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# The effect of task complexity and conflict handling styles on computer-supported negotiations

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## Abstract

Prior research has indicated that groups using Negotiation Support Systems (NSS) achieve better outcomes than face-to-face groups. However, these studies indicate that the main source of value added is provided by the Decision Support System (DSS) component, with very little additional value provided by the electronic communication component. This study examines the value added by the electronic communication component, taking into consideration task complexity and conflict handling style of the participants. Both these are likely to impact the extent to which computer-support enhances negotiation outcomes. © 2000 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Negotiation has been defined as a form of decision-making involving two or more parties who cannot make decisions independently and are required to make concessions to achieve agreement [19]. The process has often been compared to a ‘dance’ involving a sequence of offers and counteroffers until agreement is reached or breakdown occurs. Negotiation tasks present a barrier to group consensus, as members have to reconcile conflicts of interests while possessing different information, attitudes, and

opinions [17]. The outcome is a decision that must satisfy all parties within the bounds imposed by the environment.

Research suggests that the conventional model of face-to-face negotiation often lead to inefficient outcomes [16,23]. Sub-optimal outcomes occur when participants fail to agree, though a solution exists, that could be advantageous to all concerned [29]. The search for efficiency has produced strong interest in exploring alternatives to the face-to-face model, such as computer support. Recent advancements in technology allow the use of computers to enhance negotiation outcomes [9]. Computer support for negotiation has been used in labor law, international affairs, environmental issues, and management disputes [18]. But despite extensive real world applications, relatively little is known about how and under what conditions negotiation outcomes can be enhanced with computer support. Several researchers, however, have

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noted the need for research to assess the usefulness of computer-supported techniques [14,20].

Interest in using computers to enhance negotiations has led to the development of a field commonly referred to as negotiation support systems (NSS). They are a subset of group decision support systems (GDSS) and include an electronic communication component and a decision support system (DSS) module. Therefore, the core elements of a NSS provide a comprehensive system to support the entire negotiation process [1,6]. The field of NSS is rapidly developing from specialized expert systems that helps in preparing for negotiation to mediation and interactive systems that restructure the way negotiations occur [28].

There is a substantial body of literature on the performance of GDSS supported versus face-to-face groups [4,15,35]. The moderating effects of several variables, such as task type, group size, group composition, and task conflict level, have also been studied. The results are generally inconclusive. Research has suggested that task type is one of the most important moderators of the impact of technology on group process, performance, and reactions [26]. Therefore, it is not appropriate, however, to extend findings from the GDSS research stream to the area of negotiation tasks.

Not surprisingly, research on the pros and cons of NSS have proceeded at a much slower pace. Only recently, Lim and Benbasat proposed a theory of NSS that recognized the separate and important roles played by the DSS and electronic communication components. The theory suggests that the DSS provides increased information processing capacity while electronic communication has a positive impact on the sociological aspect. Empirical studies have evaluated the performance of integrated NSS as well as that of each component separately on negotiation outcomes and attitudes. These indicate that NSS groups achieve better negotiation outcomes than face-to-face groups. However, most of the benefits are derived from the DSS component. This is both surprising and disappointing. The main attraction of the electronic communication channel is its ability to allow negotiations among parties whose membership transcends time zones, geographical location, and organizational boundaries. It is therefore, important to determine why this is so and identify procedures and conditions that can help improve the effectiveness of the electronic communication component.

This study examines the value-added potential of the electronic communication component of NSS taking into consideration the moderating effects of realistic elements of negotiations, such as task complexity and participants predisposition to conflict. Researchers have emphasized the need to manipulate the level of task complexity of the negotiation problem [12]. Others have speculated but not tested the assertion that secondary benefits of electronic communication may become important when the number of issues increase. Another important consideration is the conflict handling style of the participants. This study assesses the moderating impact of both task complexity and participant's predisposition to conflict on negotiation outcomes for groups using electronic communication versus face-to-face support. The term electronic meeting system (EMS) here refers to the electronic communication channel component of the NSS. The basic research questions addressed in this study include:

1. Are there significant differences in negotiation outcomes between EMS supported and face-to-face negotiating groups in complex tasks?
2. Are there systematic differences in negotiation outcomes between EMS supported and face-to-face negotiating groups across different conflict handling styles?

Most realistic negotiations are not well structured and therefore require an agenda setting stage prior to the issues stage. In the context of the current study, participants were required to identify multiple issues, generate options, and negotiate solutions. The design was also expected to test whether secondary benefits of EMS become important when the number of issues increase. Participants with a particular conflict handling style may be able to appropriate technology more effectively than participants with a different predisposition to conflict. Therefore, the value of electronic communication may vary depending on whether participants have collaborative versus competitive conflict handling styles.

## **2. Negotiation support systems: theory and research issues**

Research on bargaining suggests that face-to-face parties have difficulty in bargaining in ways that allow

Table 1  
Research findings

Study	Design	Results
[13]	Alternative preparation aids	Multiple forms of preparation lead to better outcomes
[19]	Electronic communication versus face-to-face	Face-to-face group achieved better outcomes
[16]	Integrated NSS versus face to-face	Generally better outcomes with NSS except negotiation time
	DSS component of NSS versus face-to-face	DSS generally provided better outcomes
[9]	Integrated NSS versus DSS versus face-to-face	DSS provides superior outcomes over face-to-face; no additional value added by electronic component except satisfaction
[31]	Face-to-face, e-mail, NSS (preparation), NSS (integrated)	Electronic communication adds little value over DSS

them to identify integrative tradeoffs and that this leads to inefficient outcomes and lost opportunities [27]. To address this problem, under negotiation analysis, efforts have been undertaken to search for tools to help negotiators achieve integrative outcomes.

Table 1, provides an overview of some of the prominent studies evaluating the performance of NSS. The categories shown involve evaluating: (1) the integrated NSS, (2) the DSS component alone, and (3) the EMS component alone. The performance is usually assessed on two aspects: outcomes (joint outcomes, balanced contracts, number of contracts proposed, negotiation time) and attitudes that measure the socio-emotional behavior of the negotiations (satisfaction, perception of process, etc.). Using a comprehensive NSS, Foroughi et al. compared the performance of NSS dyads with those without. Their results suggest that NSS dyads achieved higher joint outcomes and more balanced contracts compared to dyads without. However, NSS dyads needed more time to reach agreements. In a follow up study, Delaney et al. designed a series of tests to assess the relative value of each components of the NSS. They compared the performance of DSS with face to face groups to assess the value added by the DSS. Then, they compared the performance of DSS with an integrated NSS to assess the additional value generated by the EMS component. They found that the DSS generally outperformed the face-to-face group on outcome measures thereby providing evidence of the value added by the DSS component. There were, however, no significant differences in outcomes between the DSS and the comprehensive NSS, with the exception of higher number of offers with the DSS. Further, except for higher satisfaction with the integrated NSS, there were no significant differences

between the two types of computer support on attitude measures. Another study compared the performance of face-to-face, e-mail, NSS (preparation component only), and NSS (integrated) negotiating groups. Their results indicate that the electronic communication component alone provides little value-added. Their study indicated that the value provided by the preparation component is preserved and enhanced if computer communication is structured to make preparation inputs salient during negotiation. Along the same lines, [17] find that face-to-face negotiating groups outperform groups supported by electronic communication alone.

### 2.1. EMS component of NSS

Researchers have suggested several general principles to structure the negotiation process, such as: improved communication, generation of a wide range of alternatives before judging, separating personalities from the problem, providing a cooperative climate, following an organized and orderly process, and using objective criteria and data [5,13]. Most of the above principles can be implemented by the EMS component. It provides functions such as parallel communication, anonymity, group memory, and structured discussion and avoids production blocking caused by the need to speak sequentially [10,11]. The negative effects of production blocking include suppressing ideas, forgetting them, or precluding generating new options during the waiting period for an opportunity to contribute [24]. Group memory can reduce communication problems as well as help in recalling previously discussed issues. Anonymity helps in generating options by separating people from the problem.

The EMS component may help focus the attention of the negotiators on the content of the negotiation instead of any personal conflict. Unlike verbal communication, electronic communication requires no verbalization skills, allows higher capacity of information flow, and provides flexibility in terms of concurrent communication. Electronic communication results in an increase in perceived commitment of one party by the other. The build up of trust among opposing parties should result in speeding up of the negotiating process and bring about higher satisfaction in the result.

EMS, however, has its drawbacks compared to the face-to-face mode [21,34]. Typing is slower than speaking and lack of focus may occur since people type and read at different speeds [30] while group members may have to process a large number of comments in a short time. Electronic communication usually does not allow certain cues, such as tone of voice, inflection, eye movement, body language, and facial expressions.

Several researchers have suggested that the effectiveness of a communication medium for a given task depends on the degree of fit between the richness of information required for the task and that which can be transmitted by the technology [8,32]. Others have developed a framework linking different task types to media forms that vary in terms of the richness of information that can be transmitted. Using this they have argued that tasks requiring negotiation or conflict resolution require the transmission of maximally rich information, including not only facts but also values, attitudes, emotions, expectations, etc. Information richness is important for group performance involving tasks that make it difficult to reach a consensus.

Since EMS lag face-to-face environments in terms of information richness, we propose:

**Hypothesis 1.** *Face-to-face groups will experience greater satisfaction with the outcome and more favorable perceptions of the group process and effectiveness of communication than EMS groups in complex negotiation tasks.*

## 2.2. Conflict handling styles

The impact of NSS on conflict management remains a relatively unexplored area. An important

research issue that remains unaddressed is the effect of the predisposition to conflict of participants on negotiation outcomes in EMS versus face-to-face groups.

Research has suggested that EMS have the potential to impact conflict and negotiation behavior. For instance, Poole et al. identified the following seven distinct impacts of EMS on the conflict interaction processes; (1) exploration of alternatives (positive), (2) clarification of roles and procedures (positive), (3) use of voting (positive), (4) deemphasis of personal relations (positive), (5) equalization of participation (ambiguous), (6) reliance on written media (negative), and (7) greater expression of affect (negative). Not all effects are applicable to most negotiation settings; e.g., most negotiation tasks preclude the use of voting. Also some can be replicated easily in face-to-face settings. Further, these impacts are not automatic; they depend on the specific features of the EMS and how participants use the features.

Therefore, with proper planning and use, EMS can promote productive conflict. The evidence on whether EMS helps manage conflict productively is mixed. For instance, [25] suggested that its use leads to increased conflict among groups, but [22] reported that it can lower levels of both issue based and personality based conflicts.

One reason for the conflicting results may be because these studies did not consider the effect of predisposition of participants to conflict. Blake and Mouton [2,3] were one of the first to develop a classification for handling interpersonal conflict: forcing, withdrawing, smoothing, compromising, and confrontation. Subsequently, Thomas and Kilmann [31] developed an instrument that assess conflict handling style in five categories: collaborating, competing, accommodating, avoiding, and compromising. However, while the conceptual distinction between the five styles is clear, in practice, instruments attempting to measure them do not appear to distinguish well between them [33]. It appears that the participants tend to use a combination of styles when dealing with conflict situations. Therefore, researchers have often focused on styles that are clearly separable, such as competing versus collaborating.

The use of technology adds another dimension to the impact of conflict handling style on negotiation outcomes. Participants with different conflict handling

styles are likely to appropriate technology in different ways, leading to differences in outcomes. For instance, participants with competitive conflict handling styles may seek to explore a greater number of alternatives compared to participants with a compromising or avoiding style. Competitive groups will aggressively strive to appropriate technology as effectively as possible in searching for better solutions. Collaborative groups may not exert the same level of aggressiveness and intensity. Obtaining a superior solution should lead to increased satisfaction with the outcomes.

Therefore, we predict the following:

**Hypothesis 2.** *There is a relationship between conflict handling styles and negotiation outcomes.*

**Hypothesis 3.** *Negotiation outcomes for competitive EMS groups will be equivalent or superior to that of face-to-face competitive groups.*

**Hypothesis 4.** *Negotiation outcomes for collaborative EMS groups will be equivalent to or below that of collaborative face-to-face groups.*

### 3. Research methodology

#### 3.1. Research design

The subjects were undergraduate students who participated in the exercise as part of course requirements for a Conflict Resolution in Business class. Thirty participants received the face-to-face treatment while 24 used EMS for the negotiation. All the students were business majors in their senior year. The face-to-face group had 10 women and 20 men with the majority between the ages of 21 and 24 with only five reporting that they were 25 or over. By comparison, the EMS group numbered 24 students, 11 women and 13 men, with the majority also between the ages of 21 and 24, but six students over 25.

The Thomas–Kilmann type conflict MODE instrument was administered to all participants prior to the negotiation and assignment of treatments. This instrument measures an individual's preference for competing, collaborating, compromising, avoiding, and accommodating conflict styles. We focused on clearly

distinguishable styles such as competitive and collaborative. The distribution of styles in the face-to-face group was 10 competitive and 20 collaborative, while the EMS group had 10 competitive and 14 collaborative.

The research method used in the study was a  $2 \times 2$  factorial design. The first factor is type of negotiation support (EMS versus face-to-face). The second independent variable, conflict handling style (collaborative versus competitive) depended on participants predisposition to conflict. The conflict handling style was manipulated to the extent that negotiations took place between participants with the same conflict handling style.

This study used GroupSystems V, with a topic commentor feature to structure the negotiation process and provide the electronic communication channel. Groups in the manual condition negotiated face-to-face.

#### 3.2. Dependent variables

Lim and Benbasat have discussed the measurement of negotiation outcomes through time to settlement and satisfaction with the solution. Most NSS studies have used these measures or a variant such as perceived collaborative or negative climate, and satisfaction with the negotiation outcome.

In this study, satisfaction with outcomes was measured in part by the attitude of group members toward each other [7]. This includes such aspects as trust, openness, and participatory equality. The items in all three scales were selected from Chidambaram and the extensive literature on negotiation. Post negotiation participant attitudes were measured by a questionnaire using a 7 point Likert scale. These questions were factored into measures of effectiveness of communication, satisfaction with negotiation agreement and perception of group interaction process.

#### 3.3. Task

The negotiation case involved two plant managers in the same corporation: a parts manufacturing operation and an assembler unit. Issues included: the exact future rejection rate of manufactured units, the cost of repairing rejected units, responsibility for the physical repair of the units, and disposal of a backlog

Table 2  
Test of main effects<sup>a</sup>

Outcomes/main effects	Type (face-to-face versus EMS)	Conflict handling style (competitive versus collaborative)
Ease of communication	$F = 7.31$ ( $p = 0.0095$ )***	$F = 3.58$ ( $p = 0.0645$ )*
Satisfaction with outcome	$F = 1.88$ ( $p = 0.1767$ )	$F = 0.07$ (0.7868)
Perception of group process	$F = 3.49$ ( $p = 0.0681$ )*	$F = 0.02$ ( $p = 0.8975$ )

<sup>a</sup> \*\*\* – significant at the 1 per cent level; \* – significant at the 10 per cent level.

of defective units in the assembler plant. Both groups were asked to prepare for an interest based negotiation process by completing the following outline: (1) identify the issues (2) identify each side's real interests based on the case facts, (3) generate options, and (4) consider objective criteria for evaluating the options. The exercise was part of the course grade.

#### 4. Results

Table 2 provides the results of the ANOVA analysis for each of the three negotiation outcomes. The main effect for type of support (face-to-face versus EMS) is significant for effectiveness of communication and perception of group process and insignificant for satisfaction with outcomes. In Table 3, the means of the two groups and *t*-test for difference in means are shown. The negotiation outcomes for the face-to-face group are significantly higher than the EMS group for effectiveness of communication and perception of the group process. The two groups, however, do not differ significantly on satisfaction with outcomes. Therefore, Hypothesis 1 is essentially supported.

The ANOVA results for the main effect of conflict handling styles are somewhat weaker. The difference is not significant for satisfaction with outcomes or perception of the group process. However, the main effect of conflict handling style is significant for effectiveness of communication. In Table 3, it can be seen that the competitive group achieves higher outcomes in all three dimensions but the difference is statistically significant only for effectiveness of communication. Therefore, there is only weak support for Hypothesis 2.

Table 4 shows the means of the three outcome variables segmented across conflict handling style and type of support. For the competitive conflict handling style group, the differences are not statistically significant. The results therefore provide no support for Hypothesis 3. However, the results indicate there are significant differences between collaborative face-to-face and EMS groups. For instance, the collaborative face-to-face group has significantly higher mean levels on effectiveness of communication and perception of group process. There are no significant differences between the two groups on satisfaction with outcomes. Therefore, Hypothesis 4 is not proved.

Table 3  
Comparison of negotiation outcomes<sup>a</sup>

Negotiation outcomes	Face-to-face	EMS group	<i>t</i> -statistic
Effectiveness of communication	3.75	3.36	2.57***
Satisfaction with outcomes	4.34	4.13	1.39
Perception of group process	3.81	3.44	1.87*
Results with conflict handling style			
Negotiation outcomes	Competitive Style	Collaborative Style	<i>t</i> -statistic
Effectiveness of communication	3.78	3.48	1.65*
Satisfaction with outcomes	4.28	4.23	0.28
Perception of group process	3.66	3.63	0.1329

<sup>a</sup> \*\*\* – significant at the 1 per cent level; \* – significant at the 10 per cent level.

Table 4  
Comparison of effect of conflict handling style on negotiation outcomes<sup>a</sup>

Outcomes	Competitive		<i>t</i> -test	Collaborative		<i>t</i> -test
	Face-to-face	EMS		Face-to-face	EMS	
Ease of communication	3.86 (0.43)	3.66 (0.87)	0.54	3.69 (0.37)	3.26 (0.52)	2.86***
Satisfaction with outcome	4.35 (0.46)	4.16 (0.61)	0.64	4.34 (0.56)	4.12 (0.57)	1.17
Perceptions of group process	3.77 (0.49)	3.5 (0.88)	0.70	3.82 (0.69)	3.42 (0.72)	1.70*

<sup>a</sup> \*\*\* – significant at the 1 per cent level; \* – significant at the 10 per cent level; numbers reported are means (standard deviation).

## 5. Conclusions

Previous research has indicated that NSS groups outperform face-to-face groups. However, results suggest that most of the benefits are derived from the DSS component of the NSS. The electronic communication component adds little additional value. However, these studies do not factor the effects of task complexity or conflict handling style. The reported study adds to the body of knowledge by evaluating the benefits of the electronic component of NSS when taking into consideration task complexity and conflict handling style of negotiators.

The results provide some interesting new insights. Negotiation outcomes are influenced by type of support, with the face-to-face group outperforming the EMS group on dimensions such as effectiveness of communication and perception of the group process. The two groups are equivalent on satisfaction with outcomes. Therefore, the face-to-face group achieves better outcomes compared to the EMS group. However, the results indicate that the superior performance of the face-to-face group is due to collaborative conflict handling style participants. In the case of competitive conflict handling style, the face-to-face support provides no additional benefits. Therefore, competitive conflict handling style participants are in a position to exploit the inherent advantages of EMS systems.

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