Discussion

Four conclusions are drawn from the results of this experiment. One is that the e-mediation tool produced at least as many and, for some indicators and conditions, more agreements than live mediation. The NSS-joint negotiators had a higher percentage of agreements and indicated that they were more willing to compromise than those exposed to a live mediator. Another is that when negotiators use the system together they produce more agreements than when the system is used separately. A third conclusion is that negotiators prefer the live-mediation intervention more than either of the two computer interventions. And, a fourth conclusion is that separate use of the NSS produces fewer integrative statements in

attempts made by negotiators to justify the outcome to principals. Some implications of these findings are discussed in this section.

These results add value to the findings reported from the earlier experiments. The earlier results show that e-mediation "outperformed" two non-computer conditions, reflection and advice-only. This experiment shows that it does at least as well – and sometimes better – as a live mediator who performs the same three mediation functions. The functions of mediation make a difference, but so too does the delivery system: When the NSS is used jointly, the delivery system produces a higher percentage of agreements than does the live mediator. However, this conclusion is tempered somewhat by not having included in the comparison a joint live-mediation condition. This is discussed further later.

We have also learned that the way the NSS is used makes a difference. Joint use of the NSS produced more agreements than separate use of the system. As well, separate NSS negotiators were more competitive (or distributive) than those in the other conditions, as indicated by the analyses of their justifying statements. These findings are consistent with earlier gaming results. More cooperative behavior occurred between opposing players when they had an opportunity to communicate with each other during the game. The form and type of communication make a difference: Two-way, face-to-face, oral (hearing and seeing) communication produced the least competitive behavior or distrust (Ellis, 1965; see also Wichman, 1970); the more types of statements communicated (Loomis, 1959) and the more they used their opportunity to explain how to play cooperatively and why a cooperative response is best, the less competitive and the more the mutual trust (Ellis, 1965).

Communication prior to bargaining may be even more important than that which takes place during bargaining. Krauss and Deutsch (1966) reported that when players were told prior to bargaining to communicate about a fair proposal (referred to by them as structured pre-trial communication), they attained more effective agreements (higher joint payoffs) than when pre-trail communication was unstructured (content ambiguous) or permissive (communication before and during the game). However, both structured and unstructured communication were more effective in concluding agreements after several frustrating trials, where bargainers experienced deadlock. This is similar to the joint NSS condition of this experiment: it is characterized by face-to-face communication in which bargainers access advice together for resolving an impasse and obtaining a fair outcome prior to continuing the negotiation. This feature may also have accounted for the large number of integrative statements made in the negotiators' justifying memoranda. It was not present in the separate NSS condition and its absence may have accounted for the low number of integrative statements made by these negotiators. (4) (see Druckman, 1971, for a review of other experiments on communication opportunities.)

It is also the case that these conditions represent two forms of mediation. The joint condition is more similar to the way that mediation is usually performed. The separate condition, in its electronic and live forms, resembles in some ways the procedure of shuttling between the disputants: A difference however is that, unlike shuttle diplomacy, messages from one disputant are not delivered to the other by a mediator. A question of interest is: What is it about joint-ness that produces more agreements and less competitiveness? One possibility is that working together between rounds increases the negotiators' sense of camaraderie or common fate. Another is that negotiators are benefiting from having performed the same

analysis and receiving the same advice. Both can facilitate negotiation. Whether the social (camaraderie) or cognitive (common analysis) explanation is more plausible awaits further research. (5)

The two features of the intervention that contribute to negotiated agreements are "jointness" and "live-ness." These features were not included together in the same condition. A question of interest is whether joint live mediation would increase the number of agreements further as well as improve perceptions of the mediation. This condition would combine the possible advantages of working together with the services of a live mediator, who implements the three functions of mediation. The relevant comparison is among joint live, separate live, and joint NSS. This comparison would separate the effects of joint and live and would be a next step in this program of research.

Consistent with the results obtained in the earlier experiments, negotiators had more positive perceptions of the non-computer condition. Just as the negotiators in Experiment I thought that the reflection period was more helpful than the NSS, those in this experiment viewed the live mediator as being more helpful than the NSS in both the separate and joint versions. Similarly, negotiators in Experiment II had more positive perceptions of the process and outcome, although not of helpfulness during the between-rounds sessions. These results may be due to the different attributions made to computers and humans. Lee and Nass (2002) found that people attributed greater competence, social attractiveness, and trustworthiness to partners represented by anthropomorphic characters than those represented by textboxes and stick figures.

The question of interest then is how to make the NSS more human-like. Possibilities include the use of animation (e.g., moving figures that direct the user to next steps), reinforcing statements following each of the functions (e.g., "You made the correct diagnosis . . . now let us proceed to address the problems"), and installing a voice (e.g., the animated figures speak). These enhancements may serve to increase users' comfort with the system as well as its credibility as a mediator with good advice. These qualities may also increase the effectiveness of mediated negotiation in keeping with Lee and Nass' (2002) finding that people expressed greater public (but not private) agreement with human partners than with computers. Overcoming these perceptual barriers would enable negotiators to take advantage of the key strengths of computer analysis, which are efficiency and speed. Further research is needed to evaluate these suggested enhancements.

Overall Implications

In this concluding section, we summarize the research, discuss some implications of the results obtained across the three experiments, and suggest a number of ideas for further research that derive from these studies. The software was designed to implement three mediation functions, diagnosis, analysis, and advice. The experiments consisted of comparing the form of delivery of these functions (NSS, live), the way the system is used by negotiators (separate, joint), and the availability of the functions themselves (all three, advice only, none/reflection). These conditions were varied in three experiments conducted in the context of a simulated negotiation of seven security issues with political science students

Table 15. Agreements across the three experiments

Condition	Average number of agreements by dyad	Percentage of total agreements over all issues
NSS separate (Experiment 1)	5.88 (17)*	91%
Reflection (Experiment 1)	4.00 (17)	64%
NSS separate (Experiment 2)	4.89 (9)	71%
Separate advice only (Experiment 2)	3.22 (9)	48%
NSS separate (Experiment 3)	4.80 (10)	69%
NSS joint (Experiment 3)	6.38 (13)	93%
Separate live mediation (Experiment 3)	5.50 (10)	77%

*Number of negotiating dyads in each condition. The only condition common to all three experiments is NSS separate.

at the Universities of Minnesota and Maryland. The agreement results are summarized in Table 15.

The results obtained from Experiments I and II show that e-mediation (NSS/separate) produces more agreements than no mediation (reflection), and the availability of only one of the three functions (advice only). The third experiment shows that when negotiators work together on the NSS (NSS/joint) they obtain more agreements than when they work separately (NSS/separate) and a larger percentage of agreements than when they work separately with a live mediator. Across all of the seven experimental conditions, joint NSS/e-mediation performed best in terms average number of agreements and percentage agreements (see Table 15). As noted earlier, whether this is due to the opportunity to work together or a common analysis/advice protocol remains to be investigated. Further, a live mediator improves the chances for getting agreements and produces positive perceptions of the experience. Whether "joint-ness" or "live-ness" is more important, however, awaits the results of a next experiment, which would include a joint live-mediation condition. Taken together, the results across the experiments demonstrate that negotiators are helped when the three functions of mediation are implemented in an electronic or live format.

An important implication of these findings is that we have modeled the key functions of mediation – as a sequence going from diagnosis to analysis to advice. These may be regarded as the set of activities or "rules" that improve the chances that mediation, whether delivered electronically or by a person, will work. The generality of this model awaits further experimentation with other scenarios or issues, further comparisons among the functions, and analyses of field data. These and other ideas for continuing work on e-mediation conclude this final section of the article.

A number of research issues are suggested by the findings. Some can be addressed by performing more analyses. Others involve conducting new experiments or field studies. With regard to additional analyses, it would be interesting to examine the patterns of responses to the survey questions in each category: Do similar responses given by members of the same dyad lead to more agreements? It would also be interesting to ascertain whether there is a relationship between the advice used by members of a dyad and the frequency

of agreements: Do certain types of advice produce more agreements? More generally, deeper probes of negotiating participants could reveal their understanding of the connection between the functions served by the NSS or live mediator and negotiating outcomes. Probes can be conducted as "think aloud" tasks where negotiators are asked to verbalize their thoughts during the between-round periods as they consider ways in which to apply the diagnoses and advice to the next round of talks. These questions can also be addressed with analyses of the process, including the extent to which the advice is incorporated in the conversations held by the negotiating opponents.

Other avenues can also be suggested for future exploration of e-mediation. One comparison could include an un-scripted mediator, free to perform the functions as he/she desires: Which version of mediation produces the largest improvement over reflection, separate or joint electronic mediation, scripted non-electronic mediation, or non-scripted mediation? This comparison would provide information about the extent to which the programmed structure (in electronic and live forms) contributes to the outcomes. Another concerns the subject population used for these experiments: Would similar results be obtained with role-playing negotiators from other cultures and interest areas? Non-western mediation traditions may provide resistance to technological conflict-management interventions. (see Wall and Blum, 1991; Kim *et al.*, 1993, for discussions of mediation in non-western cultures.) Business-school students socialized in a more competitive academic culture than liberal-arts undergraduates may use the mediation advice strategically for relative rather than absolute gains. (see Hopmann, 1995, for a discussion of this distinction.)

A third involves the setting in which e-mediation is used: Are these results limited to the simulated setting of this experiment. Is the NSS also effective in actual, non-simulated, negotiations? One way to conduct this research is to compare matched negotiation cases. Ideally, the cases would come from the same issue domain, differing only in the use of e-mediation or live mediation. Comparing the e-mediation intervention in security talks with either (or both) traditional mediation or no mediation would be informative. It would also address external validity issues by extending the range of situations in which electronic mediation tools are used.

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1. Unlike many psychology departments, political science departments do not typically maintain institutionalized subject pools. Experimental participants are usually recruited

from classes with the permission of the instructors. They may be paid or given class credit for participation with the stipulation that all members of the class have an opportunity to participate. The topic of these experiments corresponded closely to subjects discussed in the classes from which simulation participants were recruited.

2. Several participants in both conditions provided additional information on the outcome sheets. Some adjusted the outcomes, e.g., by including Izerian anti-terrorism troops in addition to Anician troops. The idiosyncratic aspect of this type of information precludes using it in our analyses.
3. A supplementary analysis of the data by gender revealed that females agreed on average more than males [means of 5.94 (F) versus 2.22 (M): $p < .01$], but were less confident in their decision making [means of 4.56 (F) versus 5.83(M): $p < .01$]. However, there were no significant interactions between gender and experimental condition.
4. The relatively high number of integrative statements made by negotiators in the live-mediation condition may have been due to the live feature of those interactions. It was not due to the features of working together as in the joint NSS condition.
5. Earlier simulation research by Druckman (1968) showed that more agreements occurred when negotiators studied the issues rather than strategized prior to negotiation. This occurred irrespective of whether they studied with members of the opposing team (bilateral study) or only with members of their own team (unilateral study). In that study, the cognitive activity of studying was more important than the social activity of studying together.

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