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THE EFFECTS OF CULTURE IN COMPUTER-MEDIATED NEGOTIATIONS

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ABSTRACT

The paper explores the impact of culture on anonymous inter- and intra-cultural negotiations conducted via the Internet using a Web-based negotiation support system (NSS). In e-negotiations, technology acts as a moderator in the relationship between culture and negotiation behavior. This implies that patterns of cultural impact on negotiations can be different from face-to-face negotiations. Communication technology reduces the transmission of social cues and increases the importance of explicit communication. Thus, cultural dimensions such as power distance, which rely on social cues, are reduced in their impact, while the impact of communication-related dimensions of cultures such as high vs. low context is amplified by the system. The empirical analysis of these effects is based on a set of bilateral negotiations involving 1366 participants carried out with the Web-based NSS Inspire. It indicates a significant influence of culture, particularly regarding negotiators' expectations. We also found significant cultural differences with regard to communication patterns emerging during the negotiation process and outcomes of negotiations. Our results also indicate that as the negotiation process progresses, individual differences between negotiators, including their approach to problem solving, become more important than their cultural characteristics.

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INTRODUCTION

Information technology and in particular the Internet are creating a new situation for international negotiations. Geographically dispersed parties can get into direct contact and enter sophisticated negotiations (Kappeler 1996; Studemeister 1998). This new technology allows individuals and organizations from different cultures to negotiate with each other, without being aware of their partner's nationality or culture. One could argue that in the impersonal world of electronic information exchange, the importance of cultural differences diminishes. Furthermore, the use of English as lingua franca could further reduce any cultural impact on negotiations. This paper approaches these issues from an empirical point of view and presents the results of a large set of experiments conducted with the use of Web-based negotiation support systems (NSS). The focus of the study is to determine if a cultural influence can still be detected in negotiations that are carried out anonymously, via a technical medium.

The influence of culture on negotiations has been studied using various methods, including case studies, laboratory and classroom experiments, and recently, experiments involving remote groups. Case studies of real-life negotiations allow for direct assessment of all the facets of sometimes very complex negotiations (Gulliver 1979; Walker 1990; Faure and Rubin 1993). They provide rich material at the cost of the comparability of the results across negotiation problems and cultures. In contrast, laboratory and classroom experiments allow for a significant level of control over the problem and the environment in which it is solved (Graham 1985; Adler and Graham 1989; Roth 1995; Graham and Mintu-Wimsatt 1997) but the authenticity of the task suffers.

CONTRIBUTION

The paper integrates the existing literature on cultural impacts on the use of information systems and on intercultural negotiations and—based on the analysis of electronic negotiations—it extends the current research in several directions. By considering intercultural negotiations, this paper builds on a large body of the existing literature on international negotiations. However, this literature rarely considers the impact of communication technology and analytical negotiation support systems on such negotiations. The present paper explicitly introduces technology as an intervening variable in the relationship between culture and negotiation processes.

Previous research in information systems studied the impact of culture mainly in the context of individual usage and adoption of information technology (IT) by users from different cultures. Case or field studies were used within a single culture in order to identify the impact of that specific culture on the process and its outcomes. Questions of intercultural use of IT were studied mainly in the context of group support systems (GSS), where both culturally homogenous groups in different cultures and multicultural groups were studied. This paper looks at a different type of applications: namely, Web-based negotiation support systems (NSS) in a multicultural context.

The paper adds to the existing research on intercultural negotiation in the consideration of 10 countries and the volume of empirical data. Previous empirical studies on intercultural negotiations were often based on experiments that used subjects available at a given location. The Inspire negotiations analyzed here were carried out by users from a wide range of cultures at their home institutions located. The sample size of 1366 negotiation records by far exceeds the amount of data available in most previous studies.

The paper provides empirical insights into an area for which little theoretical and empirical research is available. It is an exploratory study, which can help to formulate questions for future, more focused research. From a practical point of view, it highlights the potential impact of culture on the way systems available on the Internet are used and thus underlines the necessity of considering cultural factors in system design.

Many experiments compare negotiations conducted in culture *X* with negotiations conducted in culture *Y* (Adler, Graham and Gehrke 1987; Graham, Mintu and Rogers 1994). Classroom experiments are typically brief and they are either repeated in different countries (Roth 1995) or involve both local and foreign students (Graham 1985; Adler and Graham 1989). Thus, they do not directly model international and inter-cultural negotiations (Drake 1995). Only in a few studies, intra-cultural negotiations are compared with cross-cultural ones (Adler and Graham 1989; Brett 1998).

Experimental studies often use face-to-face negotiations. This setting allows for natural and rich communication, but it also introduces a bias since the subjects know the culture of their opponents and may try to modify their behavior to attune to their counterparts. Further, it is difficult to recruit participants who represent a foreign culture. Typically, the participants in the experiment are studying at the same university (Adler and Graham 1989) or live and work in the same area (Brett 1998).

This paper uses a different approach to obtain empirical data on cross-cultural negotiations. Our database was collected in the course of about five years. The negotiations were carried out via an experimental Internet-based NSS Inspire (Kersten and Noronha 1999b). The design of the system allows for detailed logging of the negotiation process, as well as for administering questionnaires to participants before and after the negotiation. Negotiations carried out via Inspire differ in several aspects from previous inter-cultural negotiation experiments, including the location of experiments, time frame, medium and support, and anonymity.

1. Face to face experiments carried out in one location use expatriates from other cultures. The exposure of foreign students and employees to the culture of the country they (temporarily) reside in may have an influence on their behaviour. Furthermore, by restricting participation to expatriates, a sample bias could be introduced. Participants use the Inspire system from their respective home institutions, so these potential sources of bias are avoided.
2. The negotiations are conducted over several weeks and the participants can terminate or extend the negotiations. This is in contrast with the experimental face-to-face negotiations, which are carried out in an unrealistically short period of time.
3. Communication between the negotiators is performed via a Web-based system that allows for the exchange of both structured and unstructured information. The system includes support techniques allowing the participants to evaluate offers and counter-offers, and to view the negotiation history in both tabular and graphical formats. Thus, while the communication medium is less rich than in face-to-face negotiations, the analytical support offered in Inspire is usually not available.
4. The negotiations are carried out anonymously. Therefore, participants are initially not aware of their partners' cultures. They may reveal their identity and nationality to others if they wish to do so. However, the negotiators cannot verify their counterparts' identity disclosure. The absence of cues should reduce the influence of stereotypes and biases, which might be invoked when consciously negotiating with partners from a known, foreign culture.

Since 1996, more than 4000 negotiations have been carried out via Inspire. Most negotiators are students who participate in the negotiations as part of their courses held at various universities worldwide. This ongoing exercise helped to create a unique database of negotiation records, which can be used to study the impact of culture on negotiations at a larger scale than was previously possible. However, because the user community of a system like Inspire can not be controlled to the same extent as in laboratory experiments, the study presented here must be considered as an exploratory ex post analysis of the existing data rather than the outcome of a controlled experiment.

The results of our analysis not only confirm that culture influences negotiation through its effects on communication (Elgstrom 1990), but it also suggests that these influences are broad in scope. This study also confirms the finding that while electronic

communication decreases the communication richness, it is in fact a much richer medium than earlier believed (Lee 1994) and capable of promoting positive relational communication among people (Walther 1995). This research confirms that Web-based negotiations with anonymous partners do not neutralize individual differences or cultural influences and allows the "Netizens" to maintain their cultural roots.

In the next section, we discuss the concept and measurement of culture as well as earlier studies on its influence on inter-cultural negotiations. In this section we also present the framework underlying our research. The negotiations conducted via the Inspire system are described in the third section and the data as well as the analysis are provided in the fourth section, followed by conclusions and suggestions for further research.

CULTURE AND ITS INFLUENCE ON NEGOTIATIONS

Culture being one of the negotiators' characteristics may have direct impact on the negotiation processes. It may also influence the negotiators' perceptions, expectations and behavior thus having indirect effects on the processes and their outcomes. We discuss here the framework of analysis and its constructs which are used in this study.

Framework of analysis

Negotiations can be studied at the level of individual negotiators and at the group level where the interactions between the negotiators take place. In this study, we consider bilateral negotiations, with a group comprising two negotiators. Because culture is, by definition, a property of each individual negotiator, the focus of this study is on the individual level. However, not all dimensions of negotiations can be fully understood at the individual level, so our research framework depicted in Figure 1 also takes the negotiator's opponent into account.

This framework combines several interrelated constructs discussed in the negotiation literature (Sayer and Guetzkow 1965; Rubin and Brown 1975; Adler and Graham 1989). As a main exogenous factor, we consider 'negotiator characteristics' including culture. While negotiation processes and outcomes can also depend on other factors, such as the nature of the problem and the context in which the negotiations are performed, these factors are identical for all negotiations analyzed here and thus are not explicitly shown in our framework.

Negotiators' characteristics influence expectations, which are formed prior to entering the negotiation process (Tung 1988; Chan 1998). Based on these expectations and other characteristics, the negotiator selects a pattern of behavior during the process (White and Neale 1994), which in turn leads to a certain outcome for the negotiator. Evidently, the outcome of a negotiation does not depend solely on the actions of one party, but is jointly determined by the actions of both parties. Also, the negotiation process itself can be defined as a pattern of interactions, consisting of communication acts and responses and reinforcements. Thus, the negotiation process is clearly determined by both negotiators. However,

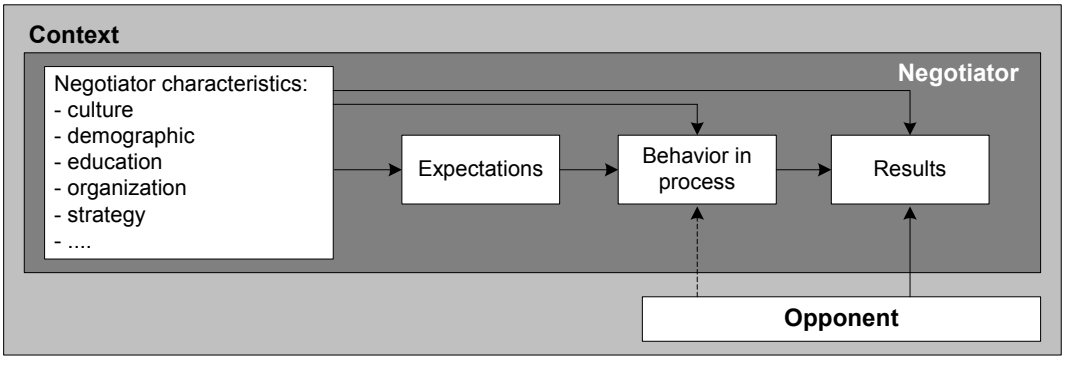

Figure 1. Framework of Analysis

planned reactions to (anticipated) behavior of the opponent are also part of a strategy, which is selected before the actual negotiations. As the focus of this study is on individuals rather than on negotiation dyads we consider behavior as an individual variable, which is only partly influenced by opponent characteristics.

In this study, we are mainly concerned with direct and indirect effects of culture on the other constructs (see Figure 1 and Appendix 1 for concepts and variables). Culture is thus the main negotiator characteristic studied here. The second important characteristic of negotiators is their *negotiation strategy*. In the literature on negotiations, the concept of 'atmosphere' is often used to describe the personal attitudes of the negotiators during the process. Chan, Graham and others suggest two main factors that contribute to the atmosphere and process: negotiation strategy and attractiveness (Graham and Mintu-Wimsatt 1997; Calantone, Graham and Mintu-Wimsattt 1998; Chan 1998). Since attractiveness refers to the personal relationship of negotiators, we do not consider it to be central in the context of anonymous, Web-based negotiations and therefore do not consider it in our empirical analysis.

Negotiation strategy can be described using the dual concern model, which considers both the negotiators' concern for their own outcome and their concern for the other party's outcome (Thomas and Killman 1974). By combining these two dimensions, four strategies can be identified. In the *contending strategy,* negotiators are concerned mainly with their own outcomes and less with those of the other party. Such negotiators tend to have high aspiration levels and make few concessions. The process is competitive, leading to "win-lose" agreements (Chan 1998).

Negotiators who have high concern for both their own and the other party's outcomes follow the *problem solving strategy.* They perceive the other party's outcome as instrumental for the achievement of their own outcomes and consider the negotiation as a way of solving a common problem to the satisfaction of both sides. *Yielding* and *inactive strategies* incorporate low concern for one's own outcomes. Actors pursuing inactive strategies would not enter into negotiations at all and actors applying a yielding strategy are prepared to meet the needs of their negotiation partners without considering their own needs. Hence, we consider these strategies to be less relevant in the context of this study, although we may also observe to some extent yielding and inactive behavior. Inactive behavior can be associated with the cases in which the negotiation deadline, which is usually set to three weeks, expired without a formal termination of the negotiation. This occurred in less than 3% of all negotiations analyzed here.

Apart from culture and strategy, we control for the subjects' gender and the role they play in the negotiation case. Other characteristics such as previous negotiations experience are not explicitly taken into account. This limitation is not made because we consider other factors to be of no influence, but because we intend to highlight the influences that are at the focus of our interest. Since most users of Inspire come from a rather homogenous population of business and information systems students, the potential impact of other factors, such as age and professional background, is rather limited.

Process characteristics involve the timing of offers, the amount of concessions made, arguments and their support, and other dynamic aspects. Since one important characteristic of the negotiations considered here is the use of an Internet-based NSS as the sole communication channel, system use and communication patterns are our main concern. In the Inspire system, users may communicate via specific, formalized offers, or via free-format text messages; as well as use a combination of both.

Results and post-negotiation assessments are task-related and satisfaction-related outcomes (Pinsonneault and Kraemer 1989; Gray, Vogel and Beauclair 1990). The former are objective outcomes defining the compromise achieved and the associated utility levels. The satisfaction-related assessment is a subjective evaluation of the negotiation, the results, and the negotiator's and the counterpart's performance. In the present study, we focus on task-related outcomes. Satisfaction is an important concept especially in the context of

evaluating the negotiation support system and its capabilities. But an analysis of satisfaction would also have to take into account system characteristics and the specific use of various features of the system and thus is beyond the scope of the present study.

In the Inspire negotiations, *contextual factors* like specifics of the negotiation problem, organization(s) within which the negotiation is conducted, and means and technologies of communication are kept constant. All subjects deal with the same problem, which is administered to them in the same way. Negotiators are not informed as to whether they are bargaining with someone from their own country or from a different country, but they can provide this information during the process. Ex ante, the difference between inter- and cross-cultural negotiations is not noticeable to them, nevertheless, we control for this factor in our analyses.

The concept of culture

Culture can be defined as the collective programming of the mind, which builds on shared norms and values (Hofstede 1980, p.21). Culture is a mechanism of collective sense making; it binds individuals in groups and distinguishes one group of people from another. In this study, we are especially concerned with cultural differences between nations (countries), although we control other factors such as gender that exhibit significant variation within our group of subjects.

The study of cultural differences in Web-based negotiations has to integrate several concepts. Besides the concept of culture itself, we have to consider the impact of technology, i.e. the negotiation support system, which imposes restrictions on the behavior of subjects and at the same time enables and supports specific behavior. Walther (Walther 1997) goes further and argues—using his findings on computer-mediated communication—that "*Computer mediated communication is an amplifier or magnifier of social psychological and communication phenomena* ..." (p. 360).

The impacts of technology on cultural behavior have been studied in research on group decision support systems (GDSSs) and, as GDSSs are now called, in group support systems (GSSs). These studies led to interesting, although conflicting results. A recent survey (Tung and Quaddus 2002) compares 30 studies dealing with the relationship between culture and results obtained with the use of GSSs. In 16 studies that involved laboratory experiments, field and action research, empirical analyses were conducted using culture as an independent variable. Twelve of these studies (75%) reported differences in the process or results of GSS supported tasks between subjects from different cultures (Tung and Quaddus 2002, p. 180ff).

Some of the studies suggest that support systems allow to "*better accommodate diversity*" (Cukier and Middleton 1996, p 296) than face-to-face communication settings. Atkinson and Pervan (1998) state that anonymity leads to higher productivity in all cultures they studied. Another study also confirms this finding but additionally indicates that the productivity gain is higher for high power distance cultures (Tung and Quaddus 2002, p. 182). Daily and Teich (2001) report that multiethnic group members who use GSS make more evenly spread contributions than similarly composed unsupported groups. Chidambaram and Kautz (1993) note that the anonymity of electronic message systems, electronic recording and display capabilities, facilitate communication of diverse groups and lead to better outcomes. These studies indicate that the influence of culture on behavior in computer-mediated communication is partly reduced and partly amplified. This may be due to different dimensions along which cultures can be distinguished. In the following section, we discuss different dimensions of culture and their possible influence on computer-mediated negotiations.

The most popular classification scheme based on four dimensions of culture was developed by Hofstede (1980); other dimensions were proposed by Adler (1993a), Hall (1976), and O'Hara-Devereaux and Johansen (1994). An overview of cultural dimensions which should be taken into account in a cultural analysis is given in Table 1.

Table 1. Dimensions of culture

Hofstede	Adler	Hall	O'Hara-Devereaux & Johansen
Individualism – collectivism	Relationship to other people		
Power distance			Equality-power
Uncertainty avoidance			
Masculinity – femininity	Activity		
	Nature of people		
	Relationship to nature		
	Space	Space	
		Context	Context
	Temporal orientation	Time	Time
			Language
			Information flows

The *individualism/collectivism dimension* distinguishes whether the common values and beliefs of the community emphasize the needs of an individual or the needs of the group. Previous research has shown a significant impact of this dimension on problem solving approach and atmosphere during face-to-face negotiations (Chan, Triandis, Carnevale et al. 1994; Graham, Mintu and Rogers 1994; Lituchy 1997). Even though, in anonymous negotiations, the negotiators initially do not know whether they bargain with an in-group or out-group partner we expect that individualistic vs. collectivistic values of negotiators also have an impact in computer-mediated negotiations.

Power distance measures the perception of, and attitude towards, authority and power. Previous research in face-to-face communication suggests that status as well as role (e.g. buyer or seller) of the negotiators influence negotiations in some cultures (Graham, Mintu and Rogers 1994; Graham and Mintu-Wimsatt 1997). Studies by Brett, Adair et al. (1998) support the assumption that social status and roles are more important in high power distance cultures than in low power distance cultures. However, others state that the removal of social context cues in computer-mediated communication has a "*substantial deregulating effect*" (Sproull and Kiesler 1986; Sproull and Kiesler 1991 p. 1492). This is supported by Tan, Wei et al. (Tan, Wei, Watson et al. 1998), who report that computer-mediated communication reduced status effects in two cultures. We therefore expect only a weak impact of power distance in electronic negotiations, as cues of social status are to a great extent not visible and status differences are not easily observable in this context. However, the role of the negotiator (i.e., buyer or seller), which is obvious to the parties, can influence negotiation behavior in our experiments.

The *uncertainty avoidance* dimension captures the way members of a culture handle risk and uncertainty. Generally, attitudes towards risk and uncertainty are an important dimension for the analysis of negotiation processes. Although we have no reason to believe that the use of a NSS dampens the influence of this dimension on the behavior of negotiators, we do not expect a high impact of this dimension in our analysis. In the problem used for the experiments, the outcomes of all alternatives were known with certainty to both partners, thus individual (or culturally determined) risk attitudes should have no impact.

The *masculinity/femininity dimension* reflects the degree to which either masculine norms such as achievement and material orientation or feminine norms like relationship, people orientation and quality of life are important in a culture (Hofstede 1980, p. 205). Alternative labels to this dimension

Alternative labels to this dimension are 'achievement' for high masculinity versus 'nurturance' for low masculinity cultures (Chesebro 1998), and the 'activity dimension' proposed by Adler (1993a), which captures the attitude of cultures towards work activities. Although Graham, Mintu et al. (1994) did not find a significant impact of this dimension on behavior in face-to-face negotiations and outcomes, we assume that it is an important variable for two reasons. Firstly, we believe that this dimension plays a role in formulating expectations of negotiators prior to negotiations. Secondly, masculine norms are related to a high task orientation and competitiveness whereas feminine values are related to an orientation towards social relationships. When using an NSS, this effect could be amplified, as the system facilitates task orientation (Kersten and Noronha 1999a).

In addition to the dimensions already discussed, Adler's (1993a p. 32) dimensions also encompass the *nature of people*, i.e. beliefs about other people, whether they are good or evil, and assumptions whether people can change their behavior and attitudes. The impact of this dimension on negotiation behavior should not be reduced by the implementation of a NSS.

The dimension *relationship to nature* is related to the basic assumptions of cultures whether humans can control nature or have to adapt to nature. Concerning this dimension we do not expect an important influence on the behavior of negotiators, given the specific context of the case in our analysis.

Another dimension of Adler's classification is the orientation of a culture towards *space*, i.e. the extent to which individuals operate in a private or public manner. The system used for this analysis provided a private space for each negotiation and we therefore ignore this dimension in our analysis.

The *context dimension* distinguishes between high and low context cultures based on the importance of contextual factors in communication processes (Hall 1976). The content of a message can only be fully understood in the context of its transmission, i.e. nonverbal aspects of communication, physical environment, social status and power relationships, roles etc. In high context cultures, information is either contained in the physical context or internalized in the person and therefore an explicit coding is often not necessary, whereas in low context cultures messages are transmitted explicitly and directly (Ting-Toomey and Gao 1991).

In face-to-face negotiations, the context dimension proved to have an important impact on the behavior of negotiators. In Graham's research (1985), the Japanese, having a high-context culture, shared less information directly (e.g., answers to questions and direct negative reactions) than other negotiators. Brett (1998) found that Japanese shared information through the use of a relatively large number of offers and counteroffers. In anonymous electronic communication, the social and physical context is strongly reduced. Here, context can only be established by transmitting additional information that goes beyond mere offers. This special context should, therefore, lead to different communication behavior of people from high context cultures and low context cultures. We therefore expect to observe such differences in computer-mediated negotiations.

The *time dimension* describes the orientation towards time and it is linked to the context dimension. High-context cultures tend to be polychronic, which means that people are involved in many different activities with different people at the same time (Hall 1976, p. 150). Additionally, a rather circular time perspective stresses high involvement (which produces a greater degree of context) and completion of transactions rather than adherence to a predetermined schedule. People in monochronic cultures, on the other hand, have a linear time perspective, they prefer to undertake one activity at a time and emphasize priority setting, schedules, segmentation, and promptness. Although the time perspective is an important dimension in inter-cultural negotiations (Mayfield, Mayfield, Martin et al. 1997), we expect that in the given experimental setting (predetermined schedule of negotiations), this dimension has less influence on the behavior of the subjects.

The *language* dimension of O'Hara-Devereaux and Johansen (1994) measures tolerance and acceptance of individuals towards (lingual) minorities within a culture (Cukier

and Middleton 1996). Generally, language and therefore communication and thinking patterns are highly interrelated with culture (Kaplan 1966). Consequently, language is certainly an important dimension to study in computer-mediated negotiations. Kaplan (1966) shows that even if persons communicate in a foreign language, communication and thought patterns of the maternal language (and culture) are evident. Thus, this dimension should influence negotiators' behavior.

The dimension *information flow* distinguishes whether members of a culture prefer objective information for decision making and problem solving processes or rather rely on informal networks as information sources (Cukier and Middleton 1996 p. 299). NSSs and GSSs are developed to make decision and negotiation processes more transparent and objective. Empirical research delivers conflicting evidence concerning this issue. Sarbaugh-Thompson and Feldman (1998) found higher task orientation in computer-mediated group processes while Walther (1995) did not observe a difference in task orientation between face-to-face groups and groups in a GSS environment. Despite these inconclusive results, we assume that negotiators with a cultural norm of fact-based and objective decision making are assisted better by a NSS than negotiators of cultures who usually base their decisions on informal sources. We expect a NSS to serve as an amplifier of these cultural aspects. We also expect the cultural variations to be clearly visible in NSS-supported negotiations.

In summary, this analysis leads us to a focus on cultural dimensions concerning *communication aspects*. Currently, we do not know much about interaction effects between technology and culture and its impact on negotiation processes. Only a few of our suggestions are already empirically supported, hence the majority of them must be considered as tentative propositions. Given the data we have from our experiments, we cannot test hypotheses using computer-supported vs. face-to-face groups. But the data available represents a wide spectrum of users from different cultures in a computer-based setting. Hence, in this exploratory analysis of computer-mediated negotiations, we will focus our attention on those dimensions where cultural differences should be visible from *communicational patterns and information flow*. Additionally, as previously shown, *individualism, collectivism, masculinity and femininity norms* and the related concepts of achievement orientation should play an important role in the development of expectations as well as in the problem solving approach.

RESEARCH SETTING

The experiments which we describe here were carried out using the Inspire system. The system is available on the Internet and used as a teaching tool at a number of universities around the world. This creates a rather open environment as compared to traditional laboratory experiments. Nevertheless, by keeping many negotiation parameters constant, some control can be exercised over the experiments.

Negotiation case

In all experiments carried out, a single case based on a simulated buyer-seller business negotiation for one commodity was used. The negotiations "Itex-Cypress" are conducted between representatives of two companies: Itex Manufacturing, a producer of bicycle components, and Cypress Cycles, a builder of bicycles. As the users' English proficiency might be low, the case is fairly simple and well structured. The case description fits one and a half pages. In order to verify the case and the language difficulty, the case was tested with two groups of students (65 in total) taking their first university-level ESL (English as a second language) course.

In writing the case an effort was made to make it 'culture neutral' as much as possible: the subject of the negotiation (bicycle) is known in every country.[1] While it is probably impossible to invent names which are equally unrelated to any language in the world, the names used in the case are rather neutral with respect to culture and all users are aware that these names bear no relationship whatsoever to their opponent's country of origin.

Both parties are presented with their side of the case; they are told that they are to

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

represent Itex (or Cypress) and that their companies are interested in achieving a compromise. They are also informed that there are other suppliers and buyers; a participant may terminate one negotiation and a request new one. Hence a breakdown in negotiations is possible.

There are four issues that both sides have to discuss: the price of components, delivery times, payment arrangements and terms for the return of defective parts. For each issue there is a given set of options, i.e., issue values. Altogether, there are 180 complete and different potential offers (alternatives) that contain all four issues.

The participants are not given issue priorities. Thus they have to decide if, for example, the price is more important than the delivery time. They also have to determine the specific trade-off values between issues. Each side, however, is given a clear indication as to the desirability of the options (issue values) in terms of the direction. There are several reasons for requesting that the participants specify their own preferences, rather than use standard ratings set by the experimenters. Firstly, there are convincing arguments that preference structures can depend on culture. Hofstede's study, for example, gives reason to expect cultural dependence of utility functions that reflect differences in the risk attitude (1997). In the simulation, the participants' partial utilities (part-worths) regarding each issue can be linear as well as non-linear (convex or concave) and thus represent different risk attitudes (Keeney and Raiffa 1976; Schoemaker 1982). An imposition of preferences could introduce the experimenters' cultural bias. Finally, by allowing participants to establish their own priorities within each issue, we expect them to be more involved in the role-playing, and to pursue their own negotiation style.

The Inspire negotiation support system

Inspire has its roots in negotiation analysis (Sebenius 1992) and such negotiation support systems as Nego (Kersten 1985) and Negotiation Assistant (Rangaswamy and Shell 1997). One research goal in its development was to study the use of decision analysis in the practice of negotiations. A major innovation of the Inspire system is to offer users both a communication platform to conduct negotiations as well as analytical and visual tools to assist users in the negotiation process.

Via the communication platform, negotiators exchange offers consisting of values for all four issues (price, delivery, payment, return of defective parts). Additionally, they can also attach text messages to offers or exchange messages without offers. This opportunity for enriched communication not only makes the negotiation process more realistic but also allows to provide contextual information (Kersten and Noronha 1999a). By exchanging information about attitudes and expectations, negotiators can create a positive negotiation atmosphere more easily and develop a personal relationship based on mutual understanding and trust. They can also exert pressure on the negotiation partners.

In addition to the communication platform, Inspire contains analytical features to support users in their decision making in each of the three phases of negotiations: pre-negotiation, negotiation, and post-settlement (Kersten and Noronha 1999b).

In the pre-negotiation phase, the system is used to analyze the scenario and evaluate feasible alternatives (possible offers). In this phase, each user specifies his/her preferences and the system constructs the user's utility function. The system uses hybrid conjoint measurement for utility construction and discrete optimization (Green and Wind 1973; Angur, Lotfi and Sarkis 1996). Conjoint analysis is simple, does not impose major requirements on the users, and does not require linearity assumptions.

During the negotiation phase, the system provides personal utility values of decision alternatives considered by the user and of the offers submitted by both parties. The system records the process and provides a negotiation history as well as a graphical representation of the negotiation dynamics. The Inspire system presents this information to both parties in a symmetric manner. Each party can see only those ratings which are based on their own preferences (utilities), and the color-coding is uniform: green for the supported user (offers sent) and red for the opponent (offers received). This visualization of the negotiation dynamics provides a rich representation of the process (see Figure 2), but does not guide the

user towards a specific behavior during the negotiation (Silver 1990).

After the parties agree upon a compromise, the system determines whether the achieved compromise is non-dominated (efficient). If it is inefficient, the system suggests the post-settlement phase. This phase begins with the computation of efficient alternatives which dominate the achieved compromise. Several alternatives are selected and displayed. The parties may then continue their negotiation until they reach an efficient compromise.

Figure 3 explains the relationship between the support features of Inspire and the main objective of our research: the role of culture on the behavior of the negotiators who use a NSS. The support features available in Inspire can be seen as limitations that restrict the negotiators' scope of activities and the use of various forms of communication. They can also be considered in terms of facilitation in that they allow using a variety of tools that can help and support the negotiators.

Procedure

Most of the subjects of this study are graduate or MBA students who use the system as a part of their course assignments. The courses range from information systems, decision support systems, negotiations, law, international business, to English as a second language, and tourism. Examples of students' assignments are available at: http://interneg.carleton.ca/interneg/training/inspire.

Inspire negotiations are set up once every 2-3 months for groups of students from several universities; there are typically between 100 and 200 students from 3-5 universities who negotiate at the same time. Students log-in to the system by providing the negotiation name and the user name. Every negotiator knows only his/her counterpart's user name. Although users are not prevented from revealing their identity or other personal information, they cannot verify the information provided by their counterparts because of the geographical distance involved. During the negotiation, the parties are in contact only with each other, the experimenters have no contact with the users.

Negotiations are conducted over three weeks with an imposed deadline. Upon request from both negotiators, the deadline may be extended. At any point in time each of the two negotiators may terminate the negotiation.

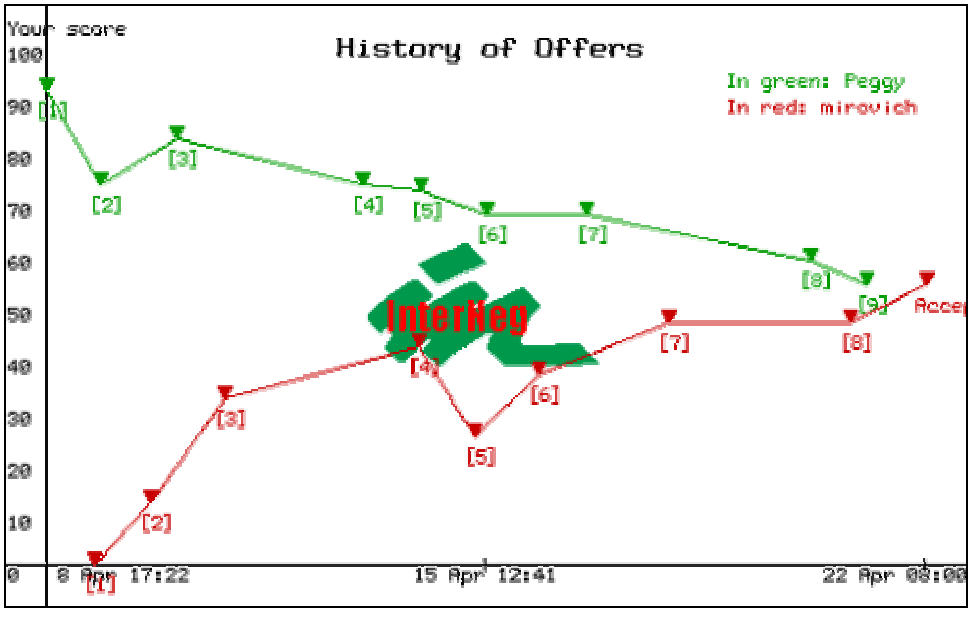

Figure 2. Graphical representation of the negotiation history

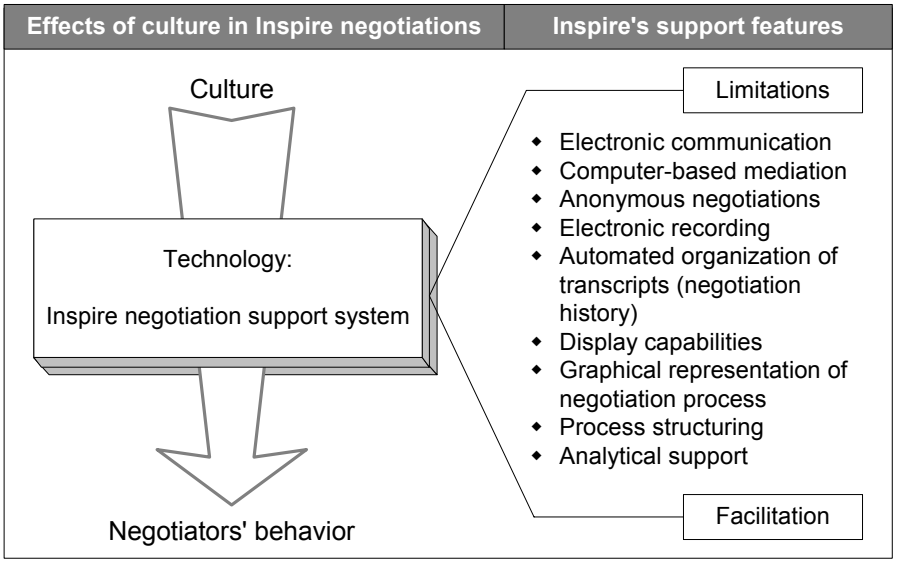

Figure 3. The impact of culture on NSS-supported negotiation behavior

Inspire users do not receive any incentives from the experimenters. Those who conduct negotiation as a part of their course work are motivated by assignment requirements. However, their choice of strategy and willingness to achieve a compromise cannot be verified by their instructors because: (1) the negotiation results also depend on the opponent, and (2) instructors do not receive any information regarding their students' activities.

There is one exception in the experimenters' lack of control of the Inspire negotiations. If one negotiator complains that her/his counterpart does not participate in the negotiation, then such a counterpart receives an e-mail from the system administrator. She/he is given three days to engage in negotiations. If the counterpart remains inactive, the negotiation is terminated and the negotiator is given an option of entering a new negotiation with another counterpart. In each series of negotiations there is less than 5% of the inactive partners. Another possible influence on the users' activities is the negotiation deadline imposed by the Inspire system, and also the instructor's deadline for submitting an assignment which is beyond the control of the experimenters. However, all instructors accept that the negotiation may take at least three weeks.

RESULTS

The results presented here are based on data from negotiations carried out between 1996 and 2000. Although the negotiations covered a period of five years, the entire setup remained unchanged throughout this time, so all data points are comparable. However, because of the openness of the system, these analyses must be considered as explorative rather than the outcome of strictly controlled experiments.

Data and user characteristics

Results reported in this paper are based on data collected from 1102 negotiations between 2204 users from 55 countries. Inspire provides a considerable amount of information from automatically generated process logs, and from questionnaires which the users fill in at the beginning and the end of their negotiations.

As outlined above, we use the national culture as an independent variable. In most of the previous studies, the country in which the experiments were conducted is used as an indicator of the national culture of subjects, e.g. (Druckman, Benton, Ali et al. 1976; Adler and Graham 1989; Herbig and Kramer 1991; Rubin and Sander 1991; Adler 1993b; Graham and Mintu-Wimsatt 1997). This assumption may fog the results—particularly for countries with large populations of recent immigrants and foreign students.

With university education becoming increasingly international the current country of residence can be a misleading indicator of a

user's national culture. Therefore, we restricted our sample to users for whom both the country of birth and the country of residence was the same. This country was then used as an indicator of the national culture. Although this selection procedure does not take cultural diversity within one country into account, as is the case for example in Canada and the USA, we can control at least for migration to some extent (Kersten and Noronha 1999a). Additionally, to obtain sufficient cell populations in the analyses of variance that were performed, only countries with at least 60 users were considered.

In total, 1366 data records of individual negotiators fulfilled these two conditions and were used in our analysis. The sample of the Inspire users that is used in this study is given in Table 2.

Single-equation General Linear Models (GLMs) were estimated for metric dependent variables. For dependent variables measured on an ordinal scale, logistic regression models were estimated. In reporting the results of these estimations, effects significant at the 1% confidence level are printed in **boldface**, results significant at the 5% level in *italics*. The variables used to operationalize the concepts of our research framework and their descriptive statistics are given in the Appendix 1.

In addition to the country of residence and gender, we also considered the problem solving attitude (PSA) as a characteristic of negotiators. Following Calantone, Graham et al. (1998) we used factor analysis to derive a PSA index from five Likert-scale variables measuring the *cooperation*, *exploitation*, *honesty*, *informativeness* and *persuasiveness* of the opponent, which were obtained from the post-negotiation questionnaire. The factor loadings obtained for the first two principal factors are given in Table 3.

The first factor can clearly be interpreted as a problem solving strategy. The loading associated with variable "exploitative" has the opposite sign from the other variables because exploitativeness describes a negative attitude. Persuasiveness may be interpreted in both directions. It is positively correlated with the other characteristics, indicating perhaps

Table 2. Composition of sample

Country	Gender			Country of opponent		Total
	Female (%)	Male (%)	Undeclared (%)	Other (%)	Same (%)	
Austria (AT)	21 (35)	39 (65)	--	37 (62)	23 (38)	60
Canada (CA)	107 (33)	139 (43)	75 (24)	120 (37)	201 (63)	321
Germany (DE)	61 (51)	58 (48)	1 (1)	101 (84)	19 (16)	120
Ecuador (EC)	74 (53)	64 (46)	1 (1)	92 (66)	47 (34)	139
Finland (FI)	39 (33)	64 (53)	17 (14)	66 (55)	54 (45)	120
Hong Kong (HK)	22 (32)	8 (12)	39 (56)	53 (77)	16 (23)	69
India (IN)	19 (10)	138 (77)	23 (13)	99 (55)	81 (45)	180
Russia (RU)	48 (52)	43 (46)	2 (2)	35 (38)	58 (62)	93
Taiwan (TW)	26 (43)	33 (55)	1 (2)	46 (77)	14 (23)	60
USA (US)	71 (35)	122 (60)	11 (5)	132 (65)	72 (35)	204
Total: N (%)	488 (38)	708 (52)	170 (12)	781 (57)	585 (43)	1366

Table 3. Factor loadings for problem solving and contending strategies

Opponent perceived as...	Factor 1	Factor 2
Cooperative	0.81456	-0.23033
Exploitative	-0.28687	0.86231
Honest	0.81156	-0.07342
Informative	0.75417	0.21743
Persuasive	0.60610	0.54545

that an opponent with positive characteristics is also more persuasive than the one with negative characteristics.

Interpretation of the second factor is more difficult. Given the orthogonal property of factor analysis, it encompasses effects not explained by the first factor. Factor loadings for this factor are particularly high for the question describing exploitativeness. An opponent with a high score on the second factor is thus pursuing a contending strategy, showing low concern for the partner's outcome.

In contrast to the other variables describing a negotiator, problem solving attitude is not derived from self reported intentions in post negotiation questionnaires as in the experiments by Graham, Mintu et al. (1994; 1997), but from the perceptions of the counterpart after the negotiation. Although this form of measurement could also introduce biases, we believe that the assessment of PSA of the opponent based on experiences is at least to some extent more reliable than self reported PSA strategy.

We use PSA as an independent variable for process and outcome analysis. However, we also investigated if our measure of PSA was significantly different for the 10 countries included in our study or if it was influenced by other factors.

When considering the entire negotiation dyad, two PSA levels have to be distinguished for the two negotiation partners. In the following tables, we denote the PSA level of a negotiator by OwnPSA and that of his/her opponent by OppPSA.

Table 4 shows the results of the GLM estimations of variables[2] influencing PSA values. Disclosure of the negotiator's identity (OwnDiscl) had a significant effect on the perceived attitude at a confidence level of about 1%. Negotiators who disclosed their identity were perceived as having an attitude more oriented towards problem solving than those who did not disclose. As was expected, a higher score also caused the opponent to perceive the negotiator to have a higher PSA. The overall fit of this model is rather low (R^2=0.0744). Since our measure of PSA is based on subjective evaluation given by the opponent, many other personal factors beyond those measured here might have influenced the relationship between negotiators and thus entered these evaluations.

Table 4. Variables influencing perceived PSA

	Source	DF	F Value	Pr>F
OwnPSA	CReside	9	0.78	0.6373
R^2=0.0744	NegoCase	1	0.09	0.7634
	Gender	2	1.26	0.2838
	HighExp	1	0.26	0.6091
	InCtry	1	0.10	0.7483
	OwnDiscl	**1**	**5.92**	**0.0152**
	OppScore[1]	**1**	**6.46**	**0.0112**
	OppGender	2	2.80	0.0616
	OppHigh	1	0.29	0.5898
	OppRes	9	1.24	0.2653

[1] OppScore, OppGender, etc. describe the opponent's score, gender, expectation and residency

Further analysis of the parameter values indicates weak influence of the opponent's (but not the negotiator's) characteristics on the perceived PSA. Female users perceived their partners to have a higher PSA than male users ($\beta_F - \beta_M$ = 0.17968, t=2.28, p=0.0232). Although the overall parameter for culture (country of residence) is not significant for neither the negotiator nor the opponent, there are some weakly significant effects for individual countries. Users from Austria perceived their negotiation partners to have a lower PSA (β=-0.36370, t=-2.22, p=0.0268), users from Russia assigned a higher PSA (β=0.38027, t=2.26, p=0.0241). Similar findings were reported by Calantone, Graham et al. (1998), who measured PSA in both ways, self reported and perceived by opponent. Hence, our results suggest that the negotiators' characteristics (including culture) appear to be unrelated to PSA which contradicts previous findings (Graham, Mintu and Rogers 1994).

Expectations

We use three variables to measure expectations: *utility of the expected compromise* (EScore), *utility of the worst acceptable compromise* (RScore), and *expected friendliness of the negotiation* (EFrndly). The first two variables are computed using the participant's direct and indirect input. In the pre-negotiation

[2] Description of variables can be found in Appendix 1.

questionnaire each participant formulated the expected compromise and the reservation levels in terms of issues and their values. After filling in the questionnaire, the negotiators were requested to specify their preferences, and their utility function was then constructed. This made it possible to calculate the utility values of the expected and the worst compromise. Expected friendliness was obtained from the pre-negotiation questionnaire.

To test for possible influences of culture on expectations, we estimated GLM equations for the three dependent variables. The results of these estimations are given in Table 5.

Table 5. GLM models: expectations

Dependent Variable	Source	DF	F Value	Pr > F
EScore	**CReside**	9	9.75	**<.0001**
(R^2=0.1035)	**NegoCase**	1	12.47	**0.0004**
	Gender	2	0.21	0.8130
	OwnPSA	1	0.37	0.5432
RScore	**CReside**	9	3.16	**0.0009**
(R^2=0.0519)	**NegoCase**	1	7.80	**0.0054**
	Gender	2	3.87	*0.0213*
	OwnPSA		0.06	0.8103
EFrndly	**CReside**	9	7.80	**<.0001**
(R^2=0.0919)	NegoCase	1	2.66	0.1033
	Gender	2	4.35	*0.0132*
	OwnPSA		0.79	0.3734

Again, the R^2 values are rather low for all three models. This indicates that a large fraction of variance in expectations is not explained by the variables which we analyzed. Since expectations are a highly subjective construct, it is likely that other personal characteristics could have a strong impact on expectations. However, our results indicate that beyond these individual factors, which cannot be controlled or taken into account when developing NSS, *cultural factors consistently have a significant effect on all three expectation variables*.

To analyze the effects individually for each country, we tested the regression parameter of each country's dummy variable against the average of all parameter estimates. The results for the two expectation variables concerning the final score are represented in Table 6.

Users from Ecuador had exceptionally high expectations with respect to outcomes, which, to a lesser extent, are also reflected in their reservation levels. Possible explanation of the strong impact of the user's culture on expectations is the high value of masculinity of Ecuador in comparison to the other countries in our sample. A consistently negative impact is present for the users from Germany. But the impact of culture on expected scores and reservation scores is not always parallel, as can be seen in the results for e.g. Russia and the USA.

Expected scores and reservation scores are also influenced by the role of the negotiator. Compared to sellers, buyers had higher expected scores (β=5.23243, t=3.53, p=0.0004) as well as higher reservation scores (β=4.97908, t=2.79, p=0.0054). Gender had a weakly significant effect on reservation scores. Compared to the baseline estimate for users who did not declare their gender, the reservation score of female users was higher by 1.34101 points (t=0.43, p=0.6646) and of

Table 6. GLM parameter estimates: expected and reservation scores

	EScore			RScore		
	Parameter	**t Value**	**Pr > |t|**	**Parameter**	**t Value**	**Pr > |t|**
Austria	-4.74597	-1.63	0.1042	-0.60358	-0.17	0.8625
Canada	-2.65383	-1.70	0.0898	1.63678	0.87	0.3859
Germany	**-11.64617**	**-4.56**	**<.0001**	*-7.54955*	*-2.48*	*0.0135*
Ecuador	**17.87107**	**7.94**	**<.0001**	*5.85667*	*2.18*	*0.0295*
Finland	0.46347	0.21	0.8356	*6.14481*	*2.30*	*0.0215*
Hong Kong	0.34901	0.10	0.9196	1.80826	0.43	0.6652
India	2.40952	1.19	0.2338	-3.35234	-1.30	0.1930
Russia	2.18746	0.84	0.3996	**-9.94937**	**-3.21**	**0.0014**
Taiwan	-1.35238	-0.46	0.6442	3.25025	0.92	0.3590
USA	-2.88218	-1.60	0.1097	2.75806	1.28	0.1997

male users by 6.02009 points (t=1.98, p=0.0481), which led to the significant overall effect indicated in Table 5.

Expectations of buyers and sellers were markedly different between countries, as Table 7 shows.

However, in a GLM model, the interaction term between country and role turned out to be not significant (F=1.12, p=0.3448).

The parameter estimates for expected friendliness are shown in Table 8. Users from Ecuador and Russia expected significantly more friendly negotiations than the average. The expectations of users from Finland, Hong Kong and India were significantly more pessimistic with respect to the negotiation friendliness. In addition, compared to the reference group, male users (β=-0.22040, t=-2.37, p=0.0179) expected negotiations to be less friendly than female users (β=-0.07146, t=-0.74, p=0.4601).

Communication behavior

In our analysis, we consider communication behavior as an individual construct that is a property of an individual negotiator. While one might argue that communication always involves two parties, our focus is on the use of communication as a way to conduct negotiations and achieve the negotiator's goals, more or less independently of the opponent's characteristics. This point of view was confirmed by estimating models including the opponent's characteristics as independent variables, which led to similar results as the individual models presented here and did not improve the fit of the model significantly.

The first aspect of communication we studied is the extent to which various forms of communication provided by Inspire were used. Inspire enables users to send structured offers, attach textual messages to such offers and to send textual messages independently of offers. The number of times each of these features was used is measured by the variables Ofr, OfrwMsg, and Msg, respectively. Table 9 summarizes the results of GLM models in which the usage of these three forms of communication is explained by individual characteristics of the user.

Table 7. Expected scores for buyers and sellers

	Buyer EScore		Seller EScore		
Country	**Mean**	**N**	**Mean**	**N**	**Diff. of means**
Austria	72.13	41	60.32	19	11.82
Canada	73.00	181	65.94	140	7.06
Germany	64.63	54	59.41	66	5.22
Ecuador	89.92	52	88.26	87	1.66
Finland	71.24	70	69.78	50	1.46
Hong Kong	70.96	12	66.25	57	4.71
India	73.26	77	71.24	102	2.02
Russia	71.66	32	70.77	61	0.89
Taiwan	63.33	9	72.98	51	-9.65
USA	70.56	102	63.50	102	7.06

Table 8. GLM Parameter estimations for expected friendliness

	Parameter	t Value	Pr > |t|
Austria	0.04013	0.35	0.7287
Canada	-0.09654	-1.56	0.1195
Germany	-0.06981	-0.69	0.4906
Ecuador	**0.65754**	**7.37**	**<.0001**
Finland	*-0.17931*	*-2.03*	*0.0431*
Hong Kong	*-0.28961*	*-2.11*	*0.0348*
India	*-0.17334*	*-2.16*	*0.0309*
Russia	*0.24581*	*2.39*	*0.0171*
Taiwan	-0.04863	-0.42	0.6753
USA	-0.08623	-1.21	0.2272

Culture had a consistent and significant influence on communication behavior. In Table 10 individual parameter estimates for the three communication forms and for each country are given.

There is a clear distinction between the task oriented communication as indicated by the number of offers on one hand and the number of text messages, which might also include information not directly related to the negotiation. Text messages were used significantly above average by users from Asian cultures. These are high context cultures, and it is plausible that users from these cultures used the free format text messages to create a richer context for the negotiations. Surprisingly, task-oriented communication was used to a significantly higher extent than on average by users from Ecuador and Finland, which represent two very different cultures according to Hofstede's dimensions. There are two possible explanations for this puzzling result: either there are several different mechanisms by which culture influences communication behavior, or the five dimensions identified by Hofstede do not sufficiently describe culture to identify the hidden common traits between Finland and Ecuador.

The second variable which showed a significant impact on the communication behavior was the problem solving attitude (as perceived by the opponent). Users with a higher PSA made fewer offers (β=-0.22517, t=-3.27, p=0.0011) and sent a smaller number of free format messages (β=-0.19262, t=-3.25, p=0.0012) than users with a low PSA.

Table 9. GLM Models for communication variables

	Source	DF	FValue	Pr>F
Ofr	**CReside**	**9**	**5.64**	**<.0001**
R^2=0.0764	NegoCase	1	0.02	0.8999
	Gender	2	0.87	0.4198
	Highexp	1	0.04	0.8327
	OwnPSA	**1**	**10.68**	**0.0011**
OfrwMsg	**CReside**	**9**	**9.29**	**<.0001**
R^2= 0.1042	NegoCase	1	0.02	0.8844
	Gender	2	0.18	0.8384
	Highexp	1	0.02	0.8951
	OwnPSA	1	3.65	0.0564
Msg	**CReside**	**9**	**3.49**	**0.0003**
R^2=0.0490	*NegoCase*	*1*	*4.60*	*0.0322*
	Gender	2	0.43	0.6477
	Highexp	1	0.00	0.9824
	OwnPSA	**1**	**10.58**	**0.0012**

Table 10. Parameter estimates for communication process variables

	Ofr			OfrwMsg			Msg		
	Parameter	**t**	**Pr > |t|**	**Parameter**	**t**	**Pr > |t|**	**Parameter**	**t**	**Pr > |t|**
Austria	-0.26714	-0.95	0.3443	-0.22152	-0.82	0.4117	*-0.48286*	*-1.99*	*0.0469*
Canada	-0.11665	-0.77	0.4393	-0.13415	-0.93	0.3520	-0.15214	-1.17	0.2408
Germany	-0.42884	-1.72	0.0855	-0.19201	-0.81	0.4201	-0.31656	-1.48	0.1397
Ecuador	**1.22017**	**5.47**	**<.0001**	**1.50115**	**7.05**	**<.0001**	-0.04063	-0.21	0.8322
Finland	**0.68596**	**3.18**	**0.0015**	**0.55461**	**2.69**	**0.0072**	-0.32779	-1.77	0.0772
Hong Kong	-0.32093	-0.96	0.3359	-0.12340	-0.39	0.6985	0.37495	1.31	0.1911
India	*-0.47665*	*-2.44*	*0.0148*	**-0.50763**	**-2.72**	**0.0066**	*0.37489*	*2.24*	*0.0257*
Russia	-0.24597	-0.98	0.3262	**-1.07914**	**-4.51**	**<.0001**	-0.20411	-0.95	0.3432
Taiwan	0.21364	0.76	0.4498	0.40477	1.50	0.1342	**0.98421**	**4.05**	**<.0001**
USA	-0.26359	-1.52	0.1294	-0.20269	-1.22	0.2222	-0.20997	-1.41	0.1599

The post-negotiation questionnaire also provides some insight into the content of messages that were exchanged, specifically whether the negotiator disclosed his or her identity to the opponent. A logistic regression was used to analyze possible effects of individual characteristics on the likelihood of disclosing one's identity. The results of this analysis are represented in Table 11.

Two factors had a highly significant influence on disclosing one's identity: culture and problem solving attitude. Users perceived to have a high problem solving attitude are also more likely (Maximum likelihood β= 0.3242, χ^2=12.1395, p=0.0005) to disclose their identity. The influence of culture is described by the parameter estimates shown in Table 12.

Users from Germany and Russia disclosed their identity significantly more often than the average, while users from Canada, Finland and India were less likely to disclose their identity. Since users from rather different cultures exhibit similar behavior, and on the other hand different behavior is observed with similar cultures, we consider it likely that disclosure of identity was influenced by other variables than culture. One such variable could be the influence of users' home institutions and local instructors, who probably emphasized the importance of anonymity in Inspire negotiations to a different degree.

Negotiation results

The results a negotiator achieves depend on individual personality traits of the negotiator as well as on characteristics of the opponent. We therefore included the characteristics of the opponent as explanatory variables in these models. Table 13 presents the results of the GLM estimation on the score (utility value) achieved by the negotiators. Compared to the other models, the overall fit of this model was considerably better.

In addition to culture, several variables had a significant influence on the score which a negotiator was able to obtain. At the 1% level of significance, users' expectations had a clear impact. As could be expected, high expectations also led to better performance (β=11.01302, t=6.83, p<.0001).

Table 11. Influences on disclosing identity - Logistic regression

Source	DF	Wald Chi-Square	Pr > ChiSq
CReside	**9**	**57.9312**	**<.0001**
NegoCase	1	2.8091	0.0937
Gender	2	2.2457	0.3253
HighExp	1	3.5145	0.0608
OwnPSA	**1**	**12.1395**	**0.0005**

Table 12. Parameter estimates for disclosing identity (logistic regression)

	Parameter	Wald Chi-Square	DF	Pr>ChiSq
Austria	-0.09123	0.0733	1	0.7865
Canada	**-0.71831**	**11.5484**	**1**	**0.0007**
Germany	**0.96861**	**13.4533**	**1**	**0.0002**
Ecuador	-0.21580	0.5388	1	0.4629
Finland	**-0.95021**	**8.0338**	**1**	**0.0046**
Hong Kong	0.47200	1.4965	1	0.2212
India	*-0.58045*	*4.8011*	*1*	*0.0284*
Russia	**1.23422**	**21.4447**	**1**	**<.0001**
Taiwan	0.26516	0.6701	1	0.4130
USA	-0.38398	2.9232	1	0.0873

Table 13/ GLM model for scores

	Source	DF	FValue	Pr>F
Score	**CReside**	**9**	**3.72**	**0.0002**
R^2=0.2180	NegoCase	1	0.93	0.3357
	Gender	*2*	*3.94*	*0.0200*
	HighExp	**1**	**38.07**	**<.0001**
	Use	*1*	*5.30*	*0.0218*
	InCtry	1	0.11	0.7369
	OwnPSA	1	2.83	0.0932
	OppPSA	*1*	*6.35*	*0.0121*
	OppRes	9	1.58	0.1180
	OppHigh	1	0.01	0.9271
	OppUse	*1*	*6.06*	*0.0142*
	OppGen	2	0.40	0.6727

We found that the users' gender has significant impact on score at a level of significance of about 2%. Interestingly, significant gender differences occurred between male and female users, and not between users who declared their gender and those who did not. Female users had a significantly lower score ($\beta_F - \beta_M = -5.52758$, $t = -2.76$, $p = 0.0060$) than male users. Another weakly (but well below the 5% level) significant effect is related to system use, of the supported user ($\beta = 0.73066$, $t = 2.30$, $p = 0.0218$) and her/his opponent ($\beta = -0.81556$, $t = -2.46$, $p = 0.0142$). As could be expected, system use by the negotiator improved the results, while system use by the opponent had a negative impact on score.

Higher problem solving attitude of the opponent also has a positive influence on the results a negotiator can achieve ($\beta = 2.67131$, $t = 2.52$, $p = 0.0121$). Similar results were found by (Graham, Mintu and Rogers 1994; Graham and Mintu-Wimsatt 1997), although in these studies a positive relation was only confirmed for some countries.

Concerning the impact of culture on scores, it is interesting to compare the parameter estimates of the impact of the negotiator's culture to that of the opponent. For example, for Canada, there is a consistent impact in both directions: while negotiators from Canada performed significantly worse than negotiators from other countries, their opponents also achieved a better score. On the other hand, no such phenomenon is visible for negotiators from Ecuador, who themselves perform better but had no negative impact on their opponent's results.

Apart from the score, another important outcome dimension concerns the question whether an agreement was achieved at all (in the primary negotiation phase or the post-settlement phase). Out of the 1366 cases analyzed in this study, 947 (= 69.3%) reached an agreement, 419 (= 30.7%) did not.

Table 15 presents the results of a logistic regression on the binary variable indicating whether an agreement was reached at all. The problem solving attitude of the negotiator (Maximum likelihood $\beta = 0.9266$) and the opponent (Maximum likelihood $\beta = 1.0770$) are both positively related to the probability of an agreement. Culture as a whole did not have a significant impact. At the individual country level, users from India reached an agreement less often (Maximum likelihood $\beta = -0.8987$,

Table 14. Parameter estimates for the impact of culture on results

	Country of negotiator			Country of opponent		
	Estimate	**t Value**	**Pr > |t|**	**Estimate**	**t Value**	**Pr > |t|**
Austria	-2.16208	-0.50	0.6179	-1.24235	-0.30	0.7659
Canada	**-7.67744**	**-3.50**	**0.0005**	*5.01128*	*2.42*	*0.0159*
Germany	-2.84915	-0.87	0.3867	2.55430	0.66	0.5122
Ecuador	**11.99152**	**3.86**	**0.0001**	0.16487	0.05	0.9600
Finland	-0.48770	-0.15	0.8802	-0.47360	-0.14	0.8898
Hong Kong	-3.10307	-0.70	0.4871	1.00431	0.17	0.8643
India	*5.95276*	*2.03*	*0.0432*	-4.26779	-1.21	0.2260
Russia	4.89893	1.12	0.2644	-2.31780	-0.54	0.5904
Taiwan	-3.74197	-0.94	0.3490	4.34905	0.90	0.3699
USA	-2.82180	-1.16	0.2455	*-4.78227*	*-1.98*	*0.0487*

Table 15. Factors influencing the probability to reach an agreement (Logistic regression)

	DF	Wald Chi-Square	Pr>ChiSq
Creside	9	10.5118	0.3107
NegoCase	1	0.4586	0.4983
Gender	2	2.7774	0.2494
HighExp	1	0.0017	0.9675
Use	*1*	*4.4866*	*0.0342*
InCtry	1	0.0235	0.8783
OwnPSA	**1**	**38.4268**	**<.0001**
OppPSA	**1**	**46.4573**	**<.0001**
OppRes	8	4.1836	0.8402
OppHigh	1	0.2929	0.5884
OppUse	1	0.0177	0.8941
OppGen	2	0.0375	0.9814

$\chi 2 = 4.9639$, $p = 0.0259$) than others, while for users from Finland, there is a weak positive effect (Maximum likelihood $\beta = 1.0815$ $\chi 2 = 2.9503$, $p = 0.0859$).

Synthesis of results

Following a grounded theory approach (Glaser and Strauss 1967), we summarize the results of our empirical analyses in an influence matrix in order to draw a more holistic picture of the relationships found. We use this approach to generate ideas and propositions in this new field of research, where theory still has to be developed (Glaser and Strauss 1967). In the table shown in Appendix 2, we list the dependent variables in the columns, the rows represent independent variables. Taking into consideration the exploratory character of this research, we also include weak influences significant only at the 5% or 10% level.

The independent variables, which we have considered in our analysis, can be separated into two groups: on one hand, there are individual characteristics like gender or the role in the negotiation, and on the other hand culture as a collective variable. According to our results, problem solving attitude must be considered as part of the first group and thus as an individual characteristic of the negotiator, rather than a culture-dependent characteristic.

This independence of PSA from culture is in striking difference to the hypotheses and results of previous research. Especially the earlier work of Graham and his colleagues suggested a direct influence of culture on problem solving attitude (Graham, Mintu and Rogers 1994; Graham and Mintu-Wimsatt 1997). In a later study this position was revised and PSA was shown to be linked not to personal characteristics, but to organizational characteristics and to perceptions the negotiator has about the behavior of his opponent (Calantone, Graham and Mintu-Wimsattt 1998). These contradictory findings could be explained by different methods by which PSA was measured. Whereas in previous studies PSA was measured with self reported items, Calantone, Graham et al. (1998) used perceptions of the opponent to measure a negotiator's PSA.

Consistent with our findings, PSA may be far more determined by situational characteristics (i.e. organizational constraints, behavior of the opponent, etc.) than by the culture of the negotiator. This argument is also supported by the finding of our study that the disclosure of identity was directly linked to the perception of the problem solving attitude. However, the weak fit of our models leaves the possibility of other, still unknown factors, open. Disclosing private information such as the identity during negotiations can be interpreted as a relationship and trust building measure, which positively affects perception of opponents during computer-mediated negotiation.

Another indirect support for the independence of PSA from culture is provided by data from the post negotiation questionnaire,

where negotiators also indicated their guess of the country of residence of their opponent. Only 40.56% of all negotiators provided such a guess, and of those, only 35.62% were correct. This includes the cases in which the opponent reportedly disclosed his or her country, but even then 40% of all guesses were incorrect. In total, only 14.42% of the negotiators had correctly guessed their opponent's country at the end of the negotiation. This result seems to indicate that behavior during the negotiation provided only weak clues concerning the country of the opponent, or that our subjects were not able to interpret the clues that were available correctly, or both.

In summary, PSA thus must be considered as an individual and process-related factor in the negotiations we analyzed, and not as a cultural factor. However, compared to the other individual factors, it had a considerable impact on behavior of negotiators and on the outcomes. The positive influence of PSA on scores, for both the negotiator exhibiting high PSA and his or her opponent, is consistent with the results of other (face-to-face) negotiation experiments (Graham, Mintu and Rogers 1994; Graham and Mintu-Wimsatt 1997). However, it is not highly significant in our situation of Web-based negotiations.

Another interesting result is the significant negative relationship between PSA and communication behavior of negotiators. At a first glance, this result contradicts intuition. But it should be kept in mind that communication behavior as we measured it here is concerned only with the number of offers and messages, and not with their content. Thus, a negotiator with high PSA, who makes substantial contributions in each round, can well achieve better results in fewer iterations and thus send fewer messages than an uncooperative negotiator, who repeats the same position again and again without making concessions.

Yet another individual characteristic of negotiators had considerably less impact on the process and results. Gender had only low impact on the dependent variables; the only effect that was significant at the 1% level linked gender to reservation scores. While there were marked differences in expectations for negotiators who were assigned different roles, these differences vanish in the negotiation process and results.

Culture had a significant effect on most dependent variables at an aggregate level. Only one variable, the probability of agreement, showed no impact of culture at all, and the impact on the opponent's score was only weakly significant. At a more disaggregated level of individual countries, it is more difficult to obtain a clear and consistent picture or to identify specific cultural traits that might lead to the patterns we observed. Reading the table column by column, certain patterns emerge. Users who had higher expectations also tended to make more offers and, in the case of Ecuador, also achieved higher scores. But the relationship between higher expectations and communication involves such diverse cultures as Finland, Ecuador and Taiwan.

While expectations concerning the outcomes are similar across very different cultures, expectations concerning friendliness are more readily interpretable in terms of cultures, with both Asian and North American cultures expecting less friendly negotiations than Europeans and South Americans. Similarly, we find a more frequent use of free text messages with Asian users. This might be related to the need to establish context via messages for users from high context cultures. For negotiation outcomes, the pattern is again less consistent.

CONCLUSIONS AND FUTURE RESEARCH

In this study, we tried to identify effects of culture on anonymous negotiations conducted via a technical medium. When first confronted with this research agenda, one might consider it to be a contradiction in itself. Is there any possibility left for cultural differences to manifest themselves when most obvious signs of culture like the physical distance people try to keep, facial expressions, gestures, manners, etc. are removed?

Artefacts and behavioral patterns are present at the surface level and are the most obvious manifestations of culture, but they are the result of the underlying cultural traits at the level of values, norms and attitudes. Research on cross-cultural negotiations concentrates on studying more complex cultural constructs

than the superficial ones. Anonymous negotiations might help to uncover these underlying factors. In face-to-face negotiations, subjects may modify their behavior and attitudes according to their perceptions of the counterparts' culture. In anonymous negotiations, participants cannot rely on these clues and thus are more likely to base their behavior on scripts inherent to their own culture.

Our study shows that cultural differences exist in the way negotiators approach the negotiation, particularly in the expectations they form before the actual bargaining begins. We can observe that even a narrow-band technical communication medium is rich enough for cultural and behavioral differences to emerge in the negotiation process. These differences, however, do not carry over into bargaining strategies, attitudes, and outcomes to the extent we hypothesized. The question remains open whether this indicates a point where we have reached the limits of the medium and significant differences would have emerged if we had used richer communication media. It is also possible that the decision-analytic and other tools built in NSS either flatten the impact of different strategies and attitudes or direct its users to a similar strategy. Alternatively, one could also put forward that strategies and attitudes depend more on the individual differences than on the culture, or that the impact of the cultural differences decreases during the information exchange process.

The analyses we have presented in this paper are based on a unique set of data, because of its size and global dispersion of participants in Inspire negotiations. The drawback of the data collection is a limited ability to control the experiments. This work is the first step in research on the impact of national cultures on the Internet-based communication and negotiation processes. Internet allows to include participants from all over the world in such experiments, but it also severely limits the possibility to control access to the system and the processes one wants to study. Thus our research cannot, at the present stage, claim the level of validity that could be obtained in carefully controlled laboratory experiments. Nevertheless, we are confident that by analyzing the data collected so far, we were able to uncover interesting relationships, which can later be studied in detail in a more controlled environment.

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APPENDIX 1: CONCEPTS AND VARIABLES

Concept	Variable	Description	Scale	Data source	Mean St. dev. [3]
Culture	CReside	Country of residence	Nominal	Pre-negotiation questionnaire	
	OppRes	Opponent's country of residence	Nominal	Pre-negotiation questionnaire	
Control variables	NegoCase	Negotiator's role: buyer or seller	Binary	Log files	
	Gender	Negotiator's gender	Nominal: Female, Male, not declared	Pre-negotiation questionnaire	
	OppGen	Opponent's gender	As above	As above	
Problem Solving Attitude (PSA)	Opp Informative	Perceived informativeness of opponent	LS[4] 1=Informative 7=Uninformative	Post-negotiation questionnaire	M=2.7153 S=1.0575
	Opp Persuasive	Perceived persuasiveness of opponent	LS: 1=Persuasive 7=Not persuasive	Post-negotiation questionnaire	M=2.8161 S=0.8862
	OppHonest	Perceived honesty of opponent	LS: 1=Honest 7=Deceptive	Post-negotiation questionnaire	M=2.4694 S=0.9981
	OppExploit	Perceived exploitativeness of opponent	LS: 1=Exploitative 7=Accommodating	Post-negotiation questionnaire	M=3.0497 S=0.9542
	OppCoop	Perceived cooperativeness of opponent	LS: 1=Cooperative 7=Self-interested	Post-negotiation questionnaire	M=2.7820 S=1.1775
	OwnPSA	Problem solving attitude of negotiator	Metric (Factor value)	Computed	
	OppPSA	Problem solving attitude of opponent	Metric (Factor value)	Computed	
Expectation	EScore	Expected score	Metric 0-100	Pre-negotiation questionnaire	M = 70.99 S = 21.43
	RScore	Reservation score	Metric 0-100	Pre-negotiation questionnaire	M = 46.17 S = 24.72
	EFrndly	Expected friendliness of negotiation	LS: 1=Very friendly 7=Very hostile	Pre-negotiation questionnaire	M = 3.6808 S = 0.8442
Process	Ofr	Number of offers sent	Metric	Log files	M = 3.6977 S = 2.0349
	OfrwMsg	Number of offers with attached messages	Metric	Log files	M = 3.3594 S = 2.0052
	Msg	Number of messages without offers	Metric	Log files	M = 1.5073 S = 1.6915
Results	Score	Utility rating of final package	Metric (0-100)	Log files	M = 66.77 S = 21.60
	Agr	Status of agreement	Binary	Log files	
Derived variables					
	HighEx	High expectations	Binary	True for EScore > 75	
	OppHigh	High expectations of opponent	Binary	As above	
	Use	Aggregate use of system	Metric	Sum of Ofr+ +OfrwMsg+Msg	
	OppUse	Use of system by opponent	Metric	As above	
	InCtry	Intra-country negotiation	Binary	True-parties from the same country	

[3] M = Mean;
S = Standard Deviation
[4] LS = Likert scale

APPENDIX 2: INFLUENCE TABLE

	Expectations			Behavior		Outcomes		
	Expected score	**Reservation score**	**Expected friend-liness**	**Disclosure of iden-tity**	**Communic. offers & messages**	**Agreement**	**Own score**	**Score of opponent**
Country	highly significant***	highly significant***	highly significant ***	highly significant***	highly significant***		highly significant***	weakly significant~
Russia		lower than average**	higher than average***	disclosed more***				
Finland		higher than average~	lower than average~	disclosed less***	more offers**	more agreements~		
Ecuador	higher than average***	higher than average***	higher than average***		more offers***		higher than average***	
Taiwan		higher than average~			more messages***			
Hong Kong			lower than average**					
India			lower than average***	disclosed less*	Less offers*, more messages*	less agreements*	higher than average*	
USA	lower than average***		lower than average~					lower than average*
Canada			lower than average~	disclosed less***			lower than average***	higher than average*
Germany	lower than average***	lower than average***		disclosed more***	less messages~			
Austria					less messages*			
Gender		higher for men**	lower for men*				higher for men*	
Role	higher for buyers***	higher for buyers***						
PSA				disclosed more***	less offers*** less messages***		higher score~	higher score*
High expecta-tions				disclosed less~			higher score*	
System use						more agreements~	higher score*	lower score*
R^2	0.106	0.043	0.110		0.079		0.218	
***p<.001	**p<.01	*p<.05	~p<.1	not tested				