ONLINE NEGOTIATION IN ELECTRONIC COMMERCE

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ABSTRACT

With the rapid growth of electronic commerce, there is a great demand and potential for online negotiation. We have developed a Web-based Negotiation System (WebNS) and conducted three experiments to test its effectiveness and user acceptance. The first experiment was used to do the comparison between web-based negotiation and face-to-face meeting. The second experiment was used to test the effectiveness and acceptance of online mediation. The third experiment was used to test the impact of using different communication media in negotiation. The test results have shown some advantages and disadvantages of online negotiation and the system is well accepted by the users. We believe that with the continuous effort on improving the technology and service, online negotiation will finally become the reality.

1. INTRODUCTION

The rapid growth of Internet and World Wide Web technology has created a great opportunity for conducting business activities electronically. Customers can search for product information on the Web and make on-line purchases. However, the price or terms for goods and services are usually pre-specified by the seller or determined by well-defined procedures such as on-line auction. No negotiation is allowed or facilitated. When electronic commerce becomes more sophisticated, it should be able to handle complex, mutually determined deals or contracts electronically (such as negotiating a real estate purchase agreement between the buyer and seller or signing a supply contract between two companies). It was estimated that a Fortune 1000 company is managing anywhere between 20,000 and 40,000 total contracts a year. The market for contract management software may reach $3.1 billion by 2005. The demand for negotiation also comes from the need for dispute resolution. When more and more businesses are moving onto the Internet, disputes also increase in the cyberspace. While online auctions have attracted many customers, many disputes occur between bidders and sellers. Commercial complaints may involve billing, order fulfillment, breach of contract, content, privacy and other issues, through the Internet overcoming geographical distances and jurisdiction. Today, government agencies, consumer groups and industry associations are demanding that e-businesses provide online dispute resolution services to ensure consumers have a quick and affordable way to resolve their complaints. The Federal Trade Commission is also promoting online mediation services, as lawsuits or arbitration in court are too expensive and not practical to resolve online disputes [Dennehy, 2000]. It is natural that when businesses are conducted remotely and electronically, negotiation and mediation for contracting and dispute resolution should also be carried out remotely and electronically. Due to the convenience and cost saving, even traditional arbitration services are moving to online [Thompson,2000]

Negotiations are usually carried out in the form of face-to-face meeting. When negotiation has to be conducted from remote sites, two parties may communicate with each other through phone calls, fax, e-mail, or video conferencing. Phone calls and video conferencing provide real-time interaction but do not support coordination on detailed documents. Fax, email and file transfer can be used to exchange documents but lack of real-time interaction. To support on-line negotiation, both real-time interaction and document exchange are needed. Recently several real-time Internet collaboration software products, such as Netscape Conference, Microsoft NetMeeting and VocalTec's Internet Conference Professional, have been developed. These products use whiteboards, application sharing, chart, and file transfer to facilitate collaboration over the Internet [Ozer, 1998]. However, they may be used but not specifically designed to support remote contracting and negotiation.

As one branch of Group Decision Support Systems, many Negotiation Support Systems (NSS) have been developed for decades. They can be classified into two categories: solution-driven NSS and process support NSS [Lim and Benbasat, 1993]. A solution-driven NSS provides solution alternatives or suggests possible agreements to the negotiating parties. These suggestions are derived from a number of different models such as Social Judgment Theory Models, Hypergame Decision Models, Bargaining Models, Multi-objective Linear Programming, and Expert Systems. A process support NSS does not provide any suggested solutions. It is designed to support the process of negotiation, from the preparation stage to the contract signing stage. A process support NSS addresses two dimensions that a solution-driven NSS does not: enriched communication channels and co-operative work [Carmel et al. 1993]. In the past, most NSS were solution-driven and were implemented in a meeting room environment. They did not support remote negotiation in a Web environment. When negotiation is conducted remotely through the Internet, many issues may occur, such as the remote coordination between negotiation parties, the constraints of communication channels, and the security and privacy issues. For the success of remote negotiation, these issues have to be addressed and carefully studied.

Recently, the Internet Negotiation Support System (INSS) was developed at Carleton University, Canada. [Kersten and Noronha 1999]. The system contains a facility for specification and assessment of preferences, internal messaging system, and graphical displays of the negotiation progress. This system can be categorized as a solution-driven NSS. It provides a method to construct a negotiator's utility functions for evaluating proposals. It also provides suggestions or solution alternatives in the sense of Pareto optimization. Since it uses a rather simple communication channel, INSS does not provide full process support for negotiators to organize and negotiate complex issues.

In this paper, a Web-based negotiation support system (WebNS) is introduced. The system is intended to provide full process support in a Web environment. Using WebNS, we want to test 1) the effectiveness and user acceptance of online negotiation in comparison with face-to-face negotiation, 2) the effectiveness of online mediation and 3) the impact of using different communication media in negotiation. The paper is organized as the following: the basic objectives and the functions of WebNS will be discussed in section 2. The hypotheses and experiments design will be discussed in section 4, the test results will be discussed in section 4, and the conclusion will be discussed in section 5.

2. THE OBJECTIVES AND FUNCTIONS OF WEBNS

We design WebNS with the following objectives:

1) Easy access through the Web. Parties from anywhere in the world should be able to negotiate with each other by accessing WebNS through an Internet web browser.
2) Multiparty communication and interaction. Negotiation parties should be able to communicate with each other in real-time and interact in a variety of ways such as hot-line co-ordination, public or private message exchange, and working on common documents.
3) Multimedia communication. Negotiators should be able to use video, audio, and text to communicate with each other as they wish.
4) Structured negotiation process. Negotiation should be organized in a well-structured process including preparation, setting agenda, issue discussion, and making the final agreement.
5) Automatic documentation. The entire negotiation process should be automatically documented. Negotiators should be able to review any issues that have been discussed and any agreements that have been reached.
6) Security and privacy. The negotiation information should be saved at the trusted third party. The information access should be restricted to the authorized user. All information that has been exchanged cannot be altered by anyone. The system should be able to recover from system or communication failure.

Based on the above objectives, the WebNS is constructed in the following way.

1) WebNS is written in JAVA and implemented in a Client/Server environment. WebNS is installed on a Web server and can be accessed through a web browser from a client computer. User registration and session registration are required for access WebNS. After user logon and session logon, the WebNS server will automatically download the WebNS client part (as JAVA applets) to the client sides and the parties can start negotiation right away.
2) A Hot Line dialogue window is created immediately after logon to facilitate public co-ordination among the negotiation parties and the mediator. Hot Line allows all parties to send and receive short messages in order to co-ordinate with each other, e.g. start negotiation or change issues for discussion. A Consulting window is created to facilitate private communication between mediator and each negotiator. Multi-media communication (Internet video and audio) is available for pair-wise communication between two negotiators or between a negotiator and a mediator.
3) The main menu of WebNS consists of three parts: Pre-Session, Session, and Help. The Pre-Session part supports the negotiation preparations including setting up negotiation items and preparing notes that can be used during the negotiation. The Session part consists of general discussion, issue discussion and completing the agreement that support a structured negotiation process. The Help part provides on-line help.
4) The Final agreement window can be used for exchanging proposal and counterproposal, editing, signing, and posting the final agreement.
5) During the negotiation process, all the messages exchanged are saved automatically in a database at the WebNS server site. With a registered user name and password, a user can view all the negotiation documents shown in corresponding windows but cannot make any changes to existing contents.
6) All the negotiation documents are saved at the server site rather than at the client site. The negotiation service may be provided by a third party trustee organization. A negotiation process may be interrupted due to communication failure, but it can be resumed without the loss of data because all data are saved at the server site.

FIGURE 1. MULTI-MEDIA COMMUNICATION AND SESSION LOGON.

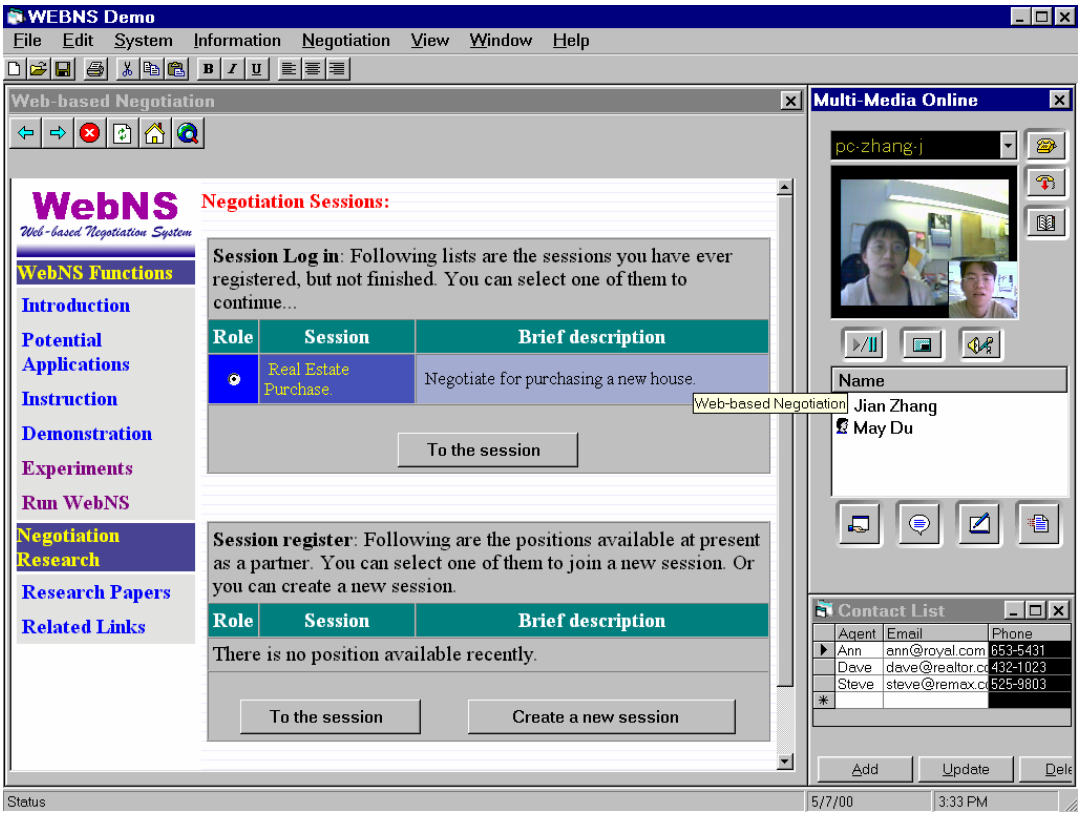
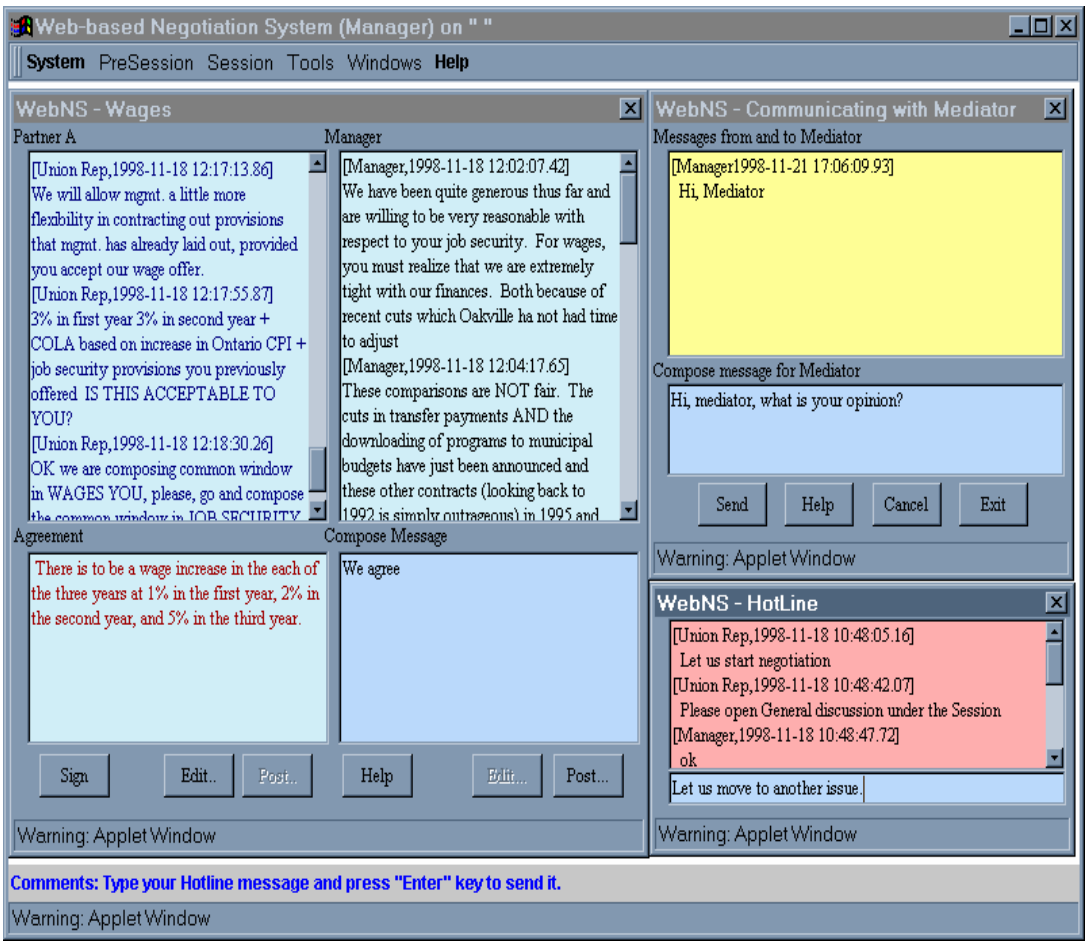


FIGURE 2. ISSUE DISCUSSION AND MEDIATION



3. HYPOTHESES AND EXPERIMENTAL DESIGN

For the web-based negotiation, we made the following hypotheses:

1) In comparison with face-to-face meeting, Web-based online negotiation is a valid alternative for remote negotiation.
2) Parallel communication channels provide effective online mediation
3) The use of video and audio will be more effective than text-only negotiation

To test these three hypotheses, we designed three experiments.

In the first experiment, a simulated case of labor union and management negotiation was used to do the comparison between web-based negotiation and face-to-face negotiation. Total 66 commerce students participated in the experiment. They were divided into 22 teams. Each team consisted of 3 members, acting as the union representatives or the management. There were 11 negotiation sessions, each had one union team negotiated with one management team. The negotiation was carried out in sequential two runs. In the first run, 6 sessions used Web-based negotiation and 5 sessions used face-to-face meeting. In the second run, the teams switched their role as union or manager and also switched the method of Web-based or face-to-face. The negotiation task was very complex and involved multiple issues. It was a big challenge to the capability of web-based negotiation. After finishing two negotiations, questions were asked for their comments and preferences.

In the second experiment a simulated case of van repair dispute was used to test the effectiveness of online mediation. Total 42 commerce students participated in the experiment. They were divided to participate in 14 sessions. In each session, one acted as a costumer, one acted as the service manager of a car manufacturer, and one acted as a mediator to help resolve dispute online. The main issue was how much should the company pay for the repair caused by the defective design but with expired warrantee. After finishing the negotiation, questions were asked for their comments as a negotiator or mediator.

In the third experiment, a simulated case of house purchasing negotiation between a house owner and a buyer was used to test the impact of different multimedia communication in web-based negotiation. Total 120 MBA students participated in the experiment. They were randomly assigned to negotiate twice with different people in two different settings. for media comparison: 1) Text (T) vs. Text with Audio (TA) (40 students), 2) Text (T) vs. Text with Video and Audio (TAV) (40 students), 3) Text with Audio (TA) vs. Text with Video and Audio (TVA) (40 students). After finishing two negotiations, questions were asked for their comments and preferences.

4. TEST RESULTS

Questionnaires were designed for each experiment and collected right after completing the negotiation. We briefly list the major findings for each experiment.

4.1. Test results of experiment 1: online negotiation vs. face-to-face meeting

CBSS, an early version of WebNS was used for this experiment. The data were collected from 66 subjects after 22 experimental negotiation sessions. Responses for each question in questionnaire was measured in scale of 1 to 5, from strong disagree (1), disagree (2), neutral (3), agree (4) to strong agree (5). All the following questions had the median score greater or less than 3 at the significant level $p = 0.001$.

TABLE 1. RESPONSES FOR CBSS VS. FTF

Questions	**Median**
CBSS made the negotiation process easy to organize	3.5
CBSS is user-friendly computer software	4
CBSS may be used for real bargaining situations	4
I prefer to use CBSS if an FTF meeting is not possible	4
The process with CBSS was more efficient in time usage than the FTF process	2

People commented that CBSS allowed private team discussion and consulting during negotiation. It made the negotiation less emotional and more problem focus, and the automatic documentation helped for easy tracing the negotiation progress, and The biggest drawback of CBSS was slow response due to the needs for reading, thinking, and typing. For details, please refer to [Yuan et al. 1998]

4.2. Test results of experiment 2: online mediation

The data for experiment 2 were collected from 28 negotiators (n) and 14 mediators (m) after running 14 dispute resolution sessions. Responses for each question in questionnaire was measure in scale of 1 to 5, from strong disagree (1), disagree (2), neutral (3), agree (4) to strong agree (5). All the following questions had the mean score greater than 3 at the significant level $p = 0.05$.

TABLE 2. RESPONSES FOR ONLINE MEDIATION

Questions	**Negotiator**	**Mediator**
The mediator was acceptable and trustworthy during the negotiation.	3.857	3.929
The mediator helped me to increase trust to the other party.	3.643	3.857
The mediator resolved inter-personal conflicts.	3.571	4.000

The mediator improved the level of objectivity in our negotiation by reducing hostility and encouraging more rational and cooperative discussions.	3.964	4.071
The mediator made significant contributions to the final settlement.	3.393	3.929
I am satisfied with the final settlement.	4.357	4.286
WebNS enables effective private consulting during the negotiation process.	4.548	
WebNS can be used in a real world negotiation.	4.071	

With the use of multiple channel communication, online mediation provided real-time consulting, which would be difficult to do in a setting of face-to-face negotiation. People commented that: "The mediator helps to clarify and advise the negotiator very quickly, and has the ability to discuss the matter with the other negotiator which makes it helpful. They also can see what is happening in the negotiation and can help with the direction it is taking." For details, please refer to [Yuan et al. 2001]

4.3. Test results of experiment 3: multimedia negotiation

The data was collected from 120 subjects after running 120 negotiation sessions. 40 sessions are used for each pair-wise comparison of different media. Responses for each question in questionnaire were measure in scale of 1 to 7, from strong disagree (1), neutral (4), to strong agree (7). The two means were listed for three pair-wise comparisons: Text vs. Text and Audio, Text vs. Text with Video & Audio, and Text with Audio vs. Text with Video & Audio. The symbol * indicated significant differences at 0.05.

TABLE 3. MULTIMEDIA NEGOTIATION COMPARISON

Questions	**Text vs. Text with Audio**		**Text vs. Text with Audio and Video**		**Text with Audio vs. Text with Audio and Video**	
	M(T)	**M(TA)**	**M(T)**	**M(TAV)**	**M(TA)**	**M(TAV)**
Easy to remember information	5.683	5.585	5.791*	5.279	5.698	5.651
Quick response	3.952	6.048*	4.244	5.902*	5.814	5.720
Clear information exchange	5.195	5.610	5.463	5.415	5.568	5.409
Distract attention from problem focus	3.395	4.116*	3.220	4.585*	2.930	4.000*
Helps me to reach a better solution	3.884	4.860*	4.310	5.190*	5.043	4.863
Helps to improve mutual understanding and acceptance	3.805	5.463*	3.949	5.564*	4.882	4.823
Provides extra power to influence the opposite party	3.605	5.093*	3.628	5.070*	4.818	4.750
Gives me extra power to express myself	4.140	5.400*	4.000	5.628*	5.090	5.114
Give the opposite party more persuasive power over me	3.093	4.186*	3.610	4.366*	3.295	3.773*

People preferred video and/or audio over text but there was less gain by video over audio. They commented that: "Text is too slow", "I enjoyed being able to gain information via tone and body language", "The video is too choppy, and unclear", "I did not find that having the video really made much difference."

5. CONCLUSION

In this paper, we analyzed the needs for online negotiation in electronic commerce. We have successfully developed a Web-based negotiation system and conducted three experiments. The experiments have shown

that Web-based negotiation system provided organized negotiation process. It helped to make negotiation less emotional and more problem focus. The automatic documentation made it easy to trace the progress during negotiation and the text typing interaction made it possible for a team to have internal private discuss before response. The parallel multi-channel communication made it possible to have real-time private consulting during the negotiation, and the mediation activities worked well in the web environment. During negotiation, text-based communication was slow. Adding video or audio significantly improved the response speed. It helped to provide extra expression and influence power, and to improve mutual understanding and acceptance. As the results, it was perceived to help to reach a better result. It is interesting to see that the video did not do add too much advantages than audio. For clear information exchange and easy to remember information, adding video or audio to text did not make differences. Adding video and audio also had certain negative impact in terms of distract attention from problem focus. In general we found that the WebNS was well accepted and most people thought it could be used for real world business applications. Finally we want to point out that there are many issues such as trust, security, and privacy for web-based negotiation need to be studied.

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