Negotiation via the World Wide Web: A Cross-cultural Study of Decision Making [*]

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Abstract: INSPIRE is a Web-based system for the support and conduct of negotiations. The primary uses of the system are training and research. Between July 1996 and April 1997, 281 bilateral negotiations were conducted through the system by managers, engineers and students from over 50 countries. INSPIRE has been used at eight universities and training centers. In research it is being used to study cross-cultural differences in decision making and the use of computer support in negotiation. This paper outlines the system, the negotiation methodology embedded in it, and reports the initial results of the experimental study of the impact of culture on Web-based bilateral negotiation.

Keywords: negotiation, international negotiation, cross-cultural study, Internet, World Wide Web, decision support, negotiation support, preferences.

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1. Introduction

1.1 Negotiation and technology

Computing and communication technologies introduce new and exciting ways of *making decisions*, engaging in *social processes*, and also conducting *research experiments*. These three broad activities are the main focus of the *InterNeg* project, and this paper reports the project's results.

The use and application of computer and communication technologies plays two important roles here. One is related to the development of INSPIRE, the first Web-based decision and negotiation support system and also other systems used for negotiation support and evaluation, and for data collection and analysis (Kersten and Noronha 1997). The second role pertains to the use of INSPIRE for cross-cultural negotiations. The technology allows the users to employ techniques for the analysis of decision and negotiation and to conduct negotiation over time and space.

We study decision making in different social settings and, in particular, negotiation, with the perspective of the cultural and technological impact on the process and outcomes. As far as we know, this research is the first of its kind in the sense that for the first time a Web-based negotiation support system has been developed and used by many people, and from many countries, who have engaged in bilateral negotiations. We are interested in the cultural differences, and in this way build on studies done by (Adler and Graham 1989; Hofstede 1989; Graham, Mintu et al. 1994); and others. We are also interested in the use of different supporting technologies in negotiation. There is little evidence that computer-based support is being used in traditional business negotiation. There is, however, increasing evidence that such support is being used in international business where the Web is used for business transactions and communication (see, for example, http://bf.cstar.ac.com/bf, http://www.jango.com and http://www.personalogic.com). Electronic commerce, broadband and media rich communication channels on one hand, and new system development technologies on the other, provide new opportunities for negotiations.

The study and experiments are part of the InterNeg project that involves:

1. construction of InterNeg, a Web site "for and about negotiation," at `http://interneg.carleton.ca` and `http://www.interneg.org`,
2. development decision and negotiation support methods and systems,
3. use of existing and the development of new 'auxiliary' systems for data processing, storage and analysis of negotiation records, exchange of multimedia type transactions,
4. preparation of teaching and training tools and materials,
5. research on the use of the computer and communication technologies in negotiation,
6. research on the difference in negotiation styles that result from the differences in culture, education, age, sex, etc., and
7. a study of the negotiations between humans and humans with systems.

Two systems are currently available in InterNeg: INSPIRE and INSS. In this paper we concentrate on the use of the INSPIRE system which has been specifically developed to study negotiation processes and negotiators' behavior. This system allows for a large scale systematic study of cultural differences in negotiation, which were previously nonexistent.

INSPIRE experiments are still being conducted and we expect that the number of participants will significantly increase in the future. For now, although people from many countries used the system, most countries are represented by only a few negotiators. We are also continuing work on the software that processes negotiation records which are automatically generated during negotiations. All these reasons contribute to our reluctance to present results in the typical form of hypothesis and proofs. Instead, we present here summarized data and point out what we think are interesting and worth further studying phenomena. Although the paper reports on an ongoing research program we hope that the uniqueness of the study and the results already collected justify it. Another purpose is to present negotiation experiment that differs from other experiments. There are key differences between this study and other studies include:

- the use of computer and communication technologies to observe the process of negotiation in a controlled setting,
- negotiations can be conducted anonymously thus the cultural bias may be reduced,
- negotiators have access to decision and negotiation support tools,
- the negotiation case allows for specification of subjective preferences among issues and options, and
- negotiations may be conducted over several weeks with or without imposed deadlines.

The paper has 5 more sections. In the rest of this section an overview of earlier studies and their results are given. The methodology underlying negotiations via INSPIRE is presented in Section 2 and the system itself is outlined in Section 3. The type of data generated by the INSPIRE negotiations and programs that are used to process it are discussed in Section 4. Section 5 presents results of 281 bilateral negotiations and focuses on the characteristics of negotiators from five countries. Discussion of the results and future work conclude the paper.

1.2 Negotiations and culture

There are four main types of studies of negotiation and culture: questionnaires, experiments, case studies, and experts' opinions. The first type of study involves the analysis of usually a large number of questionnaires asking people about their perceptions, reactions to simple situations, values, and opinions. The best known study has been done by Hofstede and included 116,000 questionnaires focusing on the set of values of employees of IBM in 72 countries (Hofstede 1989). In his analysis, Hofstede found four main culture-defining dimensions, namely, power distance, individualism, masculinity, and uncertainty avoidance.

The second type involves the conduct of the same experiments in several countries, typically among university students and participants of executive courses. Questionnaires are also used in this type of study, but they pertain to the subjects' perceptions of the game and the outcomes. Several well known experiments of this kind were conducted and reported (Graham 1985; Adler and Graham 1989; Hofstede 1989; Adler, Brahm et al. 1992; Graham, Mintu et al. 1994) (missing one more and

important). The experiments are short and take an hour or two. Often Kelley's negotiation simulation is used (Kelley 1966). The simulation involves bargaining for prices of three commodities and lasts no more than one hour; thus it is suitable for a classroom environment. It has often been used in the analysis of bargaining and its outcomes (Kelley 1966; Pruitt 1981; Graham, Mintu et al. 1994).

Case studies involve the observation and analysis of real-life cases of international negotiations that take weeks or months to complete. Examples here include the now classical discussion of cross-cultural negotiations (Gulliver 1979), several works about the Law of the See negotiation (see, for example, (Walker 1990), the Cuban missile crises, Camp David negotiations (Raiffa 1982), and so on. The case method is advocated by the Project on International Negotiations (PIN) whose members collected and published many cases (see for example, (Faure and Rubin 1993; Spector, Sjosted et al. 1994).

The forth type involves negotiators' retrospections, information and experiences contained in their own writings (Fisher 1980; Cohen 1991). Definitely much can be learned from the analysis of experts' opinions and experiences. However, those negotiations being conducted on the state and powerful organization levels are atypical and involve very high stakes. Moreover, opinions are provided by highly trained professional negotiators and diplomats who have their own trans-national and distinct culture (Cohen, Jaffray et al. 1987; Walker 1990).

Until recently it was only the second and third type of study that allow for the analysis and assessment of negotiations typical for real-life negotiations. For practical reasons, the experiments did not involve negotiations that extend beyond one or two hours. Therefore, negotiation problems and cases had to be simple. Another characteristic of these experiments is the subjects' knowledge of each other and their close proximity. Further, the subjects were usually from the same culture and negotiations did not involve any cross-cultural communication.

Cultural studies were done on the basis of negotiations conducted in culture *X* with those conducted in culture *Y* (Graham, Mintu et al. 1994). Thus, very little can be said about international and cross-cultural negotiations. An exception is the study in which the intra-cultural negotiations are compared with cross-cultural. This cross-cultural

experiment involved 30 face-to-face negotiations between Americans and Japanese and 26 between Anglophone and Francophone Canadians (Adler and Graham 1989).

Experimental studies make it possible to analyze, assess and possibly measure specific mechanisms and methods used in the process, as well as attitudes and perceptions of the subjects. This is achieved at a cost of a highly stylized and unrealistic negotiation process and its setting. Another difference between the traditional experiments and other studies is in the importance of negotiations. Experiments typically deal with fairly common negotiations, not critical to a country, organization or an individual. Other studies often focus on negotiations involving politicians and experts.

The changes that societies, groups, and individuals face alike result from the relative shrinking of the world, the globalization of economies, internationalization of medium and even small companies, and -- most importantly -- an unprecedented in the scope and richness of communication among people from every corner of the world. Some corner stores may now be thousands of miles away from the buyer and yet retain the "corner store feeling", though now this store becomes virtual. This has an obvious impact on the conduct of bargaining and negotiation. Deals can be made by people who do not know and see each other.

1.3 Previous results

There have been many studies of international, cross- and intra-cultural negotiations. We mention here a few which are either of the same type as this study, or of direct significance to the results presented.

An interesting study involved an examination of the bargaining behavior of children from India, Argentina and the US which found--among others--that Indian bargainers were more competitive than Americans and Argentineans (Druckman 1976). This observation, though with respect to professionals and more complex negotiation, has been confirmed by our study.

Graham observed that negotiators change their behavior significantly depending on whether they are engaged in cross-cultural or intra-cultural negotiations (Graham 1985). Another study reported that Americans were more satisfied, Japanese achieved

lower profits and higher interpersonal attraction, French Canadians were more cooperative, and English Canadians achieved lower profit and spent more time negotiating in their cross-cultural than intra-cultural negotiations (Adler and Graham 1989).

An intra-cultural study involved a series of experiments with students from four countries, Israel, Japan, former Yugoslavia, and the US (Roth, Prasnikar et al. 1991). Negotiations were of the pure bargaining type with one issue being the price. The results suggest that there are statistically significant cultural differences in the size of offers (low-high), percentage of rejected offers and thus in Pareto-inefficient outcomes.[1] Further, they found that the between-country differences in the outcomes became smaller as the bargainers gained experience.

Negotiations involve communication. Yet most studies concentrate on reported perceptions of negotiation processes and outcomes in questionnaires and worksheets and ignore the vital role of communication (e.g., (Ting-Toomey and Gao 1991; Drake 1995). Communication through INSPIRE is conducted with pre-formatted offers and with free-text messages. The results presented in this paper not only confirm that "Culture influences negotiation through its effects on communication" (Elgstrom 1990), but also suggest a broader, than communication, scope of these influences.

Experiments with Taiwanese and American subjects, in which the communication in bargaining situations was analyzed, showed a significant difference between negotiators' perceptions and actual interaction patterns (Drake 1995). Drake observes that despite cultural differences, the same cultural differences may not emerge in face-to-face interactions with negotiators from different cultures. If this is the case then the INSPIRE negotiation may allow one to observe what cultural differences, and in which circumstances, emerge in anonymous negotiation. It may also provide information whether negotiators significantly change their behavior when moving from intra- to cross-cultural negotiations (Graham 1985).

[1] The negotiation outcome was not Pareto-optimal (inefficient) if the negotiation broke (i.e., no party achieved any profit) but there were alternatives yielding positive profit values for both parties.

2. Negotiation with INSPIRE: Methodology

2.1 The case

The negotiation problem involves two companies: Itex Manufacturing, a producer of bicycle parts and Cypress Cycles that builds bicycles. In writing the case an effort has been made to make it as much as possible 'culture neutral' [2]. That is an effort has been made to exclude any names that are indicative to a specific culture and provide a negotiation situation that may be encountered anywhere. Subjects (INSPIRE users) are asked to negotiate on behalf of the company rather than for themselves. Furthermore, the case describes a negotiation problem with which users from almost any country are familiar and therefore no additional explanations are necessary. As the users' language proficiency might be low the case is fairly simple and well structured. The case description fits one and a half pages.

Cypress Cycles, an established manufacturer of high quality mountain bikes, is launching a new line of bikes and requires a type of component that its current suppliers cannot provide. Their first serious discussions for the supply of these components are being held with Itex Manufacturing. Itex is seeking to increase its share of the component market and would like to have the prestige that would come with supplying Cypress, should a profitable contract be concluded. There are *four issues* that both sides have to discuss. The issues are: the price of the components, delivery times, payment arrangements, and terms for the return of defective parts. The negotiators are not given the issue priorities thus they have to decide if, say, the price is more important than the delivery time. They also have to determine the specific trade-off values between issues.

For each issue there is a set of options, i.e., issue values. Altogether, there are 180 complete and different potential offers (alternatives) that contain all four issues. All the issues and their options are given in Fig. 1. This figure depicts one of the Web pages that are used to formulate offer utility values.

[2] The Itex-Cypress case was written by Dr. David Cray, School of Business, Carleton University.

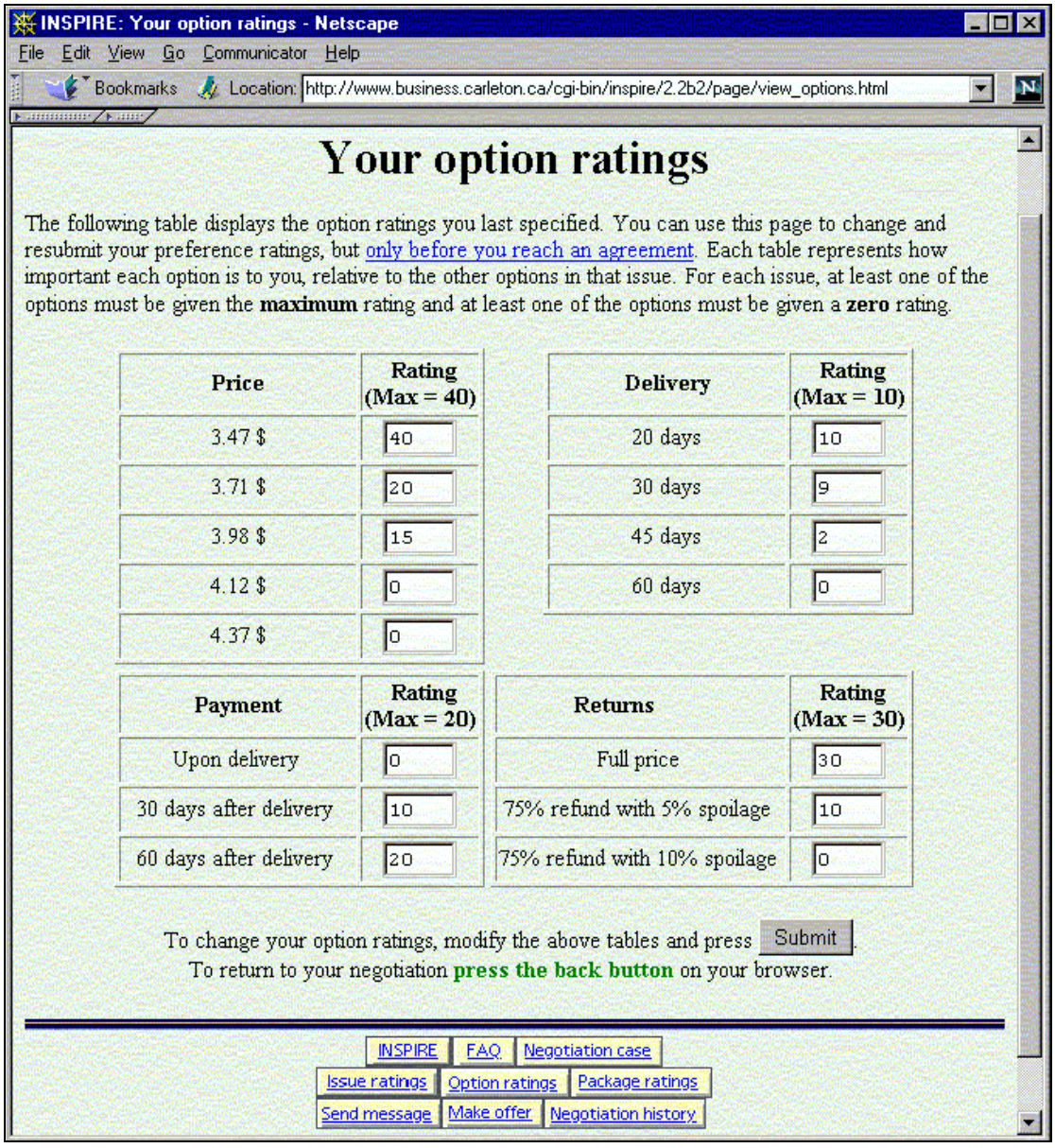

Figure 1. Issues and options in Cypress-Itex negotiations.

Both parties are presented with their side of the case, told that they are to represent Itex and Cypress respectively, and that their companies are interested in achieving a compromise. However, they are also informed that there are other suppliers and buyers so that a breakdown in negotiations is possible if they cannot reach a good deal. There is no further specification as to what indicates a good deal.

Each side is given a clear indication as to the desirability of the options (issue values) but only in a sense of the direction and not specific trade-off values. It is stated in the Itex's case description that a higher price is better for Itex, the seller. Similar

indications are given with respect to other issues. An example of the wording for the issue Returns, which describes the return policy of defective parts, is given below.

Returns
1. Full price on all returned parts. Parts returned at Cypress' option. Itex pays shipping on all returned goods 75% refund. 2. Five percent spoilage allowed. If more than five percent of a shipment is unacceptable the whole shipment is returned for a 75% refund. 3. Ten percent spoilage allowed. If more than 10% of a shipment is unacceptable the whole shipment is returned for a 75% refund.
Number 1 is the *most preferred* and number 3 the *least preferred* by Cypress.

Specification of the preference direction and not value allows negotiators to establish their own priorities within each issue. Furthermore, the negotiators' partial utilities (part-worths) may be linear as well as non-linear. In Fig. 1, the non-linear case is indicated with respect to options Price and Delivery; user's preferences are identical for price of $4.37 and $4.12. With respect to the delivery issue, user's preferences differ only slightly between the first and second options and also between the third and the fourth options but there is a significant jump in preferences between the second and third options.

There is no mechanism enforcing the preference direction and therefore some negotiators did not follow the preference direction literally. Rather, they assigned the maximum partial utility to one of the intermediate and not extreme options. For example, a Cypres' representative might have assigned a higher partial utility to the second option of the Return issue and not to the first option.

2.2 Negotiation process

The literature suggests three sequential phases in studying business negotiations: an *antecedent phase*, a *concurrent phase*, and a *consequent phase* (Graham, Mintu et al.

1994). These three phases roughly correspond to three phases of the negotiation: *pre-negotiation analysis*, *conduct of negotiation*, and *post-settlement analysis*.

The pre-negotiation phase involves an analysis of the situation, problem and opponent, formulation of preferences, reservation levels, BATNA, and strategy. Data on the negotiation problem, negotiators' characteristics, including their preferences, and situational constraints are considered within the antecedent phase (Rubin and Brown 1975). In the INSPIRE negotiation two main instruments are used to collect the data:

1. forms used to elicit preferences and construct negotiator's utility function, and
2. pre-negotiation questionnaire which every negotiator has to fill in after her/his utility function has been constructed and before negotiation can begin.

The conduct of the negotiation phase involves exchanges of messages and offers. Offers comprise the negotiated issues and their values, e.g., one of the three values of the returns policy given above. The negotiation is not sequential but parallel; an offer comprises all the negotiated issues. Participants may submit the same offer many times, or keep the option of an issue unchanged, but each submitted offer contains an option for each issue.[3]

The negotiation ends when a compromise has been achieved or one of the parties terminates the process and informs their opponent. The concurrent research phase corresponds to the conduct of the negotiation and it comprises process-related variables, such as the strategies and behaviors used by negotiators (Graham 1985), changes in the negotiation problem and negotiators' perceptions, and the dynamics of negotiations (Kersten 1985; Graham, Mintu et al. 1994).

The post-settlement analysis phase may be static and involve only the evaluation of the negotiation outcomes generated by, and after, the negotiation activity (Tung 1988). These outcomes include the information about the compromise and the negotiators' satisfaction. The analysis thus focuses on the evaluation of variables

describing outcomes. However, if the negotiation allows for the analysis and improvement of the compromise efficiency then the post-settlement phase may also involve continuation of negotiation in order to improve the compromise. The INSPIRE users have the possibility to improve inefficient compromises.

The post-settlement phase ends with filling in the post-negotiation questionnaire which, however, is not mandatory. A user may log out from the system or -- upon filling in the questionnaire -- is directed to multiple negotiation resources, handouts, systems which are available on the InterNeg site, but about which users are not informed during negotiation.

2.3 Users

We assume that users posses basic knowledge of English and are able to use Netscape. The system has been used, among others, by three groups of English as a Second Language (ESL) students, and they did not experience difficulties understanding the case. ESL students at Carleton University, some with no computer exposure, were given one hour hands-on tutorial and were guided during their first session with INSPIRE. They had no difficulties in using the system in the subsequent sessions.

The participants do not get any financial reward. Many of the participants used INSPIRE as part of their course, however, none of those considered here were evaluated (marked) on the basis of their performance. The experimenters did not inform instructors about the compromise or the score the participants achieved.

3. INSPIRE

INSPIRE is a support system based on analytical models rooted in decision and negotiation analysis (Raiffa 1982; Kersten 1985; Kersten and Szapiro 1986; Lax and Sebenius 1986; Sebenius 1992; Shell 1995; Rangaswamy and Shell 1997). The

[3] The INSS system allows for sequential negotiation as well as the specification of new issues and options by the negotiator and during the negotiation conduct phase. It also allows for the formulation of BATNA and reservation prices.

system and its architecture have been described in detail elsewhere (Kersten and Noronha 1997). A short outline follows.

There are four main support functions in INSPIRE. One function allows the user to construct a utility function that is used to evaluate her own and her opponent's offers. The second is to present negotiation dynamics in a graph on which all offers and counteroffers are plotted. The third function is to record all messages and offers and create a negotiation history. The forth function allows to verify the Pareto-optimality of the compromise (if achieved) and, if a Pareto non-optimal compromise is achieved it is used to provide negotiators with Pareto-improvements that they may consider in the post-settlement stage.

3.1 Representing preferences

INSPIRE represents the value of negotiation-related constructs--issues, options, and offers (packages)--to each negotiator by means of utility functions. This representation forms the basis of a scoring scheme that enables negotiators to make easy comparisons between offers and counteroffers and allows them to judge the significance of a concession. The system constructs a utility function for each negotiator.

The technique currently implemented for the construction of utility functions is based on conjoint analysis, in which the utility of a given package is determined from the user's preference orderings over a set of factorially designed packages, (Green and Wind 1973; Green 1974; Rangaswamy and Shell 1997). A hybrid (compositional as well as decompositional) approach is used and it comprises three steps:

1. The user evaluates the relative importance of the issues to be negotiated. The rating assigned to each issue is viewed as a component of the total utility of a package. The utility component of each issue is assumed to be independent of the other issues, i.e., any possible interactions are assumed to be insignificant. Therefore the utility components are simply added together to form the total utility function and this is called composition.

2. The user evaluates the relative importance of each issue's options. The rating of each option constitutes the utility component of an issue when that particular option is the one that's present in a package.

3. The user makes a comparative evaluation of several complete packages selected by INSPIRE, viewing each package as a whole. This is the decompositional step. The total utility of a package is decomposed into constituent option utilities using an additive model:

$$\text{Rating}(P_k) = constant + \sum_{i=1}^{n} \sum_{j=1}^{m_i} u_{ij}\, x_{ij} + error$$

where Rating(P_k) is the total utility of a package P_k, u_{ij} is the utility associated with issue i and option j (j = 1, …, m_i; i = 1, …, n), and x_{ij} is a binary variable indicating whether the given option is present in the package.

There is a large number of packages that could be presented[4], and we need some way of selectively presenting just a few packages for the user to rate, yet obtain reliable utility values. This is a problem in the design of fractional factorial experiments. One of the most compact and effective designs is the orthogonal design, in which such packages are chosen that matrix X is orthogonal. INSPIRE uses the information obtained in the issue and option ratings steps to select the set of orthogonal packages presented to the user for the package rating step. Given the ratings for these packages, the weights u_{ij} are computed so as to minimize the error terms using linear regression.

Since the utility of every possible option is considered explicitly, the utility function for a given issue can be nonlinear. This is an advantage since people usually do not have linear utilities as they traverse a given range of values. An example of non-linear partial utilities is given in Fig. 1. User's rating of the price issue reflects his/her indifference to price options of $4.12 and $4.37 which are considered equally bad, and the preference significantly increases for option of $3.98. User's preference of the delivery issue can be represented with and S curve with small differences between

[4] If there are or n issues each with m_i (i = 1, …, n), options then there are m_1 x m_2 x … x m_n complete packages.

two top and two bottom options but a significant difference between the middle options (30 and 35 days).

By default, issues are assumed to have "discrete" options, i.e., only a small number of explicitly listed options are considered to be meaningful as outcomes of the issue. These are also called salient options. However, some issues can also be "continuous" in the sense that any intermediate value can be meaningful. In such cases, the utility function within an issue is assumed to be piece-wise linear, i.e., linear interpolation (or extrapolation) is used to compute the utility of intermediate points between salient options.

3.2 Evaluating offers and compromises

Evaluating the utility function with respect to the combination of options that comprise an offer provides a numerical estimate of the goodness of the offer. INSPIRE uses this in several ways: it generates graphics plotting the score versus time, thus enabling the negotiators to understand at a glance the history of concessions that have occurred; and it uses the scores to suggest possible improvements on any compromise that is reached. In the interest of the study INSPIRE currently refrains from making full use of the support possibilities suggested by utility functions, e.g., recommending or shortlisting good counteroffers during the conduct phase. It also does not prevent the user from composing non-optimal offers during the post-settlement phase, since strong guidance from the system could mute the differences in natural behavior.

A negotiator’s preference information is never revealed to his or her counterpart, or anyone else, as in real negotiations. This implies that evaluation of a compromise that has been accepted by both parties must be done independently for each side, using the corresponding utility function; interpersonal comparisons of utility are never performed. A compromise is considered Pareto-optimal or efficient if it cannot be “improved,” i.e., if there does not exist any other package with a higher score for one party and an equal or higher score for the other party - measured with their respective utility functions.

Whenever a compromise is reached, INSPIRE determines whether it is Pareto-optimal. If it is, the negotiation ends; or else, INSPIRE computes the set of all

packages that dominate the compromise, and presents up to five packages that span the spectrum of scores they represent. An example of the page in which the user is presented with three Pareto-improvements is given in Fig. 2.

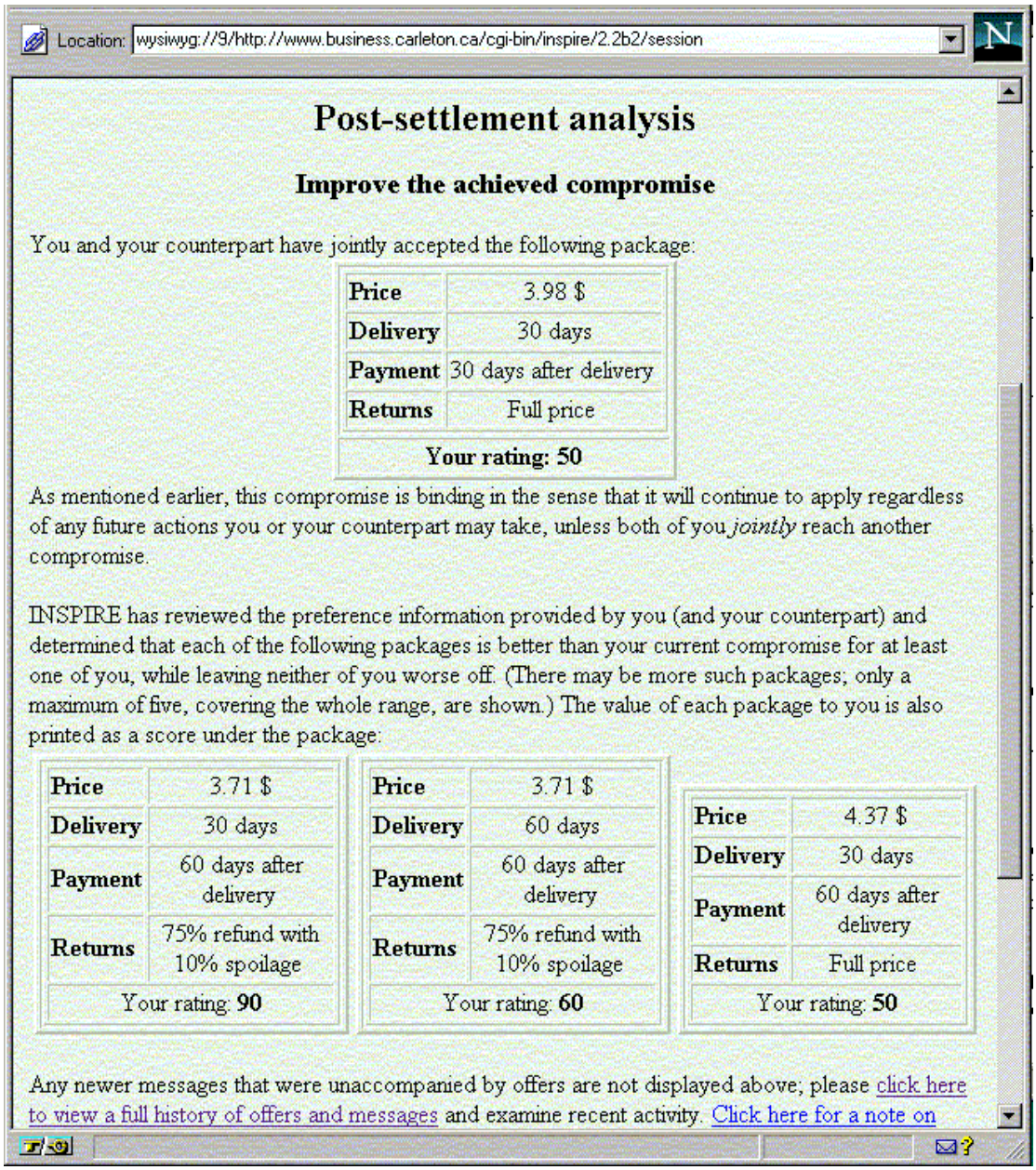

Figure 2. An inefficient compromise and three Pareto-optimal packages.

The user is given the choice to select one of them or construct a new offer altogether, or terminate the negotiation and stay with the inefficient compromise that has been achieved. Note that this computation requires INSPIRE to make simultaneous use of both utility functions, without actually revealing them to the negotiators. In other words, the character of the post-settlement phase is subtly different with respect to all

other activities performed by INSPIRE: it requires a controlled and limited sharing of the two negotiators' preference information in the form of the results reported by a trusted third party (INSPIRE), whereas all other processing requires access only to one's own preference information. While this has not been of any significance in the academic contexts of the study, it may be an issue in sensitive real-world negotiations where third-party trustworthiness is an issue; the likely result will be a reduced usage of such support features.

3.3 Design and implementation

The traditional view of a negotiation (or group) support system is that of a desktop application: each user has one copy of the software on their personal computer, which communicates with the other users' copies over a network (typically a LAN), usually in synchronous mode (i.e., with both parties simultaneously logged on). Figure 3 depicts how INSPIRE's process model, conceptualized as a negotiation support system, has been translated into its implementation structure as a Web application. The system uses the client/server model of distributed systems to partition the main components.

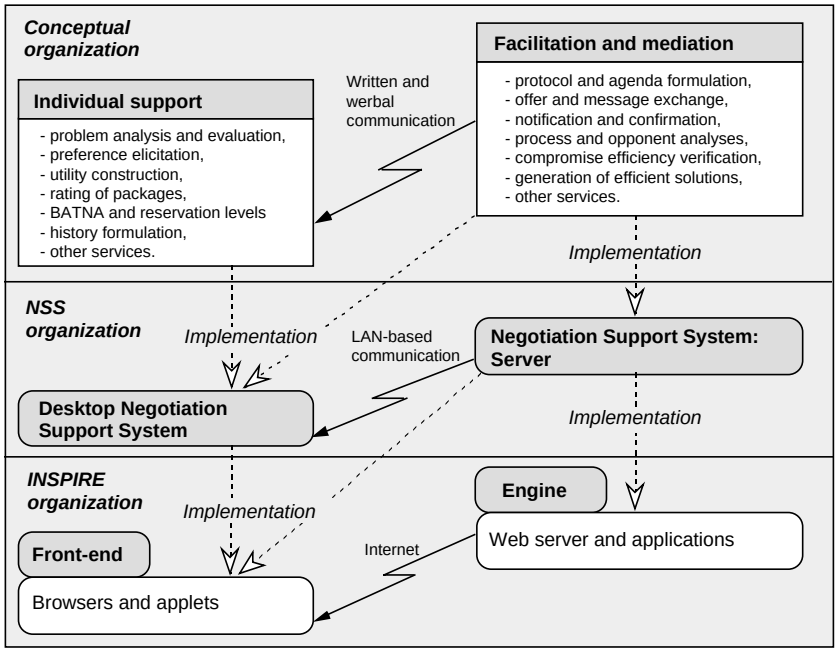

Figure 3. Negotiation support and its implementation in INSPIRE

Three major factors affect the system's design:

1. We wish to enable users with nothing more than a Web browser and an Internet connection to avail of INSPIRE’s services. This implies a tremendous degree of portability and gives the researchers access to users in remote countries with minimal computing resources.

2. Current trends in net-centric computing are towards pay-per-use software: programs reside at their developers' home sites and are automatically downloaded and executed whenever the user needs a particular piece of functionality. This induces a tendency towards an architecture in which the server (INSPIRE’s home site) plays a central role, regardless of the structure of communication needs.

3. Since one of the INSPIRE’s primary goals is to observe and log user activities as completely as possible for the cross-cultural study, and since it is difficult to monitor actions on the user's host machine, it is desirable that all nontrivial activities be conducted through the INSPIRE site.

One other factor that significantly influenced the design is the fact that the negotiations supported are asynchronous: since the two parties negotiating with each other typically reside in far away countries with different time zones, it is rare for both sides to be simultaneously logged on. Therefore, INSPIRE is designed to interact independently with each user, saving the state resulting from each user's actions in a form that can be retrieved when the counterpart logs on some time later.

INSPIRE presents itself to the user via Web pages containing, apart from paragraphs of hypertext providing context-specific guidance, forms for user input and graphics for visualization. Each page is in essence a snapshot of the situation or context at a given moment in the negotiation process; the contents of the page are of course dynamically generated since they differ for each negotiation. Each page provides the user with many prompts (hyperlinks or buttons) for the various things he or she can possibly do at that point. Since some of the page structure can be prespecified, INSPIRE’s architecture has been built around two major components: the frontend, comprising skeletal HTML/JavaScript pages implementing contextual structure, prespecified instructions and choices, and the engine, a set of large C++ programs that implement the negotiation methodology and provide functionality such as messaging, user authentication, session management, etc.

All of INSPIRE's implementation is object-oriented, and each piece of functionality is provided by a group of object classes that is loosely coupled with the rest of the system. Therefore each of them has been implemented fairly independently of the others. An effort was made to construct software objects that can be used and reused in different conditions and in different configurations. Moreover, we aimed at a system which in future can be expanded and use new and additional components. This has led to a more powerful cousin of INSPIRE called INSS, supporting sequential negotiation and continuous issues; however, the latter has not been used within our cross-cultural study and will not be discussed further.

4. The Data from INSPIRE

4.1 Data sources

The INSPIRE system provides two sources of data, which together describe the entire negotiation as well as the negotiators themselves:

1. two questionnaires that are filled on-line by each negotiator, and
2. the complete computer records of the negotiation.

The first questionnaire is filled out during the early preparation phase of negotiation (the 'pre-negotiation questionnaire'), and the other after the negotiation is terminated ('post-negotiation questionnaire'). In brief, these questionnaires try to capture background information about the negotiators that would otherwise be unavailable, given that they are typically unknown people coming in over the Internet. They also directly elicit perceptions and judgmental information about each other and the negotiation environment.

The pre-negotiation questionnaire contains 16 questions about the user's background, including age, countries of birth and residence, self-evaluation of negotiation experience, level of Internet use, prior knowledge (if any) about the counterpart, and expectations about the nature of the forthcoming negotiation and the compromise that will be reached. The user is typically required to specify the latter judgments on a scale of five levels whose extremes are labeled, e.g., from 'Very friendly' to 'Very hostile.' Two additional questions are about the difficulty of INSPIRE's preference

elicitation mechanisms which are later used to provide users with the subjective values of alternatives. The system does not allow users to proceed to the second phase of negotiation (exchange of offers) until they fill in this questionnaire.

The post-negotiation questionnaire contains 40 questions, including a few open-ended requests for comments about the system's features and potential. The questions are about the system and its features (17 questions), the agreement reached (2), the process (4), the negotiator and the opponent (17). The questions about negotiator and the opponent are grouped together, because typically the negotiator does not know her/his opponent. Thus, almost any question about the opponent in fact describes the negotiator's perception and not reality. Examples of such questions are: whether the negotiator found the opponent informative, persuasive, honest, etc. In Adler's terms, these questions measure the opponent's attractiveness' and the negotiators' 'problem solving approach' (Adler and Graham 1989).

INSPIRE's history recording mechanism logs each negotiator's activities in detail and provides complete computer records of the negotiation. This includes information about the negotiator's use of messaging, visualization, and analytical tools. The negotiation database contains all the objects created and exchanged during the negotiation, including the offers and messages composed, along with time-stamps. In essence, these logs provide two qualitatively different types of data: (1) direct inputs from the negotiators (e.g., the transcripts of their online conversation, (2) their value system as represented by their preference ratings, and the composition of their offer packages), and (3) observed data (e.g., the timing and frequencies of messages and offers, the sequence of scores on the offers and compromises, and the gains achieved during the post-settlement phase).

4.2 Data analysis and exploration tools

While it is possible to study the transcripts of each negotiation individually and analyze the strategies used, for the purposes of our present study the raw data described above has to be transformed into statistics across the entire negotiation database. Further, even within a given negotiation, there are many *derived* measures of interest, e.g., the mean time between counteroffers, the score on the expected compromise (obtained by applying the negotiator's utility function to the expected

compromise package elicited in the pre-negotiation questionnaire), the difference between the expected and achieved compromise scores, the concession pattern, and comparisons against the corresponding measures for the counterpart.

Much of this computation has been automated through another INSPIRE component called INtoSPSS; the name is an artifact of its original purpose, to transform INSPIRE data into a form suitable for input to the SPSS statistical analysis package. This module shares the bulk of its code with the rest of the INSPIRE engine---and therefore has access to the complete data---but differs in implementation in one significant way: it has been designed to run off-line, not on the Web. Further, its data structures have been designed to enable easy insertion and coding of new derived measures; typically within 3 to 8 lines of C++ each. In its default mode, the program currently presents all the data in a standard tabular form that can be fed directly into SPSS. Other modes are currently available to provide an output format suitable for S-Plus, and to print out the unstructured answers to open-ended questions from the post-questionnaire. The latter is particularly useful for research queries such as "summarize all user comments about system features that were not found useful."

Deciding which derived measures to compute and analyze is not an easy problem; there are too many possible measures, and all of them suggest extremely fascinating research hypotheses (see the following section on structuring the data). Moreover, the researchers' interests lean towards the discovery of new, interesting and significant patterns in negotiation behavior and tool usage, rather than confirmation of preconceived cultural hypotheses. In other words, the need is for data exploration tools supporting visualization, direct manipulation and data mining. This need has been addressed to a limited extent through programs that we have developed in S-Plus and SPSS, and we are currently exploring other tools such as these based on the data mining techniques.

4.3 Structuring the data

Around 70 measures from each negotiation are currently being analyzed via the tools just described. Each of these variables (factors) constitutes a column in the INtoSPSS output table. Each negotiation contributes two rows to the table, one for each negotiator. In general, each of the 70 variables can be cross-correlated and regressed

with one or more of the others in order to examine the implied hypothesis that the given group of variables influence each other. In order to enhance clarity of understanding, it helps to structure these variables *a priori* using intuitive judgments of causal relationships.

The measures are broadly categorized into *independent* variables and *dependent* variables. We are primarily concerned with the effect of the former on the latter. Note that these are strictly judgments and often the direction of causality is far from obvious. Moreover, many variables are *intermediate* in the sense that they are causally influenced by some independent variables, and in turn, influence the value of some dependent variables. For example, the number of offers made by a negotiator is influenced by the bargaining norms in her/his culture, and influences the likelihood of reaching agreement with a counterpart from another culture. The following classification therefore only helps identify and focus on the core variables, namely those that most clearly belong to the two extreme categories.

4.3.1 Independent variables

These are factors that are largely controlled by the researchers and are not unaffected by most other variables in the study. They fall into three sub-categories: *subject*, *task*, and *system* variables.

Subject variables are those which describe the negotiators. Some of the most important variables for our study, namely cultural markers, fall into this category. Country of birth and country of residence are the two cultural markers most heavily studied; for a discussion see Section 5.1. These are often confounded by other key subject variables such as age, gender, negotiation experience, and language difficulty.

Task variables relate to the problem undertaken by the subjects; these center around the negotiation case. For example, cultural cues in the case description, the domain of the case (strategic, marketing, etc.), the complexity of the case, and deadlines can potentially have significant effects on the observed results of negotiation. For this paper, task variables are not particularly important because they have all been kept constant for the entire study to date. However, varying factors such as team size and multilateral negotiation cases hold the promise of interesting future studies.

System variables represent the presence or absence of specific support features in INSPIRE. For example, forcing users to go through the initial preference ranking steps can make them more aware of their priorities and alternatives and influence their subsequent negotiation behavior, than if the preference elicitation step were skipped. The scores provided on each package by INSPIRE are another system attribute that can have significant impact on behavior and outcome since it reduces attention with respect to individual issues. The display of various kinds of negotiation visualization aids (e.g., negotiation dance graphs), decision analytic tools (e.g., utility construction methods), the ability to compose offers via structured menus instead of free text, the ability to transfer complex objects during communication (e.g., documents in support of one's argument), and general ease of use factors of system variables that are controlled in INSPIRE.

4.3.2 Dependent variables

Dependent variables of interest in this study are any direct measures of the ultimate effectiveness of decision making, negotiation style, etc. They can be classified into three categories: measures of the goodness of the negotiation's outcome, the negotiation process, and the system's effectiveness.

Some variables representing good decision *outcomes* are objective and easy to measure, e.g., whether an agreement was reached at all, the level of achievement on each issue in the final compromise, and whether the compromise was Pareto-optimal. Because the utility functions are known for both negotiators it is easy to determine if the compromise they achieved is Pareto-otptimal, i.e., none of them can improve own utility without worsening the utility of the opponent.

Other variables are subjective, but can nevertheless be elicited successfully, e.g., the goodness of the final compromise as scored by each negotiator's own value system (utility function). Still others are quite hard to elicit, e.g., the quality of the relationship (including goodwill) established at the end of the negotiation, which has long-term implications, and feelings of satisfaction with the outcome. Variables in the last category are usually measured through the post-negotiation questionnaire.

Similarly, variables measuring the goodness of the decision *process* that has been completed are sometimes objective, e.g., process efficiency as measured by the time to completion, the number and size of messages and offers; whether post-settlement negotiation was conducted to improve the compromise, etc. Subjective process variables include posterior judgments of satisfaction with the process (which is important because high satisfaction implies that the cognitive complexity of the system was at a tolerable level), recognition of cultural differences, feelings of being better prepared, etc.

4.3.3 Intermediate variables

Intermediate variables are a complex set of measures that link both the dependent and independent variables; achieving some sort of causal structure on this set would amount to creating a very useful negotiation factor model.

One class of intermediate variables is the initial ‘psychological baggage’ or ‘habitual domains’ that the negotiators bring to the table. This is dependent on the cultural background of the negotiators and impacts the process and outcome of negotiations. For example, in cultures where competitive bargaining is the norm, there may be greater expectation of hostility than in cultures where relationship-building is the basis for negotiation. Initial expectations about the final agreement, and the value system of the negotiators (as measured by the preference rankings) on various criteria are other examples in this category.

A second major class of intermediate variables relates to the *behavior* of the negotiators *during* the negotiation. For example, people from high-context cultures may spend a greater amount of effort 'creating context' during the initial phase of the negotiation. They may give up anonymity more quickly by introducing themselves, they may have a lower proportion of offers without attached messages, and they might be more verbose in an attempt to overcome the barriers of online communication. Linguistic patterns, message and concession patterns, timing and choice of offers (strategies), surprises created or encountered and disregard for certain system features (such as Pareto-optimal analysis) are other examples in this category.

A third major class involves the *perceptions* of the negotiators *after* the negotiation. Perceived level of control over the negotiation, and judgments about and empathy achieved with the counterpart are examples in this category. While these variables themselves are measures of overall performance, dependent on many prior factors, they in turn influence the ultimate process and outcome measures; e.g., a negotiator who felt in control may perceive herself as having done well, even though more objective measures of outcome might prove otherwise.

There are many other types of potentially confounding intermediate variables which we have briefly considered but disregarded for the purposes of this study, e.g., organizational factors and variation in decision making styles.

5. Analysis and Results

Between September 1996 and May 1, 1997, 281 bilateral negotiations have been initiated with INSPIRE. 86 of them are considered unusable for analysis mainly because users, after the initial request, did not initiate the negotiation. The remaining 195 negotiations are considered for further analysis.

There are two main types of INSPIRE users: the participants of university courses and seminars, and Web surfers. It is mainly the Web surfers who have dropped out and their negotiations were unusable.

The analysis presented in this section is preliminary and data driven with its roots in the "grounded theory" methodology (Strauss and Corbin, 1994). At this stage we do not attempt to generate a theory of anonymous cross-cultural negotiations because the experiments with the system continue and we expect many more users in near future. Instead we provide the initial results and formulate questions to be addressed in a separate and detailed study.

5.1 Defining culture

The literature on previous studies indicates that the culture of participants is assumed to be of the country in which the experiments are conducted (Druckman 1976; Adler and Graham 1989; Herbig and Kramer 1991; Rubin and Sander 1991; Adler 1993;

Graham and Mintu-Wimsat 1997). Countries with high immigrant populations like Canada and US and the internationalization of the university education, make such an assumption doubtful. Yet, there is no one agreed upon definition of culture; according to Faure and Rubin ((Faure and Rubin 1993) p. 3) there are over 160 definitions of culture. It is beyond the objective of this study to determine one generally acceptable definition. At the same time, we needed a working definition that would alleviate problems encountered in countries with high immigrant population. Therefore we defined culture using data driven approach.

We have asked participants for information about their country of birth, residence, countries visited for a period of more than two months, and the first language learned. This information was then used to determine their cultures. We assumed that the culture is defined by the following four-step procedure:

1. the country of residence and language if they coincide, otherwise by,
2. the country of birth and language if they coincide, otherwise by,
3. the country of the first language learned if not English, Portuguese, Spanish, otherwise by the country of residence, and finally by
4. the country of birth.

The proposed procedure for defining culture encompasses definition that has been used by authors studying culture in the context of negotiations. It is more precise in that it allows to identify people who are in a country of ethnically different culture as, for example a Pole in Canada or an Indian in the US. The procedure is not without its drawbacks as it fails to distinguish an Irishman who studies in Canada (if he/she states that Canada is her/his country of residence). Furthermore, it cannot distinguish between people who have emigrated to a country half a century ago from those who are there for several months. Nevertheless, it is an improvement over the classification based solely on the country of residence with a large population of foreigners (e.g., foreign students) or immigrants. An indication of the cultural diversity and the role of migration is that if we consider participants' country of birth INSPIRE was used by people from 55 countries, but if the country of residence is considered there are only 22 different countries.

This migration as well as the participation of Web surfers contributes to the fact that most countries are represented by only a few people in the data. In this paper, we take a “20 participants” cut-off point, that is countries with at least 20 users are analyzed. Using this criterion and the criterion of culture defined on the residence, birth and language we have five countries: Canada, China, Finland, India and US Together, they comprise 58% (227) of the total number of negotiators.

Table 1.

Implications of two definitions of culture

	Canada	China	Finland	India	US	5 countries
Residence	190 (61%)	49 (16%)	22 (7%)	31 (10%)	18 (6%)	310 (100%)
Residence/birth/language	76 (33%)	77 (34%)	22 (10%)	33 (15%)	20 (8%)	228 (100%)

The implications of the two definitions of culture are shown in Table 1. The change in the definition leads to a significant change in the five country negotiators’ population. This is because many foreign students who study in Canada and the US are taken into account when culture is defined by the country of residence. The change in definition also changes the populations within countries. This is primarily indicative to Canada and China as many Chinese students from the Canadian universities used INSPIRE.[5] We want to stress here that we make no attempt to provide an ‘objective’ definition of culture nor try to partake in the discussion about the cultural adaptation and change of immigrants and foreign students.

5.2 Negotiators

The data about the users of the INSPIRE system is collected in the pre-negotiation questionnaire. The vast majority of the overall population are university students in Canada (University of New Brunswick, Carleton University, and McMaster University), China (Hong Kong Baptist University and Carleton University), and Finland (Abo Academy and Helsinki School of Economics). In India, the negotiations are carried out by managers and engineers during their several-weeks long executive

courses at the Indian Academy of Management in Bangalore; the US negotiations were carried out by researchers from several institutions and a group of graduate students from MIT.

The mean and standard deviation of the variables describing negotiators' is given in Table 2. As one may expect, younger, on average, negotiators consider themselves less experienced than the older ones. However, the correlation is weak; the 2-tailed Pearson correlation between age and negotiation experience is .329 at the 0.01 level.

Table 2.

Negotiators

	Total	5 countries	Canada	China	Finland	India	US
Valid cases	341	221	60	59	14	12	13
Age [a]	28 (7.7)	28 (7.7)	27 (6.2)	24 (4.0)	26 (4.7)	35 (5.9)	38 (8.5)
Negotiation experience [ab]	3.5 (1.1)	3.5 (1.1)	3.9 (0.9)	3.9 (1.0)	3.6 (0.7)	2.2 (0.6)	2.8 (0.9)
Current use of Internet [a c]	2.9 (1.5)	2.9 (1.5)	2.9 (1.4)	2.8 (1.2)	2.6 (1.1)	3.8 (1.4)	2.2 (0.6)
Expect increased Web access	60%	60%	38%	80%	43%	100%	22%
Used DSS/NSS previously	17%	17%	18%	8%	57%	19%	23%
Knew opponent's name	16%	16%	12%	20%	36%	0%	15%
Knew opponent's country	18%	18%	10%	32%	35%	0%	15%

[a] Average (variance)
[b] 1 - very experienced, 5 - no experience. Valid cases: 333, 147, 50, 41, 7, 8 and 9.
[c] 1 - several times a day, 6 - rarely, less than once every two weeks.

Negotiators' access and use of the Web is high, except for Indians who at present experience difficulties with access and speed but who unanimously expect a significant increase in access to the Web. Interestingly enough, while Canadians' and Chinese' access to the Web is very similar at present, their expectations are quite different as only 38% of the former versus 80 of the latter expect increased access.

[5] Almost all of the Chinese negotiators with residence outside of Canada and US are students from Hong Kong.

For the majority of participants the INSPIRE system is the first DSS/NSS they have used. The exception are Finns who are students from MIS/DSS courses and thus were exposed to other types of computer-based decision support.

The negotiation participants were asked whether they know their opponent or the country she/he is from. Although some of them replied positively, in most cases they mistakenly assumed that the opponent is from the same course and/or from North America. This is confirmed by users' statements about their opponents and their country them made after the completion of negotiations (see Section 5.6).

5.3 Agreements

The total number of bilateral negotiations is 195 with 390 negotiators. To indicate the buyer's (Cypress) and the seller's (Itex) culture, in Table 3, we present the number of negotiators representing each company. It follows from the data that the distribution of negotiators into buyers and sellers is not equal and, for example, many more Finns were sellers than buyers and the reverse is true for Indians and Chinese. We plan to equalize this in the future negotiations.

Table 3.

Negotiation and agreements

	Total	Canada	China	Finland	India	US
Negotiators	390	75	77	22	33	19
Itex	195	43	23	19	9	4
Cypress	195	32	54	3	24	15
No agreement	162 (41%)	15 (20%)	18 (23%)	7 (30%)	21 (64%)	6 (32%)
Agreement	228 (59%)	60 (80%)	50 (77%)	15 (70%)	11 (36%)	11 (68%)
Efficient	114 (46%)	31 (52%)	17 (29%)	10 (62%)	8 (67%)	9 (69%)
Not-efficient	124 (54%)	29 (48%)	42 (71%)	6 (38%)	4 (33%)	4 (31%)
Post-settlement	24 (18%)	6 (21%)	9 (21%)	1 (17%)	1 (25%)	2 (50%)

At present the INtoSPSS program does not allow to distinguish between the negotiation that was purposefully terminated by a user from the negotiation which ended because user(s) did not return messages and/or offers and the deadline passed. We can, however, determine negotiation that ended with an agreement from those which were continued after the agreement had been achieved and moved into the

post-settlement phase. Data in Table 3 indicates the distribution of users who achieved an agreement, optimal agreement, and who moved to the post-settlement stage.

Relatively high proportion of users achieved an efficient agreement. No comparative negotiations without computer support were conducted, but we hypothesize that the case is complex enough and it is the computer support that contributed to the fact that 46% of the successful negotiators achieved an efficient compromise. We plan to conduct further experiments and verify this hypothesis. Other experiments will be conducted to establish the level of complexity for which computer support gives a clear advantage.

A relatively small number of negotiators used the post-settlement feature. Only 23 out of 124 the negotiators, who have reached a non-efficient agreement, moved to the post-settlement phase. In other words, 82% of the users did not want to improve agreements they had achieved. The small samples for every country with the exception of Canada and China, and the unequal distribution of buyers and sellers do not justify making comparisons between countries. Further experiments are needed to verify the need for a compromise improvement mechanism, and also what type of mechanism would be used. These experiments may have a significant implication for the design of NSS.

The overall result of users' reluctance for compromise improvement coincides with the results obtained by (Teich, Wallenius et al. 1995) for which a theoretical basis has been given by (Kersten and Mallory 1998; Kersten and Noronha 1998).

5.4 Offers and messages

INSPIRE negotiations are conducted through the exchange of offers and messages. The offers and messages can be submitted together or separately. The negotiation ends with an agreement, i.e., when both parties accept an offer. This acceptance is normally done with the help of the system's menu. However, the acceptance and also the whole exchange of offers may be conducted through messages only. The users may inform about issues and options in messages and do not send any offer. For the purpose of data analysis we are not able at present to identify negotiation which end

with a message only. However the review of 35% of the records identified only one such negotiation.

In Table 4 we present, together with the mean and standard deviation as previously, 95% confidence intervals for mean. This is to show quite small differences for all, except American, negotiators in the number of offers and/or messages exchanged.

Table 4.

Offers and messages (95% confidence interval for mean)

	Total	Canada	China	Finland	India	US
Valid cases	390	76	77	23	33	19
Offers w messages [a]	2.6 (1.8)	3.3 (1.5)	3.6 (1.8)	3.2 (1.8)	1.5 (1.1)	2.6 (1.8)
Offers w/o messages [a]	3.0 (2.1)	4.0 (1.9)	3.9 (1.8)	4.4 (2.9)	1.9 (1.0)	2.8 (1.9)
Messages w/o offers [a]	1.4 (1.7)	1.4 (1.6)	2.3 (1.9)	2.0 (1.8)	0.3 (0.7)	1.4 (1.7)

[a] Average (Variance).

Table 4 contains interesting data. There is a significant difference between the negotiators from India and all the others; Indians sent significantly fewer offers and messages. Their age and negotiation experience may have an impact here, but the US negotiators, who -- on average -- have similar age and experience, do not conform to this thesis. The Americans seem to cover almost the whole spectrum.

Another interesting issue is a relatively small number of messages sent without accompanying offers and a high number of offers sent without messages. The average number of offers sent with no accompanying messages is both for the whole population and for each country greater than offers sent together with messages.

In general, oral, written or visual cues and messages are used to indicate attitude, expectations, and to exert pressure. Cues and messages, especially if not accompanied by offers, are possibly more indicative of the negotiators' focus on their objectives and expectations than on issues. Exchange of offers only, or offers accompanied by messages, may be more indicative to principled negotiations (Fisher, Kopelman et al. 1994). If this is the case -- and we plan to study this issue further -- then computer supported negotiation may facilitate focus on 'issues and not personalities'.

5.5 Expectations and achievements

The agreement is only one outcome of the negotiation. Other outcomes include satisfaction with the process, with the agreement, and with oneself. It is also a better understanding of the opponent than before negotiations. We consider the issue of satisfaction using negotiators' satisfaction with the agreement, evaluation of their own performance in the negotiation and the difference between the expectations they had before and after negotiation. This data is presented in Table 5.

Before we discuss the data given in Table 5, it is important to stress the role of scores in the INSPIRE negotiations.

Table 5.

Negotiators satisfaction

	Total	Canada	China	Finland	India	US
Valid cases [a]	177-224	51-75	46-77	8-22	13-33	11-19
Satisfaction with agreement [b, c]	2.9 (1.4)	3.1 (1.3)	2.8 (1.3)	2.5 (1.2)	2.4 (1.3)	3.0 (2.0)
Satisfaction with own performance [b, c]	3.0 (1.3)	2.9 (1.4)	3.0 (1.3)	2.8 (1.1)	3.1 (1.4)	3.2 (1.6)
Met expectations [d, c]	3.5 (1.6)	3.7 (1.7)	3.8 (1.4)	3.4 (1.4)	2.8 (1.6)	3.5 (2.0)
Score achieved [c, e]	65 (17)	63 (16)	66 (14)	65 (20)	91 (10)	59 (17)
Score expected [c, e]	72 (20)	66 (23)	69 (20)	69 (21)	82 (22)	71 (15)

[a] The number of valid cases often depends on the variable in the table, the range covers a range for all variables.
[b] 1 - extremely satisfied, 7 - extremely unsatisfied
[c] Average (Variance)
[d] 1 - yes, completely, 5 - no, not at all
[e] Between 0 and 100.

First, scores play only internal role; each negotiator defines her/his preferences which are on the scale of 0-100. If the parties have fully opposing interests and their preferences are exactly reverse, then in the agreement, the sum of the joint scores is 100. However, if the interests and preferences are overlapping, then the joint score may significantly exceed 100. At the extreme, if the interests are identical the total score is 200.

Second, the users do not provide the expected and achieved scores. Before they enter the negotiation they are asked to specify the offer which they believe will be the compromise. For this offer the system calculates the score. Similarly, it is the system which calculates the score for the achieved compromise.

Data in Table 5 shows that users' satisfaction with the agreement is high or very high. Negotiation with an unknown opponent via a computer is novel. It changes the context and the process. It requires patience and limits the range of techniques one can use in persuasion and argumentation. The INSPIRE experiments indicate that this is not a deterrent; users' level of satisfaction with the process and its outcome suggest that technology may be effectively employed in negotiation.

Canadians and Americans are less satisfied with what they achieved, than the others. For Americans it is justified because, on average, they achieved 17% lower score than expected in comparison with the Canadian, Chinese, and Finnish negotiators whose score dropped by 4-6%. This may be the reason for which their satisfaction with the agreement and their own performance is the lowest. Note also, that the Americans cover a wide spectrum of satisfaction with the agreement.

The lowest satisfaction with the achieved score is reported by the Canadians. It is lower than Chinese and Finns although for all of them the under-achievement of expectations is very similar.

Americans and Canadians achieved the lowest score. Nonetheless, Canadians are more satisfied with their own performance than everyone one else, except for the Finns. Canadians’ satisfaction with their performance is not hindered by their own evaluation of meeting expectations that are lower than the evaluations made by others. Note, that Canadians expectations are also the lowest in the group.

The expected score is much higher for Indians (82) than for other participants, nevertheless they have exceeded their own very high expectations and achieved almost all they could achieve. This implies that they either have preferences very similar to their opponents or that their opponents gave in significantly, or both. It may indicate their strong competitive attitude, ability to achieve set objectives, and/or willingness to cooperate. We plan to investigate whether Indians really represented the interests of their company (Itex or Cypress) or negotiated to achieve a high score.

Judging on the basis of the expected scores Americans also appear competitive. They, however, achieve much less than they expect. The drop from the expected and achieved scores is at least three times higher than for others. This does not seem to influence their satisfaction. Americans are almost as satisfied as Indians who achieved scores 54% higher than Americans. Notably Indians achieved scores higher than they expected to achieve; they are the only negotiators who actually achieved more than they had expected at the beginning.

5.6 Opponents

All the communication between the INSPIRE negotiators is conducted through the system. Therefore users' identity, including their email address, is not revealed. Users are using names (aliases) they choose before beginning negotiations. However, users, in their messages, may reveal their name, country, email address etc. In fact they may completely bypass the system if they wish to do so. We have asked users, after they completed their negotiations, if their partners revealed their identity and/or country. Out of 390 users, 198 answered these questions and in both cases 35 users (17.6%), said that their partners informed them about both their identity and country.

We also asked about the user's guess of the opponent's country. Out of 117 responses, 61 (52%) gave the answer 'Canada', 17 (14.5%) - 'US' and 10 (8.5%) - 'the world'. This data seem doubtful and possibly influenced by the fact that many users may have been either informed that the system is located in Canada or guessed it from its Web address.

To obtain a better picture of users' perception we asked them to evaluate their opponents in terms of the attitude to negotiation and other personal characteristics. We also asked them to state their interest in working with and seeing the opponent, and also their understanding of the opponent's priorities. The summary of the data is given in Table 6.

Table 6.

Negotiators' perception of their opponents

	Total	Canada	China	Finland	India	US.
Valid cases	198	61	50	9	16	11
Opponent considered:						
Cooperative [a,b]	2.6 (1.2)	2.9 (1.3)	2.6 (1.1)	2.7 (1.3)	2.2 (1.1)	2.8 (1.2)
Exploitative [a, c]	3.0 (1.0)	3.1 (1.0)	2.7 (0.8)	3.4 (0.7)	3.5 (1.0)	3.3 (0.8)
Honest [a, d]	2.4 (1.0)	2.4 (1.1)	2.5 (0.8)	2.8 (1.2)	1.9 (0.7)	2.3 (1.1)
Informative [a, e]	2.5 (1.0)	2.7 (1.0)	2.4 (0.8)	2.7 (1.5)	2.1 (0.9)	2.8 (1.3)
Persuasive [a, f]	2.7 (0.7)	2.7 (0.6)	2.6 (0.7)	2.8 (1.0)	2.9 (0.7)	2.6 (0.8)
Negotiator could understand opponent's priorities [a, g]	2.5 (0.9)	2.6 (0.9)	2.5 (0.7)	2.4 (0.9)	2.4 (0.6)	3.4 (1.0)
Negotiator would like to:						
See opponent [a, h]	2.5 (1.2)	2.9 (1.3)	2.3 (0.8)	2.7 (1.1)	1.7 (1.0)	2.9 (1.6)
Work with opponent (yes/no)	71%	66%	78%	78%	75%	55%

[a] - Average (Variance)
[b] 1 - cooperative, 5 - self-interested
[c] 1 - exploitative, 5 - accommodating
[d] 1 - honest, 5 - deceptive
[e] 1 - informative, 5 - uninformative
[f] 1 - persuasive, 5 - push-over
[g] 1 - always, 5 - never
[h] 1 - extremely interested, 5 - not at all interested

The negotiators' perception of the opponent does not differ significantly among the countries. It appears that they generally consider opponents on neither extreme of each of the five characteristics: cooperation/selfishness, exploitation/accommodation, honesty/deception, and informativeness/persuasiveness. The Indian negotiators differ somewhat from all the others in that their opinion about opponents seem generally the most positive. They have consistently the lowest scores for cooperation, honesty and informativeness and the highest for exploitation which means that they find their opponents rather accommodating. They, however find the opponents less persuasive than the others.

The other results are as follows: the Chinese participants evaluate their opponents as being more exploitative than the others; the Finns are the least inclined to see their opponents as honest partners, which is contrary to the perceptions of the American

and Canadian of their opponents, but foremost to the Indians; the Canadians find opponents the least cooperative; and the Americans find them the least informative.

With respect to the participants' understanding of the opponent priorities, the American negotiators seem to have more difficulties in understanding their opponents than the others. Other negotiators have fairly similar and a 'middle of the road' response.

Americans and Canadians are the least interested in seeing the opponent or in working with him/her in the future. The difference is quite significant if compared with the Indians and Chinese. Perhaps the reason for this is that the Americans and Canadians were the least satisfied with the agreement and, with the exception of the Chinese, with their own performance.

Adler proposes measures for problem solving behavior (PSA) and interpersonal attractiveness (IA). PSA is defined on the first five opponents' characteristics given in Table 6. IA is defined on the negotiators' willingness to see and work with the opponent and the perceived opponent's friendliness. We have computed these aggregate indices and found that the correlation between PSA and IA is significant at the 0.01 level and is .608 for the five country sample with 147 valid cases.

6. Conclusions

This paper presents the results of an ongoing study. Therefore, it is oriented more towards data exploration and formulation of hypothesis and research directions than the verification and confirmation of the existing hypothesis.

To summarize the findings, there appear to be differences between the cultures as we have defined them here. This is despite the fact that the negotiators generally did not know their opponents' identity. However, some of the differences may be explained by the profession, experience and age of the negotiators. We plan to conduct more experiments and with groups of similar profile.

Elgstrom made an observation that the impact of culture can be seen in the communication (Elgstrom 1990). The results presented here suggest a broader

implication of culture, including negotiators' expectations, reservation levels, concessions made during the negotiation and satisfaction with the agreements and their own performance. Ability or willingness to understand others in the case of anonymity also appears to be rooted in culture. However, we want to reiterate that our observations are preliminary and based on small and not well controlled samples.

With respect to future experiments, we also need to collect data allowing for the comparison of the cultures of the two negotiators in order to assess the differences in how, for example, Americans negotiate with Canadians and with Indians, when they do not know who is on the other side of the virtual table. To do this we need a larger samples, than we have now.

An important finding of this work is a general and high acceptance of the INSPIRE and its features. The system was designed for training and research purposes, nevertheless the users see its practical usefulness which, in fact, surprised us. Out of the 192 users who evaluated the system, 89% stated that they would use it for training and practice of negotiation skills, 83% to prepare for actual negotiations, and 61% stated that they would use the system in actual negotiations. This very high acceptance of the system led us to work on the INSS system that already has many more capabilities in handling negotiators' requests.

Table 2 shows that the Indian and US participants are in their mid-thirties on average, their negotiation experience is similar, but Indians have the least experience with, and usage of, Internet of the whole population. Indians also have little experience with DSS and/or NSS. Their ability to achieve expected compromises or surpass them and high level of satisfaction with the process and their own performance suggest that the system and Web-based negotiations do not introduce a significant burden or additional complexity into the already complex negotiation process.

Negotiation analysts devote much effort on the specification of conditions for the achievement of efficient compromises. They suggest that negotiators choose efficient compromises if given such an opportunity (Raiffa 1982; Kersten 1985; Kersten and Szapiro 1986; Lax and Sebenius 1986; Sebenius 1992; Shell 1995; Rangaswamy and Shell 1997). Behaviorists, on the other hand, suggest that the efficiency of a compromise is less of an issue if we compare it with the process variables. Of primary

interest are relationships that emerge between the negotiating parties (e.g., trust, creativity, understanding, learning), (Cohen 1991; Fisher, Kopelman et al. 1994; Fisher, 1980). The results of this study indicate that negotiators are often reluctant to improve an already achieved compromise despite the fact that the are provided with several packages superior to the one they agreed upon. The underlying reasons for accepting inefficient compromises needs to be further studied.

A significant amount of work has to be done with the existing numerical and categorical data. Even more work is required to analyze messages. Text analysis is a potentially fascinating area of study INSPIRE negotiations. We know from the interactions with some of the users and from the messages we receive that many of them consider INSPIRE negotiation extremely important. There are cases when users feel cheated by their opponents, get angry and emotional. This shows that the system has a value as an effective negotiation tool and that virtual negotiations may not take away all the frustration and anxiety which is associated often with face-to-face negotiations.

Rubin and Sander suggest that while cultural differences exist, it often happens that much of the reported differences are the results of expectations and perceptions (Rubin and Sander 1991). The InterNeg project allows for as an unbiased as possible communication among negotiators who do not know the identity or even the nationality of their opponents. We plan to study this issue further, the anecdotal evidence shows that the issue may be quite complex and difficult to study. In one negotiations, John, born in Canada, sent a concluding message to his partner saying, “Greg, it was a pleasure to negotiate with you, see you tomorrow”. John assumed that his partner was his next-door colleague. In fact, his partner was a Chinese student who only recently arrived in Kingston, Ontario to complete his graduate courses in Canada.

References

Adler, N. J. (1993). "Do Cultures Vary?", in: *Societal Culture and Management*, T. D. Weinshall, (Ed.), Berlin: Walter de Gruyter & Co., 23-46.

Adler, N. J., R. Brahm, et al. (1992). “Strategy Implementation: A Comparison of Face-to-face Negotiations in the People's Republic of China and the United States”, *Strategic Management Journal*, **13**, 449-466.

Adler, N. J. and J. L. Graham (1989). “Cross-Cultural Interaction: The International Comparison Fallacy?”, *Journal of International Business Studies*, 515-537.

Cohen, M., J.-Y. Jaffray, et al. (1987). “Experimental Comparison of Individual Behavior under Risk and under Uncertainty for Gains and for Losses”, *Organizational Behavior and Human Decision Processes*, **39**(1), 1-22.

Cohen, R. (1991). *Negotiating Across Cultures. Communication Obstacles on International Diplomacy*. Washington, DC: United States Institute of Peace Press.

Drake, L. E. (1995). “Negotiation Styles in Intercultural Communication”, *International Journal of Conflict Management*, **6**(1), 72 - 90.

Druckman, D. (1976). “Cultural Differences in Bargaining Behavior: India, Argentina, and the US”, *Journal of Conflict Resolution*, **20**, 413-452.

Elgstrom, O. (1990). “Norms, Culture, and Cognitive Patterns in Foreign Aid Negotiations”, *Negotiation Journal*, **5**(4), 147-159.

Faure, G. O. and J. Z. Rubin (1993). “Culture and Negotiation”, *Negotiation Journal*, **9**(4), 380 - 381.

Faure, G. O. and J. Z. Rubin (1993). *Culture and Negotiation. The Resolution of Water Disputes*. Newbury Park, CA: SAGE.

Fisher, G. (1980). *International Negotiation. A Cross-Cultural Perspective*. Yarmouth, MA: Intercultural Press Inc.

Fisher, R., E. Kopelman, et al. (1994). *Beyond Machiavelli. Tools for Coping with Conflict*. Cambridge, MA: Harward University Press.

Graham, J. L. (1985). “Cross-cultural Marketing Negotiations: A Laboratory Experiment”, *Marketing Science*, (Spring), 130-146.

Graham, J. L. (1985). “The Influence of Culture on the Process of Business Negotiations: An Exploratory Study”, *Journal of International Business Studies*, 81-95.

Graham, J. L., A. T. Mintu, et al. (1994). “Explorations of Negotiation Behaviors in Ten Foreign Cultures Using a Model Developed in the United States”, *Management Science*, **40**(1), 72-95.

Graham, J. L. and A. Mintu-Wimsat (1997). “Culture's Influence on Business Negotiations in Four Countries”, *Group Decision and Negotiation*, **6**, 483-502.

Green, P. E. (1974). “On the Design of Choice Experiments Involving Multifactor Alternatives”, *Journal of Consumer Research*, **1**, 61-68.

Green, P. E. and Y. Wind (1973). *Multiattribute Decisions in Marketing: A measurement Approach*. Hinsdale, IL: The Dryden Press.

Gulliver, P. H. (1979). *Disputes and Negotiations: A Cross-Cultural Perspective*. Orlando, FL: Academic Press.

Herbig, P. A. and H. E. Kramer (1991). “Cross-Cultural Negotiations: Success Through Understanding”, *Management Decision*, **29**(8), 19 - 31.

Hofstede, G. (1989). "Cultural Predictors of Negotiation Styles", in: *Process of International Negotiations*, F. Mautner-Markhof, (Ed.), Boulder, CO: Westview Press, 193-201.

Kelley, H. H. (1966). "A Classroom Study of the Dillemas in Interpersonal Negotiation", in: *Strategic Interaction and Conflict*, D. Archibald, (Ed.), Berkeley: University of California Press, 49-73.

Kersten, G. E. (1985). "NEGO - Group Decision Support System", *Information and Management*, **8**(5), 237-246.

Kersten, G. E. and G. R. Mallory (1998). Rational Inefficient Compromises in Negotiations. Laxenburg, Austria, IIASA.

Kersten, G. E. and S. J. Noronha (1997). Supporting International Negotiations with a WWW-based System. Interim Report, IIASA, Austria.

Kersten, G. E. and S. J. Noronha (1998). "Rational Agents, Contract Curves, and Non-Efficient Compromises", *IEEE Systems, Man, and Cybernetics*, **28**(3), 1-13.

Kersten, G. E. and T. Szapiro (1986). "Generalized Approach to Modeling Negotiations", *European Journal of Operational Research*, **26**(1), 142-149.

Lax, D. A. and J. Sebenius (1986). *The Manager as Negotiator*. New York: The Free Press.

Pruitt, D. G. (1981). *Negotiation Behavior*. New York: Academic Press.

Raiffa, H. (1982). *The Art and Science of Negotiation*. Cambridge, MA: Harvard University Press.

Rangaswamy, A. and G. R. Shell (1997). "Using Computers to Realize Joint Gains in Negotiations: Toward an "Electronic Bargaining Table"", *Management Science*, **43**(8), 1147-1163.

Roth, A. E., V. Prasnikar, et al. (1991). "Bragaining and Market Behaviour in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An Experimental Study", *The American Economic Review*, **81**(5), 1068-1095.

Rubin, J. Z. and B. R. Brown (1975). *The Social Psychology of Bargaining and Negotiation*. New York: Academic Press.

Rubin, J. Z. and F. E. Sander (1991). "Culture, Negotiation, and the Eye of the Beholder", *Negotiation Journal*, **6**, 249-254.

Sebenius, J. K. (1992). "Negotiation Analysis: A Characterization and Review", *Management Science*, **38**(1), 18-38.

Shell, G. R. (1995). "Computer-assisted Negotiation and Mediation -Where We Are and Where We Are Going", *Negotiation Journal*, **11**(2), 117-121.

Spector, B. I., G. Sjosted, et al., Ed. (1994). *Negotiating International Regimes*. London: Kluwer.

Strauss, J.S. and R. Corbin, (1994). "Grounded Theory Methodology", in: *Handbook of Qualitative Research*, N. K. Denzin, and Y. S. Lincoln, (Ed.), Thousand Oaks: Sage.

Teich, J., H. Wallenius, et al. (1995). “A Decision Support Approach for Negotiation with an Application to Agricultural Income Policy Negotiations”, *European Journal of Operational Research*, **81**, 76-87.

Ting-Toomey, S. and G. Gao (1991). “Culture, Face maintenance, and Styles in Handling Interpersonal Conflict. A Study of Five Cultures”, *International Journal of Conflict Management*, **2**, 275-296.

Tung, R. L. (1988). “Toward A Conceptual Paradigm of International Business Negotiations”, *Advances in International Comparative Management*, **3**, 203-219.

Walker, G. B. (1990). "Cultural Orientation of Argument in International Disputes: Negotiating the Law of the See", in: *Communicating for Peace: Diplomacy and Negotiation*, F. Korzenny and S. Ting-Toomey, (Ed.), Newbury Park, CA: Sage, 96-117.