National Cultural Differences in the Use and Perception of Internet-based NSS - Does High or Low Context Matter? *

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Abstract

In this paper we apply an extended technology acceptance model (TAM) to explore whether national culture influences users' perception and use of Internet-based negotiation support systems (NSS). In particular, we are interested if different preferences for communication patterns as we find them in low context and high context cultures influence the attitudes towards different features of NSS. Our empirical analysis is based on data from over 2000 participants from more than 50 countries, who used Web-based system Inspire in experimental negotiations. Our results show that significant impacts of culture do exist. Users from high context cultures exchange significantly more messages and offers during negotiations than users from low context cultures. One possible explanation for this result is the necessity to establish a social context in computer-mediated negotiations. Users from low context cultures evaluate analytical negotiation support tools significantly better than users from high context cultures. This indicates that an analytical approach to problem solving is more compatible with their preference for direct and task oriented communication.

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1 Introduction

Internet-based negotiations are becoming an important mode of business communication. Recently, several web sites have been constructed to provide business organizations with an "electronic negotiation table" (for example, http://www.ozro.com, http://www.biosgroup.com, http://moa.com, and http://www.frictionless-commerce. com). These web sites presently focus on providing a virtual space to seek potential partners, exchange information, keep negotiation records, and provide on-line documentation.

Since internet-based business negotiations are a relatively new development, many issues involved in the design and use of systems that support them remain unresolved. System design and development cannot be driven only by technology. In order to gain wide acceptance for such systems, user attitudes towards various design features must be taken into account. There is especially a need for research on the acceptance of novel features of negotiation support systems (NSS) that are not available in face-to-face negotiations. A lack of such insights might lead developers to forego potential innovative solutions and provide only familiar capabilities in their efforts to make the environment as user-friendly as possible.

User attitudes towards a web-based NSS are a rather complex issue because the potential diverse locations of users can mean significant cultural diversity. Web-based systems explicitly aim to provide a communication platform and marketplace in which parties from around the world can freely participate. In this context, it is quite possible that features that make a system particularly attractive to users from one culture cause users from another culture to reject the same system because of different communication patterns, values, and behavioral preferences. Although negotiation support systems, as well as other support systems like group decision support systems (GDSS), are often implemented in an international context, cultural impacts on system use are, to a large extent, neglected in this field of research (DeVreede, Jones, & Mgaya 1998; Raubichaux & Cooper 1998; Tan, Watson, & Wei 1995). DeVreede (1998) claims in his survey of emprical studies that until 1988 almost all GSS research was carried out using only American groups (202). There are only a few empirical studies so far that take into account cultural aspects of support systems (e.g. DeVreede *et al*. 1998; Kersten & Noronha 1999a; Watson, Ho, & Raman 1994). There is, however, some empirical research on cultural aspects of computer-mediated communication in general (Tan, Wei, Watson, & Walczuch 1998; 2001; Ulijn & Campbell 1999; Ulijn & Kumar 1999; Ulijn & St. Amant 2000).

To study the impact of culture on the use and on users' perceptions and assessments of a web-based NSS, we use data collected during negotiations with the Inspire negotiation support system. Inspire is an experimental negotiation support system and was created by the InterNeg© Group (http://interneg.org), which develops materials and systems to conduct research and provide training on decision making and negotiations. Inspire is an innovative support system that combines elements of traditional negotiations (i.e., the exchange of messages and offers between parties) with additional features such as analytical and visual decision support tools. During the sample period from 1996 to 2000, over one thousand negotiations, involving students, managers, and engineers from more than 50 different countries took place using Inspire. These offer a unique opportunity to study the acceptance of Internet-based negotiation tools in a widely-varied cultural environment.

Based on an initial analysis of the data from questionnaires provided by the system after conclusion of each negotiation session, we found an overwhelmingly positive attitude of Inspire users towards web-based negotiation support (for a description of the sample see Section 3). The answers to three questions that indicated users' willingness to use a system similar to Inspire are given in Table 1.

Use a system similar to Inspire to:	Percent
- practice negotiation	88.2
- prepare for actual negotiations	81.3
- conduct actual negotiations	61.3

Table 1: User Willingness to Use Internet-based Negotiation Support.

These results provide a convincing argument for the viability and acceptance of Internet-based negotiation support. This paper now attempts to identify particular factors that lead to the observed level of acceptance of this new technology. It further explores the role national culture plays among these factors.

In Section 2, we first describe what we mean by culture and link this concept to communication patterns and negotiation behavior. We also discuss the technological aspects of intercultural negotiations via web-based NSS and suggest a modified version of the technology acceptance model (TAM) developed for such systems (Vetschera, Kersten, & Köszegi 2001) as a framework for our analysis. The suggested model explicitly considers culture, among other user characteristics, as an important variable to explain user attitudes towards NSS. In Section 3 we give a brief overview of the Inspire system, its history, and the way negotiations are supported in that system. We then describe the user population. Empirical results are presented in Section 4, and in Section 5 we discuss topics for ongoing and future research.

2 Research focus and model

2.1 Research background

Before we enter into a discussion of cultural differences we need to clarify what we mean by culture. A social system can only function efficiently if its participants behave predictably, at least to some degree. Hofstede (1980) argues that mental programming of the human mind allows for some degree of predictability as it leads to more or less the same behavior of persons in similar situations. He distinguishes three levels of mental programming: the universal, the collective, and the individual level (Hofstede 1980: 16). The broadest level of mental programming is the universal level, which is shared by all mankind and includes the biological operating system and humans' basic expressive behaviors like aggression or associative behavior. The most differentiated level is individual programming, which consists of the individual personality. The remaining level is collective programming, which is shared by some, but not all, other people and which Hofstede defines as culture (1980: 21). Culture builds on shared norms and values. Hence, differences in these norms and values distinguish the members of one group from those of other groups. There are numerous sources of cultural variation, such as gender, age, profession, education, ethnicity, religion, social class, nation, etc. Although for business-related matters the most obvious source of cultural variation is seen in ethnolinguistic differences, all other sources must be taken into account (Cukier & Middleton 1996). There may be more cultural variation between professional groups within a single company than between members of the same professional group throughout different companies even in an international context (see e.g., Ulijn 2001). Nevertheless, for the purpose of this paper we focus on *national* culture as a possible source of differences in use and perception of NSS, although we do control for other factors in our analysis.

Generally, national culture is an extensively researched variable in international negotiations, and its impact on negotiation process and outcome is well accepted (Adler 1993; Adler & Graham 1989; Brett 1998b; Brett *et al*. 1998a; Chan 1998; Graham & Mintu-Wimsat 1997; Kharbanda & Stallworthy 1991; Ulijn *et al*. 2001). Most of these studies were conducted in a face-to-face experimental setting and concentrated on culture's impact on negotiation processes, strategies, atmosphere, and outcomes.

Furthermore, the absence of visual cues such as race, gender, etc. complicates categorization of the opponent into an ingroup or an outgroup member and restricts adaptive behavior (see e.g., Triandis 1988). Based on these findings we argue that compared to face-to-face negotiations, participants in computer-mediated negotiations tend to ground their strategies and tactics more in their own characteristics. Because they do not know the cultural background of their negotiation partners, they are less able to adapt their behavior to the specific opponent and their behavior will be guided more by the norms and values of the ingroup (i.e., their own cultural background). Previous studies on cultural differences in negotiation behavior, like those mentioned above, do not differentiate between the influence of subjects' perceptions of their counterparts, cultural differences and subjects' expectations resulting from their perceptions, and the influence of participants' culture on negotiation. Hence, by examining cultural differences in intercultural electronic negotiations we may observe less-adapted and culturally more "pure" behavior.

Another difference between web-based and face-to-face negotiations is the system itself and the features and support tools it offers to negotiators. There is already some research addressing the question of how cultural and technology interact (Ulijn *et al*. 2001; Ulijn & Campbell 1999; Ulijn & Kumar 1999; Ulijn & St. Amant 2000).

Ulijn & Campbell (1999) and Ulijn & Kumar (1999) propose the iceberg metaphor to explain the complexity of culture. Accordingly, there are two layers of an iceberg:

- the explicit, visible top of the iceberg, which represents facts; and
- the much bigger, implicit, invisible body, which represents emotions and unconscious rules.

In computer-mediated communication settings, interaction and communication possibilities are restricted more-or-less to the explicit level. Although the implicit layer does influence behavior, its effect is not directly observable by the negotiation partners. In a face-to-face negotiation, for example, it is much easier to infer the opponent's beliefs and intentions from the exhibited emotional cues. In computer-mediated communication, such cues need to be made explicit to be obvservable by the negotiation partner; this is not always possible (i.e. unconscious rules) or requires effort (expression of emotions in words).

One way to understand intercultural computer-mediated communication is to compare cultural preferences for communication patterns as proposed by Hall (1976) and by Kaplan (1966), who link cultural norms to communication and linguistic patterns. Kaplan argues that thought patterns and linguistic styles are reciprocally determined and futhermore, that "Logic [...] which is the basis of rhetoric, is evolved out of a culture; it is not universal. Rhetoric, then, is not universal either but varies from culture to culture..." (Kaplan 1966: 2). The English language and its related thought patterns have, for instance, evolved out of the Anglo-European cultural pattern. Related thought and communication patterns are characterized by a linear and direct discourse. Additionally, the Anglo-European culture is characterized by analytical and systematical problem solving and people of this culture prefer to solve problems linearly, one problem after another, in a monochronic time orientation. However, Asian thought patterns (e.g., Chinese, Korean) are circular and indirect. Problem solving tends to be more person-oriented and, in contrast to the analytical Western approach, intuition is given more weight in these cultures. According to Kaplan (1966: 15) the Romance (Latin, French, Spanish, etc.) thought

pattern allows digressions from the principally linear discourse. These "side-paths" allow for the discussion of several aspects of a problem, and are thus a polychronic time orientation.

Hall (1976) extends Kaplan's work and distinguishes between low-context and high-context cultures to describe cultural differences in communication patterns. He describes how much information needs to be coded and explicitly transmitted in a message (i.e. 'contexting') to be efficient in different cultures (91ff). According to Hall, in low-context cultures, like the United States or Western European countries, there is only a small amount of shared and implicit information carried in the context of an event. This creates a significant need for contexting during communication. Low-context cultures are more explicit, as they prefer a direct and linear discourse in communication (see Figure 1).

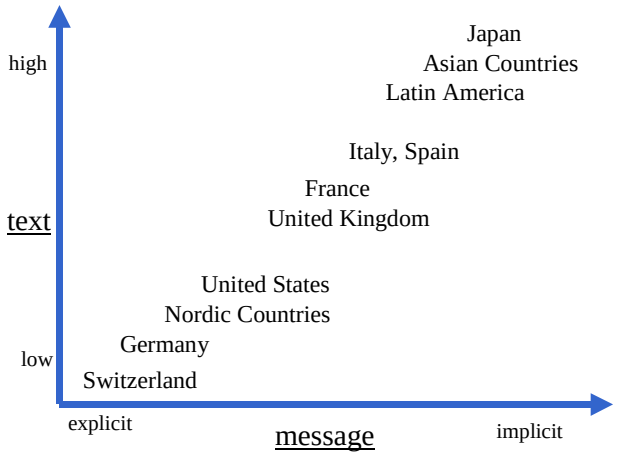


Figure 1: Communication Patterns (Demorgon & Molz 1996)

To the contrary, in high-context cultures like in Latin-American or Eastern (Asian) countries, most information is either contained in the physical context of an event or internalized in the persons. Less information needs to be coded explicitly in communication to be effective. These implicit cultures prefer indirect and circular communication patterns.

We expect these different preferences in communication patterns to influence intercultural computer-mediated communication. In this paper we argue that preferred communication patterns of different national cultures influence communication behavior during NSS-supported negotiations. The NSS used in this study supports negotiations in two different ways: (1) it provides a communication platform to exchange offers and messages between negotiation partners; and (2) it offers analytical negotiation support. We expect to find differences between low-context and high-context cultures in use and in perception of these tools based on the differences outlined above. Accordingly, we have formulated two research questions:

RQ1: Do users from low-context cultures evaluate analytical support better than users from high-context cultures? Is analytical negotiation support more compatible with thought patterns of users from low-context cultures?

RQ2: Do users from high-context cultures compensate for the lack of visible personal and contextual cues in computer-mediated communication through the additional exchange of contextual in-

formation? Do users from high-context cultures exchange more messages than users from low-context cultures?

The analysis presented in this paper is ex-post motivated. As the data we use does not stem from controlled laboratory experiments, we follow an exploratory path guided by these research questions.

Some empirical evidence for the appropriateness of this approach was obtained by Rutkowski (2001), who is also contributing to this issue. She follows the theoretical assumption that patterns of interpersonal communication between actors are central to the development of GSS tools and methods. Her empirical research delivers significant differences in process and outcome of group interactions depending on different patterns of interpersonal communication. However, her study does not investigate cultural aspects.

In the following subsection, we present the research framework used for this analysis. It has its roots in information system (IS) evaluation literature and links user characteristics to important concepts to measure technology acceptance and adoption.

2.2 Framework of analysis

User satisfaction and willingness to use an information system are important concepts in IS evaluation (Benbasat & Nault 1990; Guimaraes, Igbaria, & Lu 1992). Both concepts are often used to measure the "success" of implementing an information system. One of the most often used models in this field is the technology acceptance model TAM (Davis 1989), in which the intention to use a system is determined by the attitude towards the system, which, in turn, depends on two subjective factors: the perceived *usefulness* and the perceived *ease of use*. Perceived usefulness is defined by Davis (1989: 320) as "the degree to which a person believes that using a particular system would enhance his or her job performance" whereas perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort." An extensive amount of empirical data confirms the appropriateness of distinguishing between the two concepts and also confirms the suitability of the basic structure of TAM (Agarwal & Prasad 1998; Doll, Hendrickson, & Deng 1998; Mathieson 1991; Straub, Keil, & Brenner 1997; Taylor & Todd 1995).

The analysis we present in this study is based on the AMIS model (Assessment Model of Internet-based Support), a modified version of TAM (Vetschera *et al*. 2001). Several earlier extensions of TAM have recommended the integration of various characteristics of users (such as experience or education), tasks, and the system as factors that influence perceived ease of use and perceived usefulness (Al-Khaldi 1999; Dishaw & Strong 1991; Jackson, Chow, & Leitch 1997; Moore & Benbasat 1991; Szajna 1996; Taylor & Todd 1995). The AMIS model depicted in Figure 3 also considers these factors, although for our analysis, task and system factors are the same for all users and thus need not explicitly be taken into account. AMIS was empirically tested for Inspire users and supported by statistical analysis.

The AMIS model combines users' experiential attitudes with the results they achieve by using the system. According to AMIS, a party's intention to use an Internet-based NSS in the future is determined by its holistic assessment of one such system based on concrete experiences in the past. This assessment is directly influenced by three factors. In addition to demonstrated usefulness and ease of use, which are based on the corresponding factors from the TAM model, AMIS considers positive results of system use to lead to a better assessment of the system. These relationships were confirmed in a previous study (Vetschera *et al*. 2001).

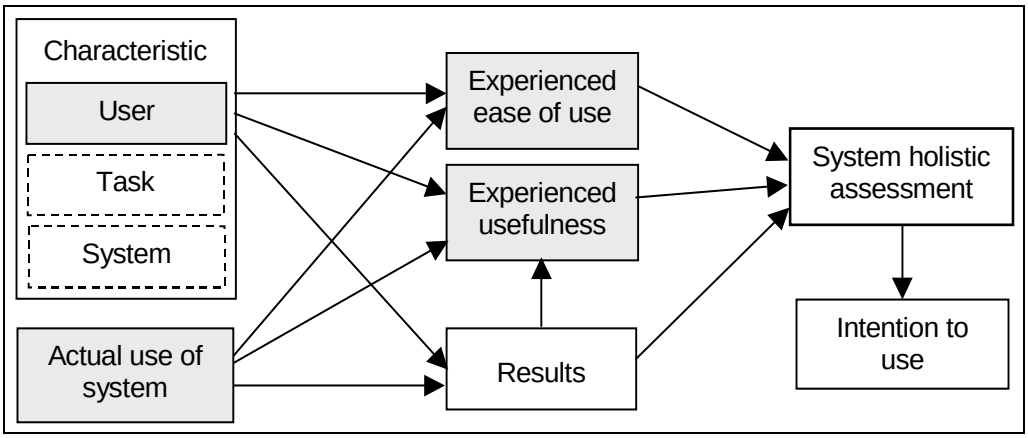


Figure 2: AMIS Assessment Model of Internet-based NSS.

The AMIS model further suggests that an evaluation of the system with respect to usefulness and ease of use depends on the extent to which a negotiator has used the system. The actual previous use of an NSS should positively influence a future outcome, i.e., the result of negotiations. However, Vetschera *et al*. (2001), only found a significant influence of actual use on experienced usefulness.

In this study, we will explore some of the relationships suggested by the AMIS model. In particular, we will consider effects of user characteristics on experienced ease of use and experienced usefulness to describe the interaction between user characteristics and the Inspire system (indicated in gray in Figure 3). Additionally, we will analyze a possible influence of user characteristics on the actual use of the system. This relationship is not suggested in AMIS and, if confirmed, could lead to an extension of the model.

Previous work on the impact of user characteristics on the assessment of support systems provides some evidence for our propositions. Agarwal (1999) found a significant positive impact of the level of education and previous experience on perceived ease of use. Other authors studied direct relationships between user characteristics and system assessment without considering perceived (or experienced) usefulness or ease of use as intermediate variables. Yaverbaum (1989) reported significant relationships between demographic characteristics of IS users and the "motivating potential score," which is related to users' willingness to use a system. Guimaraes (1992) found a weak influence of decision-maker characteristics (e.g. experience) on satisfaction with DSS, with other factors such as task characteristics and the implementation process having a stronger influence. Udo and Guimaraes (1994) also reported a positive relationship between user experience and overall satisfaction with a DSS. Considering actual use as the dependent variable, Bergeron (1995) reported a positive influence of experience.

Cultural differences in GDSS-supported group processes were identified in controlled experiments in a local setting by Watson *et al*. (1994). In a field study about application and acceptance of GSS in Africa, DeVreede *et al*. (1998) identified several relevant external factors, such as computer literacy, oral communication preference, and referent power, which need to be included in a modified TAM. Kersten *et al*. (2002) found a significant impact of the user's country of residence on several variables related to the Inspire negotiation process. However, these three studies concentrate mainly on process issues and outcomes rather than assessment of system features.

3 Research setting

3.1 The Inspire Negotiation Support System

The Inspire system is arguably the first web-based negotiation support system developed to facilitate and support bilateral negotiations. The system provides negotiators with a single, standardized case of business negotiations in order to allow for statistically valid analysis. It was designed to evoke a negotiation situation with which users from almost any country could identify, and therefore, an extended contextual explanation is unnecessary. As the predominantly international users' proficiencies in English are not easily predictable, the description of the case is fairly simple and fits within one-and-a-half pages.

In the negotiation, the users represent two companies: Itex Manufacturing, a producer of bicycle parts, and Cypress Cycles, which builds bicycles. Both sides negotiate over four issues: the price of the bicycle components; delivery schedules; payment arrangements; and terms for the return of defective parts. Negotiators are only informed about their (and their opponent's) role in the Cypress-Itex case and they make their own decisions regarding their preferences, strategies, and tactics.

Inspire has its roots in negotiation analysis and negotiation support systems such as Nego (Kersten 1985) and Negotiation Assistant (Rangaswamy & Shell 1997). It was created with one objective--to study the use of decision-analytic methods 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. Both features of the system are described briefly in the next sections.

The communication platform. Negotiations are facilitated by the communication platform. Negotiators exchange offers consisting of values for the four issues of price, delivery, payment, and return of defective parts. Associated with each issue is a pre-specified set of options, i.e., issue values. Altogether, there are 180 complete and different potential offers (alternatives) in which values of all four issues are specified.

Inspire users 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 enhances the "contexting" of the negotiation situation for both parties. By exchanging information about attitudes and expectations, negotiators can more easily create a positive negotiation atmosphere and develop a personal relationship based on mutual understanding and trust, as well as exert pressure on negotiation partners. Written messages can also provide other contextual information such as additional information about the product (Kersten & Noronha 1999a).

Analytical negotiation support. The analytical features of Inspire support users' decision making in each of the three phases of negotiation: pre-negotiation; negotiation; and post-settlement (Kersten & Noronha 1999b).

In the pre-negotiation phase, the system is used to analyze the scenario and evaluate feasible alternatives (possible offers). Thus, 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 (Angur, Lotfi, & Sarkis 1996; Green & Wind 1973). Conjoint analysis is simple, does not impose major requirements on the users, and does not require linearity assumptions (Green & Wind 1973). The ease of use and simple informational requirements are—in our view—necessary fea-

tures for systems used by people with very different educational, professional, and cultural backgrounds.

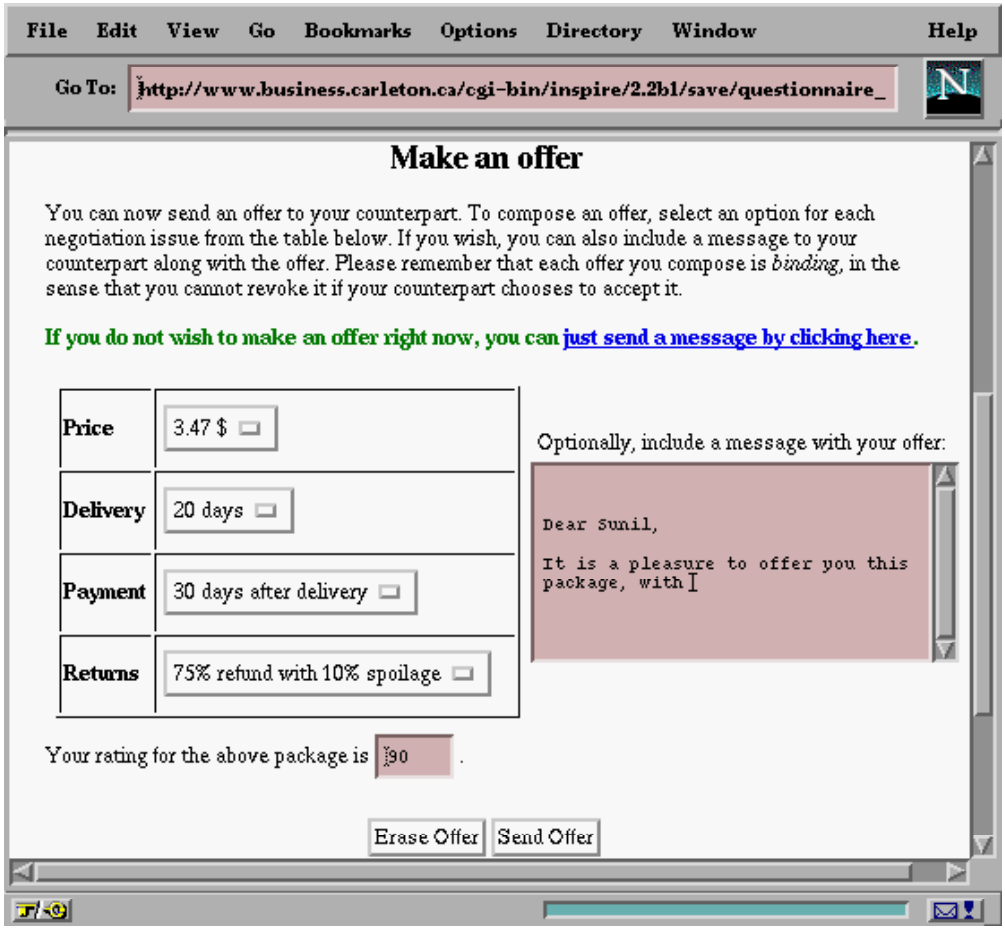


Figure 3: Communication platform

During the negotiation phase the system provides utility values of the 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 visualization of the negotiation's dynamics.

The Inspire system presents to both parties in a symmetric manner a tabularized history of negotiation and graphs. Each party can see only its own offer ratings (utilities). The system uses uniform color-codification: green for the supported user and red for his/her opponent. These representations of the negotiation dynamics provide negotiators with a rich representation of the process without indicating the good or preferred alternatives or strategies.

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

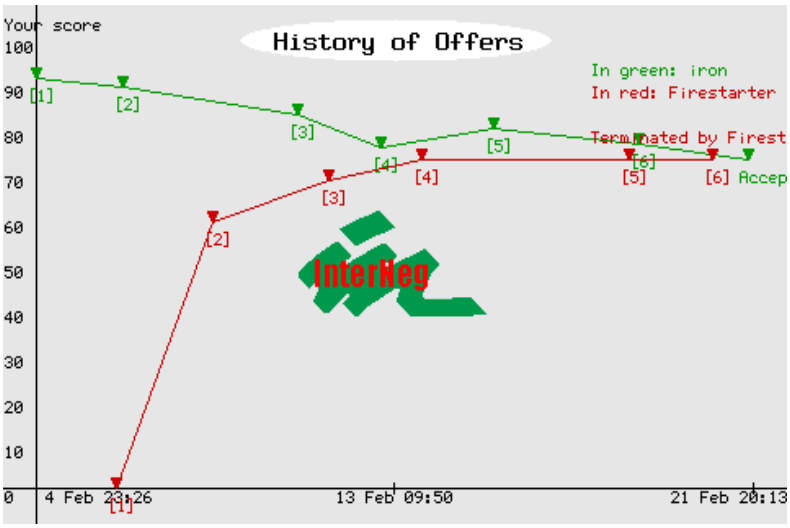


Figure 4: Negotiation History Graph

3.2 Procedure

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

Inspire negotiations are scheduled once a month for student groups from several universities; there are typically between 150 and 250 students, from 3-5 universities, who simultaneously negotiate. Students, no matter where they are geographically, log-in to the system by providing the negotiation name, which is selected by the instructor, and the user name, which they select themselves. Their opponents know them by the user name, but not their negotiation name. Thus, neither an instructor nor a counterpart can obtain access to a student's negotiation records without that student's consent, and anonymity is maintained. Although users are not prevented from revealing their identity or other personal information, their counterparts cannot verify the information provided because of the geographical distance involved. During the negotiation, the parties are in contact only with each other; those people conducting the experiment have no contact with the negotiators (i.e., Inspire 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 the users may terminate the negotiation.

Inspire users do not receive any incentives from the researchers (InterNeg team). Those who conduct negotiations as a part of their assignments are motivated by the particular 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 from the InterNeg team regarding their students' activities.

There is one exception in the researchers' lack of control over the Inspire negotiations. If one negotiator complains that his/her counterpart does not participate in the negotiation, then counterpart receives an e-mail from the InterNeg team. He/she is given three days to engage in negotiations. If the

counterpart remains inactive, the negotiation is terminated and the negotiator is given the option to enter a new negotiation with another counterpart. In each series of negotiations, less than 5% of the participants have been inactive. Other possible influences on the users' activities have been the negotiation deadline imposed by the Inspire system as well as the instructor's deadline for submitting an assignment, which is beyond the control of the researchers. However, all instructors accept that the negotiation may take at least three weeks.

3.3 Concepts and variables

The results reported in this paper are based on data collected between 1996 and 2000, from 1102 negotiations between 2204 users from 55 countries. Inspire provides a considerable amount of information from automatically-generated process logs and questionnaires the users fill out at the beginning and end of their negotiations. Although these questionnaires were not developed specifically to assess the users' attitudes towards technology adoption, they provide rich data related to variables in the AMIS model. In the following, we describe the measurement of constructs and variables we use in our exploratory analysis.

Users and user characteristics. Apart from the users' demographic variables, we consider *national culture*, *previous negotiation experience, present Internet access*, and *previous use of NSS* as relevant user characteristics. Table 2 lists the variables and their measurement:

Variable	Description	Type	Value Range
YOFB	Year of birth	real	numerical
Gender	User's gender	categorical	female, male, missing
OCCUPATN	User's occupation	categorical	student, pofessional, other
Creside	User's country of residence	categorical	AT, CA, CH, DE, EC, FI, HK, IN, RU, TW, US
NSSBEFOR	Previous experience with NSS	categorical	0 = no, 1 = yes
NEXP	Previous negotiation experience	Likert scale	1 = several times a day, 6 = almost never
IACC	Present internet access	Likert scale	1 = very experienced, 5 = no experience

Table 2: Variables of User Characteristics and their Measurement

Dependent variables. Table 4 shows how the dependent concepts *actual use*, *ease of use*, and *usefulness* were measured.

Previous negotiation experience was measured on a five-point Likert scale ranging from 1, for "very experienced," to 5, for "no experience." The average experience of users was 3.67. Only 12.7% of users referred to themselves as "very experienced" or "experienced," 26% had never negotiated before. Present Internet access was measured on a six-point Likert scale, ranging from 1 for "several times a day" to 6 for "almost never" and averaged 2.59, which indicates quite frequent Internet access. Only 5.4% of users answered that they "almost never" accessed. 85.2% of Inspire users never used an NSS before.

As outlined above, we use the national culture and ethnolinguistic groups as independent variables. In most of the previous studies, the *country* in which the experiments were conducted is used as

an indicator of the subjects' national culture (e.g., Adler 1993b; Adler & Graham 1989; Druckman, Benton, F. Ali, & Bagur 1976; Graham & Mintu-Wimsat 1997; Herbig & Kramer 1991; Rubin & Sander 1991). However, as most of the Inspire users are graduate students, and university education is becoming increasingly international, the current country of residence could be only a weak indicator of a user's national culture. Therefore, the sample was restricted to users whose place of birth and residence was the same country. This country was then used as an indicator of national culture. Although this selection procedure does not take into account cultural diversity within a country, as is the case for example in Canada or Switzerland, we can control at least for migration to some extent (Kersten & Noronha 1999a). Additionally, to obtain sufficient cell populations in the analyses of variance that were performed, only countries with more than 30 users were considered. Based on these criteria, data from five enthnolinguistic groups consisting of the following eleven countries were used:

- Latin: Ecuador
- Asian: Hong Kong (China), Taiwan, India
- Anglo-Germanic: USA, Canada, Switzerland, Germany, Austria
- Nordic: Finland
- Slavic: Russia

We decided to include India in the Asian group although this classification is ambiguous. India has 14 different main languages, comprised of several different dialects. Languages spoken in Northern India belong mainly to the Indo-European language family whereas languages spoken in Southern India belong to the family of Drawidic languages. Additionally, due to historical reasons, there are many (higher-educated) Indians who speak English as their maternal language (so-called Anglo-Indians). From a linguistic perspective, India could therefore also be classified into an Indo-Germanic language group. However, according to ethnical and religious aspects of Indian culture, India can be classified as a high-context culture with a polychronic time preference (e.g., Ulijn and Kumar 1999: 332). Therefore, we decided to group India with Hong Kong and Taiwan in the Asian group. With Canada and Switzerland classified as the Anglo-Germanic group we decided to neglect that some Canadian or Swiss users in our sample may belong to the Latin language group from a linguistic perspective. All together, we included data from 1483 users (67.3%) of the total number of negotiators. An overview of the users' countries and genders is given in Table 3.

		GENDER			
		Female	Male	No Answer	Total
Country of Residence	AT Austria	27	39		66
	CA Canada	118	144	76	338
	CH Switzerland	15	23	1	39
	DE Germany	36	35	2	73
	EC Ecuador	85	69	1	155
	FI Finland	47	75	21	143
	HK Hong Kong	29	9	42	80
	IN India	21	160	28	209
	RU Russia	49	40	2	91
	TW Taiwan	24	33	1	58
	US USA	80	132	19	231
Total		531	759	193	1483
		35,8%	51,2%	13,0%	100,0%

Table 3: Country of Residence and Gender

Dependent variables. Table 4 shows how the dependent concepts *actual use*, *ease of use*, and *usefulness* were measured.

Concept	Variable	Description	Type	Value Range
Ease of Use	CASEUND	Ease to understand case	Likert scale	1 = extr. difficult 5 = extr. easy
Cronb. Alpha = 0.6734	WTGISSUE	Ease of weighting issues	Likert scale	1 = extr. difficult 5 = extr. easy
	WTGOPTIO	Ease of weighting options	Likert scale	1 = extr. difficult 5 = extr. easy
	INEASY	Ease of using the system	Likert scale	1 = extr. difficult 7 = extr. clear
	INSTRUCT	Clarity of the system instructions	Likert scale	1 = not clear at all 7 = perfectly clear
Actual use	OFR	Number of offers sent	real	numerical
Cronb. Alpha = 0.7213	OFRWMSG	Number of offers sent by user that included written messages.	real	numerical
	MSG	Number of written message sent by user besides offers	real	numerical
Usefulness	MSGHELPF	Messages helpful	Likert scale	1 = detrimental 7 = extr. helpful
Cronb. Alpha = 0.4293; r = 0.2733	UTILITYV	Usefulness of the utility rating displayed with offers	Likert scale	1 = detrimental 7 = extr. useful

Table 4: Dependent Variables and their Measurement

A final factor analysis confirmed that *actual use* and *ease of use* are homogenous concepts. The value of the Cronbach alpha coefficient for *ease of use* (0.67) exceeds the suggested threshold for exploratory research of 0.6 (Hair, Anderson, Tatham, & Black 1998: 118). The alpha coefficient for *actual use* even exceeds the limit of 0.7, which is the recommended threshold for non-exploratory studies. We thus can use these constructs for our future analysis. For both concepts, we used additive scales over items as factor values for further analysis.

The alpha coefficient for *usefulness* clearly indicates that the two items MSGHELPF ("Helpfulness of Messages") and UTILITYV ("Usefulness of Utility Evaluation") do not measure a single underlying construct. This is also confirmed by the low correlation between these two variables (r = 0.27). It seems that the users perceived the communication platform of the system and the analytical, decision-oriented features of the system as rather distinct components, each having a usefulness of its own. Based on this result, we considered the two items separately.

4 Results

Our research framework led us to expect that users' characteristics influence their perceptions of usefulness and ease of use, as well as their actual use of the system. To test this, we estimated individual and simultaneous multivariate general linear models (GLM) for all dependent variables using gender, occupation, culture, and previous use of NSS as factors and age, present Internet access, and previous negotiation experience as variates. Table 5 shows results of the individual GLMs for all four

dependent variables (values significant at the 1% level are printed in **boldface** and *italics*, those significant at the 5 % level in **boldface**):

Dependent Variable	Source	Type III SS	df	Mean Square	F	Pr > F
Actual use	Gender	21,636	2	10,818	,564	,569
	Age	9,519	1	9,519	,496	,481
	Country	***2538,038***	***10***	***253,804***	***13,229***	***,000***
	Used NSS before	41,107	1	41,107	2,143	,143
	Internet access	***220,546***	***1***	***220,546***	***11,495***	***,001***
	Neg. experience	3,281	1	3,281	,171	,679
Ease of use	Gender	39,077	2	19,538	1,888	,152
	Age	29,665	1	29,665	2,867	,091
	Country	***405,995***	***10***	***40,599***	***3,924***	***,000***
	Used NSS before	6,375	1	6,375	,616	,433
	Internet access	1,007	1	1,007	,097	,755
	Neg. experience	**51,933**	**1**	**51,933**	**5,019**	**,025**
Usefulness of communication platform	Gender	3,746	2	1,873	1,024	,360
	Age	4,388	1	4,388	2,398	,122
	Country	**37,205**	**10**	**3,720**	**2,033**	**,028**
	Used NSS before	,400	1	,400	,219	,640
	Internet access	,280	1	,280	,153	,696
	Neg. experience	,734	1	,734	,401	,527
Usefulness of analytical tool	Gender	3,286	2	1,643	,876	,417
	Age	2,426	1	2,426	1,294	,256
	Country	***49,086***	***10***	***4,909***	***2,618***	***,004***
	Used NSS before	,654	1	,654	,349	,555
	Internet access	,205	1	,205	,109	,741
	Neg. experience	,313	1	,313	,167	,683

Table 5: GLM-Models User Characteristcs

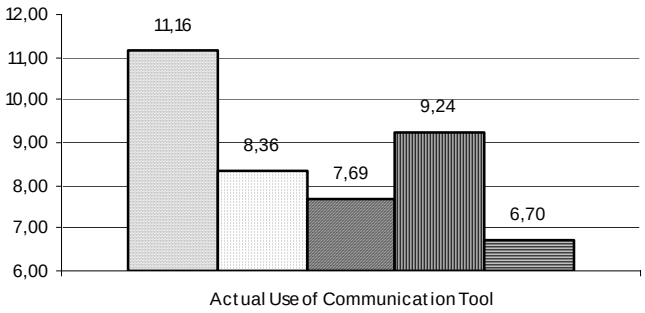
Apart from country of residence, only two user characteristics had a significant impact on the perceived usefulness, ease of use, or actual use. Previous negotiation experience had a positive influence on perceived ease of use with a parameter estimate of $\beta = 0.2583$ ($p = .03$). Present Internet access significantly influenced actual use, i.e. the more frequent the user accesses the Internet, the more often he/she actually sends messages or offers ($\beta = 0.3267$, $p = .001$). There were no significant second-level interaction effects between factors and variates entered into the GLMs.

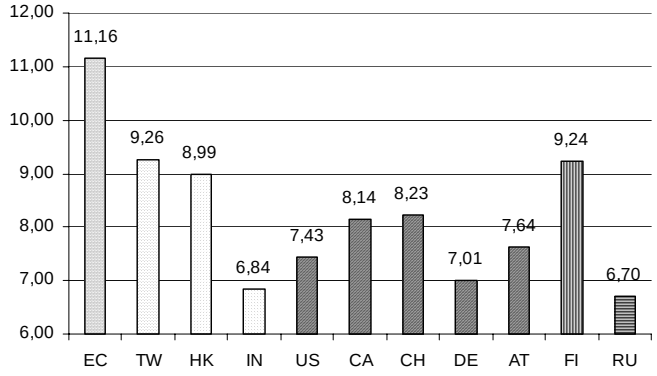
The user's country of residence was the only consistent influence on all four dependent variables. Figure 6 gives an overview of the averages of all four dependent variables across ethnolinguistic groups and across countries.

In our GLMs we used the USA as the *reference category* to estimate parameters for each country. We also tested the hypothesis that parameter values of individual countries are identical to the average parameter for all countries (see Table 6). In the following, we discuss significant parameter estimates in detail.

Actual Use of Communication Tool

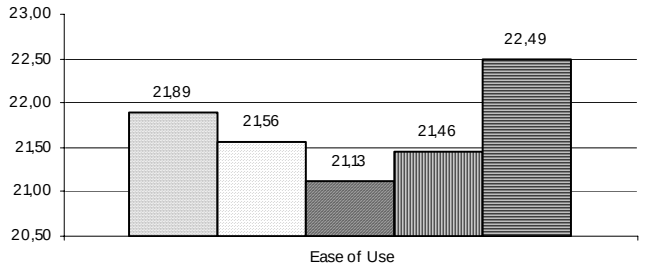
- Latin
- Oriental
- Anglo-Germanic
- Nordic
- Slavic





Ease of Use

- Latin
- Oriental
- Anglo-Germanic
- Nordic
- Slavic



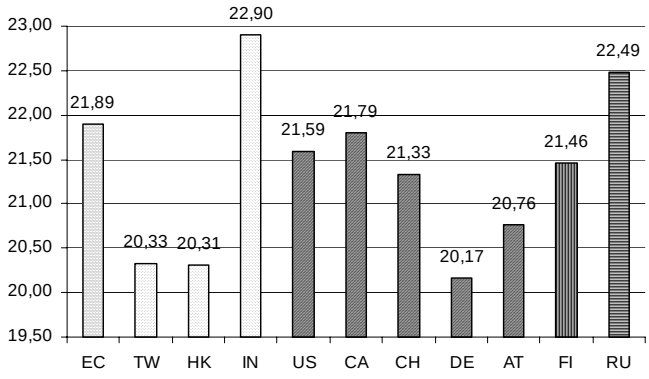
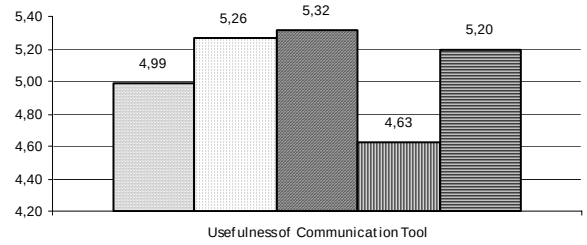
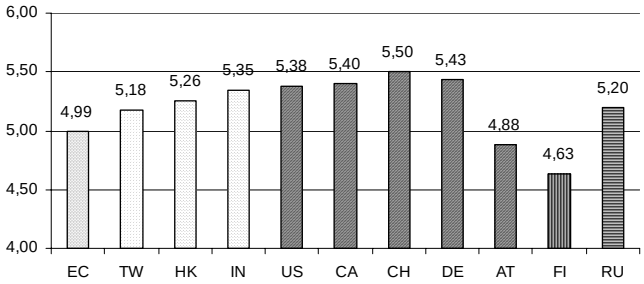


Figure 6: Cultural Differences (continued on next page)

Usefulness of Communication Tool

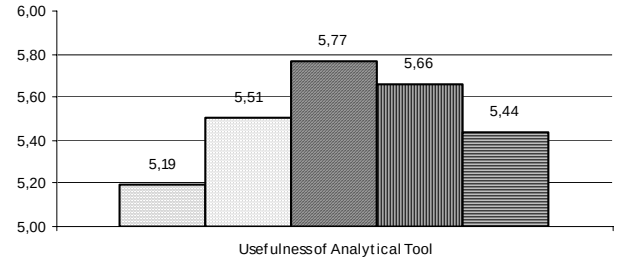
- Latin
- Oriental
- Anglo-Germanic
- Nordic
- Slavic





Usefulness of Analytical Tool

- Latin
- Oriental
- Anglo-Germanic
- Nordic
- Slavic



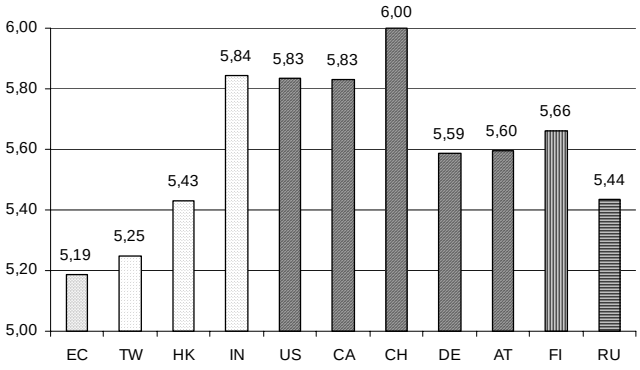


Figure 6: Cultural Differences

Actual use. We measured the actual use of communication platforms by adding the number of offers, the number of offers with messages, and the number of messages without offers to form one construct variable. The highest usage of the communication tools was by users from Ecuador ($\beta = 3.192$, $p < .001$), followed by Hong Kong ($\beta = 0.828$, $p = .099$), Finland ($\beta = 0.977$, $p = .009$), and Taiwan ($\beta = 0.577$, $p = .299$). Users from India ($\beta = -1.587$, $p < .001$), Russia ($\beta = -1.143$, $p = .013$), Germany ($\beta = -1.204$, $p = .014$), and the USA ($\beta = -1.044$, $p = .002$) sent significantly fewer offers and/or messages to their negotiation partners than average users.

Although the parameter estimate of Taiwan is not significant when compared to the sample mean, Taiwanese negotiators sent significantly more offers and messages compared to negotiators from the USA ($\beta = 1.621$, $p = .014$). On the more aggregated level of ethnolinguistic groups, we find highly significant parameter estimates for four groups, i.e. Latin ($\beta = 2.832$, $p < .001$), Asian ($\beta = -1.002$, $p < .001$), Anglo-Germanic ($\beta = -0.878$, $p < .001$), and Slavic ($\beta = -1.569$, $p < .001$), and an almost significant estimate for the Nordic country ($\beta = 0.618$, $p = .064$). When comparing variances of high-context cultures (Latin and Asian) with low-context cultures (Anglo-Germanic, Nordic, and Slavic), we obtained a highly-significant difference ($\beta = -.931$, $p < .001$), i.e. users from countries classified as low-context used the communication tools significantly less than users from high-context cultures.

Perceived ease of use. Perceived ease of use was also measured with an additive scale by tallying all item values of the factor into one variable. Significantly better evaluations of ease of use came from Indians ($\beta = 0.473$, $p < .001$) and Russians ($\beta = 0.149$, $p = .024$). Significantly lower evaluations were given by users from Germany ($\beta = -1.273$, $p = .008$) and from Taiwan ($\beta = -1.123$, $p = .026$). Negotiators from Hong Kong evaluated ease of use similarly to users from Taiwan, but the parameter estimate in the model is not significant ($\beta = -0.409$, $p = 0.479$). On the aggregated level of ethnolinguistic groups, we found no significant differences ($F = 1.47$, $p = .209$). Consequently, there is no significant difference between low and high-context cultures in the perceived ease of use of Inspire.

Perceived usefulness of communication platform. The usefulness of the communication platform, i.e. the possibility of sending messages with or without offers was perceived significantly less useful by Finnish users ($\beta = -0.557$, $p < .001$). Austrians, Ecuadorans, and Taiwanese users valued the additional communication possibilities relatively low, although the differences with the mean or with American users were not significant. Users from Switzerland, Germany, Canada, and the USA gave the highest evaluations. When estimating a GLM on the aggregated level of ethnolinguistic groups, we derived a significant difference ($F = 4.17$, $p = 0.002$).

The Anglo-Germanic perceived the communication platform significantly more useful than the sample mean ($\beta = 0.223$, $p = .012$) and the Nordic perceived it significantly less useful ($\beta = -.0455$, $p = .002$). On the highest level of aggregation between low-context and high-context cultures, we again find no significant differences ($F = 0.40$, $p = .527$).

Dependent Variable	Country	Estimates (against Sample Mean)		USA as Reference Category	
		Parameter	Pr>|t|	Parameter	Pr>|t|
Actual Use	Austria	-0.607	0.234	0.437	0.492
	Canada	-0.179	0.495	**0.865**	**0.031**
	Switzerland	0.192	0.771	1.237	0.122
	Germany	***-1.204***	***0.014***	-0.160	0.795
	Ecuador	***3.192***	***< 0,001***	***4.237***	***< 0,001***
	Finland	***0.977***	***0.009***	***2.021***	***< 0,001***
	Hong Kong	0.828	0.099	***1.872***	***0.003***
	India	***-1.587***	***< 0,001***	-0.542	0.211
	Russia	***-1.143***	***0.013***	-0.099	0.872
	Taiwan	0.577	0.299	***1.621***	***0.014***
	USA	***-1.044***	***0.002***		
Ease of Use	Austria	-0.694	0.144	-0.979	0.107
	Canada	0.459	0.063	0.174	0.660
	Switzerland	-0.118	0.867	-0.403	0.637
	Germany	***-1.273***	***0.008***	***-1.558***	***0.010***
	Ecuador	0.330	0.337	0.045	0.927
	Finland	-0.080	0.828	-0.065	0.469
	Hong Kong	-0.409	0.479	-0.694	0.326
	India	***0.473***	***< 0,001***	***1.188***	***0.009***
	Russia	**0.149**	**0.024**	0.565	0.188
	Taiwan	**-1.123**	**0.026**	**-1.408**	**0.020**
	USA	0.285	0.402		
Usefulness of Communication Platform	Austria	-0.260	0.198	-0.358	0.171
	Canada	0.164	0.122	0.066	0.702
	Switzerland	0.328	0.274	0.230	0.526
	Germany	0.270	0.201	0.172	0.523
	Ecuador	-0.240	0.099	-0.339	0.111
	Finland	***-0.557***	***< 0,001***	***-0.656***	***0.003***
	Hong Kong	0.008	0.974	-0.090	0.765
	India	0.149	0.301	0.052	0.792
	Russia	0.095	0.677	-0.003	0.992
	Taiwan	-0.054	0.802	-0.152	0.559
	USA	0.098	0.510		
Usefulness of Analytical Tool	Austria	0.018	0.929	-0.307	0.234
	Canada	**0.219**	**0.036**	-0.106	0.527
	Switzerland	0.320	0.290	-0.006	0.988
	Germany	0.004	0.985	-0.322	0.214
	Ecuador	***-0.507***	***< 0,001***	***-0.832***	***< 0,001***
	Finland	0.018	0.906	-0.307	0.151
	Hong Kong	-0.217	0.376	-0.542	0.071
	India	**0.328**	**0.023**	0.002	0.990
	Russia	-0.177	0.412	-0.502	0.072
	Taiwan	-0.332	0.120	**-0.657**	**0.011**
	USA	**0.325**	**0.024**		

Table 4: Cultural Differences

Perceived usefulness of analytical features. We observe a different pattern for the usefulness of Inspire's analytical tools. Users from Ecuador perceived this feature as less useful than other users (β = -0.507 , $p < .001$). Similarly, users from Taiwan (β= -0.332, $p = .120$), Hong Kong (β = -0.217, $p = .376$), and Russia (β = -0.177, $p = .412$) evaluated the usefulness of the analytical feature lower than

the average user, although the difference with the mean is not significant. But when we compare users from Taiwan to users from the USA, the difference becomes significant ($p = .011$). Users from the USA ($\beta = 0.325$, $p = .024$), Canada ($\beta = 0.219$, $p = .036$), and India ($\beta = 0.328$, $p = .023$) rated the usefulness of analytical features significantly better than the average users. Swiss users also evaluated usefulness relatively high, although the difference between the means is statistically not significant. When we compare variances between ethnolinguistic groups, we find a significant difference ($F = 4.85$, $p < .001$). In particular, the Anglo-Germanic group perceived this tool significantly more useful than the average ($\beta = 0.280$, $p = .001$), and the Latin group perceived it significantly less useful ($\beta = -0.427$, $p = .001$). Between low and high-context cultures, the difference in perceived usefulness is significant ($F = 8.26$, $p = 0.004$), i.e. users from low-context cultures assessed the analytical support function of Inspire significantly more useful than users from high-context cultures.

5 Discussion and conclusions

Given these results, we need to consider national culture as an important factor for design and implementation of NSS in an international context. If we compare the use and evaluation of the features offered by Inspire according to cultural groups, we find interesting and plausible patterns.

In our analysis, we distinguished 5 ethnolinguistic groups, i.e. the Latin group and the Asian group as high-context cultures, and the Anglo-Germanic group, the Nordic, and the Slavic groups as low-context cultures. Our research was guided by the question: do different communication patterns influence the use and perception of different features of NSS? Or, more simply: does high or low context matter?

For face-to-face negotiations, one would suppose that people from high-context cultures need less-explicit coding of information compared to low-context cultures. When we look at the average actual use of the communication platform across these ethnolinguistic groups in computer-mediated negotiations, we find the opposite pattern. Ecuadorians and people from Taiwan and Hong Kong sent significantly more offers and additional messages than Canadians, Americans, or Europeans (but not the Finnish). This apparent contradiction can be explained by the different communication settings. In negotiations through Inspire, users were matched anonymously and exchanged only written information in the form of offers or plain-text messages. We believe that the extensive use of the communication platform by users from high-context cultures can be explained by their need to *construct* a social context in which negotiations are embedded. As computer-mediated communication restricts social and visual cues, which belong to the context rather than to the task, more information needs to be coded explicitly than in a face-to-face setting.

For users of low-context cultures, the mere exchange of offers seems to be sufficient. Theoretically, it is not necessary to deliver additional information to negotiate or achieve a settlement. Furthermore, the exclusive exchange of standardized offers can be seen as facilitating the focus on issues or tasks instead of personalities or social matters (Kersten and Noronha 1999). We assume that this task-oriented way of negotiation better fits to European and North American countries, while high-context cultures take a different approach.

The distinction between high and low-context cultures is also apparent in the significantly different perception of Inspire's analytical support. To specify preferences about four different issues and to combine them into one utility function is a very task-oriented way to think about preferred negotiation outcomes. Social or personal factors in negotiations do not enter these calculations. This way of negotiation support is probably more compatible with the direct and explicit communication patterns of low-context cultures. In our study the most positive feedback on the analytical support feature was

reported by users from Switzerland, followed by India, the USA, and Canada. The lowest values of usefulness in our sample were attributed by users from Ecuador, Taiwan, and Hong Kong.

Although we find some significant differences in ease of use and perceived usefulness of the communication platform between individual countries, these differences are not congruent on an aggregated level of ethnolinguistic groups which is, given the results discussed above, surprising.

The explanations for the different patterns in perceived usefulness of the analytical tool and actual use of system features are still tentative and need to be verified through further research. Although they seem plausible, some puzzles remain. For instance, users from Finland evaluated the system in some aspects rather different from other European countries, which can not be explained by referring to the distinction of low and high-context culture. Here, cultural differences in technology adoption could possibly be explained by differences in cultural dimensions such as individualism, masculinity, uncertainty avoidance, or power distance, as suggested by Hofstede (1980). There is clearly a need for further research to explain these differences. Another example are the results obtained from Indian users, who have a very different cultural background than users from Western countries, but who evaluated the system similar to Americans and Canadians. As mentioned above, India's culture can be characterized as a high-context culture with a strong preference for indirect communication. Indians prefer, as other Asian cultures, an intuitive, polychronic, and person-related problem-solving approach as opposed to the systematic, monochronic, and task oriented problem-solving approach of Anglo-Germanic people. On the other hand, parts of India have the same linguistic roots as the Anglo-Germinic group. One possible explanation for the similarity between Indians and users from the Anglo-Germanic group in our study could be a selection bias in our sample., i.e. access to Inspire system is probably restricted to highly-educated Anglo-Indians.

As mentioned in Section 2, there are other sources of cultural variation besides ethnolingistic reasons, such as gender, profession, and education. Although we entered these variables into our models, none of them proved to have a consistent impact on our dependent variables. Only negotiation experience, which could be roughly equated with education, positively influenced users' assessments of the system's ease of use. Surprisingly, gender did not affect any of our dependent variables.

However, we can summarize the results of our empirical analysis of computer-mediated negotiations and draw some conclusions:

- Users from high-context cultures use the communication tools more often than users from low-context cultures. This result can by explained by the preference of high-context cultures for an indirect and circular communication style. As personal and social cues of the opponent are not visible in computer-mediated negotiations, the context has to be established by exchanging additional information by attaching messages to offers.

- Users from low-context cultures evaluate the analytical support tool of Inspire as more useful than users from high-context cultures. This result can be explained by the preference of low-context cultures for systematic and analytical problem solving and their task orientation.

National culture is an important new factor arising in the context of information systems used for cross-cultural applications like international negotiations. It has already been shown that culture strongly influences the web-based negotiation process (Kersten *et al*. 2002). The present study goes one step further and indicates that culture also has to be taken into account in determining a user's perception of and attitude towards an information system. Cultural aspects thus need to be considered

when developing individual or group decision support systems that are to be used by international participants.

The results of our study also have consequences for the methods by which Internet-based decision and negotiation support systems can be evaluated. Localized assessment based on a small, uniform user group does not provide a valid evaluation of systems in this context. Features that are particularly important or useful to one group of users might have much less value or even be obstacles for users from another cultural background. Globalization of software development and use thus also requires globalization of software evaluation.

This study is based on a significantly larger sample than other similar studies. This, however, has some drawbacks, which will need to be addressed in future work. Inspire is an open system, so we cannot control the user population that forms the basis of our analysis. This might introduce unknown biases through user characteristics, which are neither controlled nor measured in our analysis. To the extent possible given the web environment controlled, experimental design to analyze cultural impact on perception and use of NSS is therefore necessary. Additionally, beyond analysis of the quantitative data provided by the system, a qualitative analysis of negotiation materials such as the written messages attached to or separate from offers could strengthen the arguments about different preferences for communication patterns.

Our study also shows that the AMIS model is a useful starting point for evaluating decision and negotiation support systems in a web-based context. But, it also has shown that the AMIS model is just a starting point, and that further work on its theoretical foundations, measurements of constructs, and empirical verification are necessary.

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