

CULTURE INFLUENCE ON HUMAN COMPUTER INTERACTION

Cultural Factors Toward User's Preference on Groupware Application Design

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Abstract: This paper reports about on-going research on how cultural dimensions affect user's preference in intercultural collaboration using computer supported cooperative work (CSCW) tools. It proposes how selected cultural dimensions should be applied when designing a synchronous groupware application aimed for multicultural users. Using four cultural dimensions, which are Collectivist-Individualist, Power Distance Index, Uncertainty Avoidance, and Low- and High Context communication from Hofstede, Gudykunst, Triandis, and Edward T.Hall, this research will try to analyse how culture influences the way users prefer to interact using a groupware as a remote collaboration tools.

1 INTRODUCTION

During the last decades, there has been a tremendous change in our ways of communicating. Nowadays technology plays an important role in our daily lives. Technology has replaced most of the communication practices, where people often use email as a communication medium instead of traditional mail and where teleconference meeting replaces traditional face-to-face meeting. The current business trend integrates technological issues and human factors; the internet enables us to have a lunch meeting with colleagues from New York and dinner conference with staff in Frankfurt in the same day. Communication has move towards a "without limits" trends (*the world without limits*).

With the expanding growth and development of the information and communication technology, cultures have been dramatically affected, especially as a result of the increasing accessibility and speed of communication platform. Many multinational companies rely on multicultural teams call for an effective functioning of geographically dispersed work-related activities. Developing a groupware that supports multicultural teams is one strategy to improve intercultural communication hindrance in the global business environment. Groupware aims to save time and cost in coordinating group work, however, developers are often more focussed on the

technology and produce highly sophisticated software systems that may not be necessary at all in real-life multicultural groups. The design of groupware has to be centred on users and should behave as a "co-work" environment that provides flexibility, adaptability, and intelligent system behaviour.

Earlier research had shown an increase of scholarly interest on cultural factors affecting Human Computer Interaction (HCI). Research exploring issues related to cross-cultural and user-interface design had quickly spread (Marcus 2000). However, there is not much research done on how culture influences user's preference and behaviour on groupware application. Although basic principles of groupware tools for supporting social mechanism for intercultural remote collaboration such as awareness, coordination and conversation (Vilhjalmsson 2003) has been conducted, no special intention has been paid to investigating how cultural dimensions influences user preferences on using groupware as a collaboration tools. In addition to technical problems, cultural problems also play an important role among the problem with the tools, especially when interaction between users from different nationalities occurs. This paper shows the influence of culture toward user's preferences on working collaborately using groupware as a communication solution. It will try to analyse the

effect of selected cultural dimensions on user's preferences on how tools and features that should be include in a groupware application.

2 RESEARCH OBJECTIVE

At University Duisburg-Essen, Germany, a synchronous groupware named PASSENGER has been developed at the Institute of Computer Engineering throughout the last years. This client-server based groupware application enables student teams to communicate and cooperate via internet, even if the members are located at distributed sites (Werner 2003). The system has not applied any social aspect which allow multicultural user to collaborate conveniently using the available tools with less suitability for working environment. It did not provide flexibility for user to change the settings based on user's preferences. To counter these limitations, a new system approach is under development, namely PASSENGER 2. PASSENGER 2 relies on *user-defined* specification to present optimal environment and configuration during its operation. In order to do so, we will need to know the user's requirement on how to make PASSENGER 2 become a tailor-able and flexible synchronous groupware design that can adapt to user's preference settings to optimally to support day to day cooperative in working environment. Therefore, in this paper, user's requirement set on how human factors should be taking under consideration when designing the tools and features for the groupware design will be defined.

Integrating theories from cultural studies and Computer Supporter Cooperative Work (CSCW) may lead to an adaptable groupware application designed accordingly with user's preference. This paper will try to explain how several cultural dimensions may influence human as the user interacting with the computer as the supporting tool for collaborative working from the HCI point of view. This is an on-going research; in this paper only four dimensions are being discussed, which are: Collectivism vs. Individualism, Uncertainty Avoidance Index, Power Distance Index, and Low-and High-context from Hofstede (Hofstede 1997), Gudykunst(Gudykunst 1991), Triandis (Triandis et al. 1985), and Edward T. Hall (Hall 1976).

3 THEORETICAL FOUNDATION

3.1 Culture

There are many definitions of culture in the

literature, but there is no agreement on a specific definition of culture (Hoft 1996). Most of the definitions refer culture as influencing the way in which communication takes place. Thus, for the purpose of this paper, culture is defined in terms of cultural aspects that affects the communication style which influence human (user) to human interaction through the use of computer as its tool.

3.2 Cultural Dimension

3.2.1 Cultural Metamodels

The Iceberg Model - shown in Fig. 1, identifies three layers of culture: (1) Surface: visible and easy to research; (2) Unspoken rules: obscured and need context of situation to understand the rules; (3) Unconscious rules: out of conscious awareness.

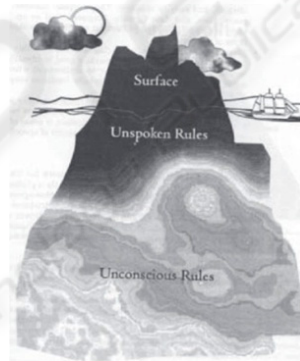


Figure 1: The Iceberg Model (Hoft 1996).

The Pyramid Model - shown in Fig. 2 is introduced by Geert Hofstede (Hofstede 1980): (1) Personality: specific to an individual and is both learned and inherited; (2) Culture: it is learned and not inherited; (3) Human Nature: it is universal, inherited, and not learned.

The Onion Model - shown in Fig. 3 is introduced by Fons Trompenaars (Trompenaars 1993): (1) Outer layer: explicit products and artifacts of culture; (2) Middle layer: defines norms and values; (3) Core: implicit and consists of how people adapt to their environments.

3.2.2 The Focus of the Four Cultural Dimensions

In this paper, we will review four cultural dimensions, which are: (1) Collectivism vs. Individualism: Collectivistic cultures emphasize goals, needs, and views of the ingroup over those of the individual (Gudykunst 1991); (2) Uncertainty

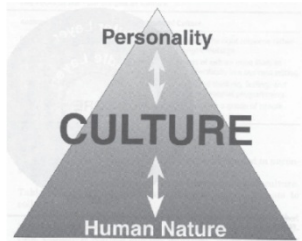


Figure 2: The pyramid model (Hofstede 1980).

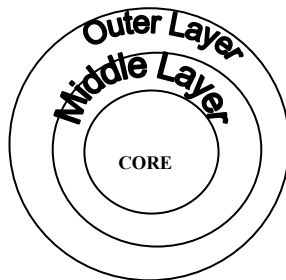


Figure 3: The Onion Model (Trompenaars 1993).

Avoidance Index: focuses on “the extent to which people feel threatened by uncertain or unknown situation” (Hofstede 1996); (3) Power Distance Index: is described by “the extent to which less powerful members of institutions and organization accept that power is distributed unequally” (Hofstede 1997).; (4) Low vs. High Context Communication: Edward T. Hall differentiates cultures on the basis of the communication that predominates in the culture. Context refers to the amount and specificity of information in a given situation.

4 METHODS

In order to define how cultural dimensions influenced user preferences in the field CSCW, a survey was conducted. We used qualitative survey as the method used in this research. Two methods that we used in conducting this qualitative research were: (1) In-depth interviews with the key person in the industry/company; and (2) Distribution of questionnaires (paper based and web based).

The survey was carried out for two months in Indonesia in 2009. Indonesia was selected as the subject respondent since Indonesia is the largest archipelago and the fourth most populated country in the world which is rich with culture. The questionnaires were distributed for two months. Respondents were from multicultural environments working in the globalised industries, organizations, and academic institutions. More than 20 companies from different fields or companies, such as Information and Technology, Advertising, and

Telecommunication, as well as Academic Institutions were visited to conduct the in-depth interview with the key person. The total respondents of both paper based and web based questionnaires were 142 respondents from 150 that were distributed. The position or levels of the responded varies from staff until executives/director. The age of the respondents were dominated with the age of 25-45 years old. The data gained from the questionnaires was translated into numerical information in order to produce statistical result. An appropriate statistical method is applied in processing the data obtained from the questionnaires. The method for analysis is qualitative method using SPSS software version 12.0 to create a descriptive statistic of the data.

5 DISCUSSION

5.1 Individualism vs. Collectivism

Hofstede scored Indonesia as a country belonging to the collectivistic culture. As shown in Fig. 4, Indonesia has one of the lowest world rankings for Individualism with a 14, compared to the greater Asian rank of 23, and world rank of 43. The score on this Dimension indicates the Indonesian society is Collectivist as compared to Individualist (Hofstede 1980).

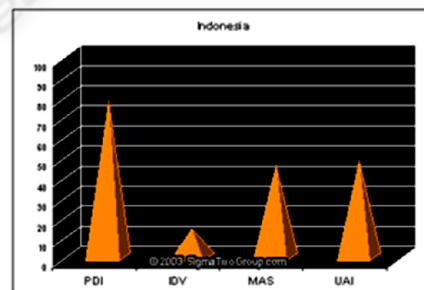


Figure 4: Hofstede Cultural Dimension for Indonesia (Hofstede 1980).

Individualistic cultures focus on the “I” identity and collectivistic cultures focus on the “we” identity. The emphasis is placed on individuals’ goals in individualistic cultures, while group goals have precedence over individuals’ goals in collectivistic cultures (Gudykunst and Ting-Toomey, 1988). This is true, as shown in Table 1, most respondent agreed that members have strong relationship in the group and everyone takes responsibility for fellow members of their group as much as 90.1% or 118 respondents and 9.9% or 13 respondents disagreed. Gudykunst (1988) described collectivistic cultures emphasize group harmony; individualist cultures

Table 1: Indonesia as collectivistic culture.

Answer	Frequency	Valid Percent
Disagree	13	9,9
Agree	118	90,1
Total	131	100,0

emphasize the importance of verbal self-assertion (Gudykunst & Ting-Toomey 1988). This is true, most respondent answered that when working in group, conflicts are very much avoided, in order to keep the group harmony. Words are expressed as polite as possible. For instance, to say “no” is avoided and undesirable, since it can lead to a confrontation. To behave in such a way that would result in the group ‘losing face’ is absolutely displeasing. But, on the other hand, the word ‘yes’ does not necessarily denote approval, but serves as maintenance of the communication line. In Hofstede’s analysis on Indonesia, Hofstede mentioned that “When someone says *yes*, does he or she mean *yes* or *no*. Indonesia is a gracious culture that is polite. Wanting to be agreeable and never wanting to embarrass another”, this is untrue. Most of the respondent disagree with the statement above (62,3% or 66 respondents), while as much as 37,7% or 52 respondents agreed, as shown in Table 2.

Table 2: The word “yes” may not mean yes.

Agree	Frequency	Valid Percent
No	86	62,3
Yes	52	37,7
Total	138	100,0

In collectivistic culture, decision making are usually done collectively using voting or the group’s majority voice. To avoid conflicts, polling tools will be useful for this type of user to be able to obtain a fair result of discussion whenever ambiguity persist. Triandis (1986) contends that the larger the number of in-groups, the narrower the influence and the less depth of influence. This affects the number of groups that user will allow when a session starts when working in a groupware. When the user belongs to a high rating of individualistic culture, the tendency to limit the group occur, and not allowing a non-invited users to enter and join a session. Users that belong in a high rank of collectivistic culture would have the tendency to invite sessions directly to an open list (or mailing list) and would allow any other participants to join the session even if the session has already been started.

5.2 Uncertainty Avoidance Index (UAI)

The second highest Hofstede ranking for Indonesia is UAI at 48, compared to the greater Asian average of 58 and a world average of 64. This reflects a more moderated influence of this dimension within the

Indonesian society. In a country with low uncertainty characteristic, societies are open toward changes or ready to accept changes. This is true, as shown in Table 3, most respondents are open in accepting the changes in their society (66,7%), whereas 42% answered very open, 24,6% answered open, 15,2% answered average, 8% not open, and 10,1% answered very not open.

Table 3: Open in accepting changes in the society.

Answer	Frequency	Valid Percent
Very open	58	42,0
Open	34	24,6
Average	21	15,2
Not open	11	8,0
Very not open	14	10,1
Total	138	100,0

In Table 4 below, it shows that most of the respondent, 93,2% or 124 respondents, answered that they are willing to follow the changes and the other 6% answered they prefer to leave it as it is. One respondent answered that he preferred not to have any changes, and 6, 3% or 9 respondents refuse to answer.

Table 4: Willing to follow the changes.

Answer	Frequency	Valid Percent
Willing to follow the changes	124	93,2
Just leave it as it is	8	6,0
Do not want to have changes	1	0,8
Total	133	100,0

Users belonging to the high UAI culture are tend to be more rigid type of people and would have the tendency to work using the default setting. Users belong to this type of culture resist change more, therefore would like everything to do in order and using the default settings, and also insist to have clear instructions. Therefore manuals or guidelines should really be available for users to refer to. On the other hand, users belonging in the low UAI culture are more of the loosely type of people and more a risk taker. User of this type would prefer to be able to configure or set up the configuration manually based on their taste and preference. This type of users will have the tendency to ignore rules; therefore all settings should be made as flexible as it can be. Since low UAI culture are risk takers, then user are more of the “experiment” type. Users of this type will have the tendency to use the most of the provided tools available in the groupware. Users of this type also have the tendency to negotiate; therefore groupware may be useful for as a negotiating tool.

5.3 Power Distance Index (PDI)

In PDI dimension, Indonesia scored 78. It indicates that in Indonesia, there is a far distance between those who have high power to those who have the least power in the society. The average PDI for the greater Asian countries is 71 (Hofstede 1997). In cultures with low power distance, bosses and subordinates work closely together and consult with each other. In culture with high power distance, the relationship between the boss and the subordinate is strictly ruled and dependent on the decision of the boss. This is true, as shown in Table 5, most of the respondents answered that usually the boss or leader (with 34,5%) and the supervisor (with 26,8%) that dominates the interaction as Indonesia is as a country with high PDI score.

Table 5: Who dominates the interaction.

Answer	Frequency	Valid Percent
Boss/leader	49	34,5
Supervisor	38	26,8
Both member & leader	24	16,9
Member only	20	14,2
No answer	11	7,6
Total	142	100,0

Most of the respondents agreed that rank and status is very important in the Indonesian culture, as shown in Table 6 below. This opinion reach 61,3% or as much of 87 respondents agreed, while 31% or 44 respondents did not agreed, and the other respondents that did not answer is as much as 7,7%. This affects the usage of the user profile in a groupware application. Rank and status is important for this type of user, therefore user would like to be able to see other user's profile in order to be more respected by the other users. This also affects the communication style in a groupware, as the boss, usually would want to have more special treatment. This will affect the video screen window on the groupware interface layout. The boss' screen should be different from its subordinates, for instance the size of the window would only be accepted if it is made larger. Individuals in high power distance cultures being more relaxed and open to accept changes compared to their low power distance counterparts. Most respondents are willing to try and accept new application that enables them communicate and coordinate better with their colleagues or with the other companies. Although in term of web-based application, the bandwidth should also be increased considering the infrastructure in Indonesia to avoid delay of the system.

Table 6: Rank and status is important.

Answer	Frequency	Valid Percent
No	44	31,0
Yes	87	61,3
No answer	11	7,7
Total	142	100,0

5.4 Low vs High Context Communication

The dimension of context is firstly introduced by Edward T. Hall (Hall 1976). Members of low context, individualistic cultures tend to communicate in a direct fashion, while members of high-context, collectivistic culture tend to communicate in an indirect fashion (Gudykunst 1991). In low-context cultures, open confrontation of ideas and direct, issue-oriented discussion are valued modes of human expressiveness. This relates to the usage of tools in groupware, whereas in low context culture, user would prefer to be able to use external tools to express their creative ideas while working.

Users belonging in the high-context culture are often indirect when stating a purpose. This will affect the timing of the session in a groupware. The session should not be given a strict ending time and flexible. Users belonging to high-context culture would probably use emoticons more often than people from low-context culture. High context culture would also prefer to use video conference to coordinate within a group and the tendency to make use of PowerPoint during discussion to highlight pointers rather than a long documentation reports. Indonesia has the tendency to belong in the high-context culture. As shown in Table 7 below, most respondents answered that they prefer to use Instant Messaging (IM) as a good way of communicating with the other colleagues. Most of the respondents use IM for both business and personal reasons (Table 8). On the contrary, users belonging in the low-context culture are the "straight to the point" type of user. Time is used as effective and efficiently as it should be. Therefore each session should be given a limitation of time. Low-context cultures have the tendency to use notepad, and word applications for collaboration. Hall's (1976) description of low-and high-context cultures can also be argued that there is greater need for coordination of activity in high-context cultures than in low-context cultures. It can also be assumed that user belonging in the high-context cultures will make use of the groupware for collaboration activities rather than user belonging in the low-context cultures.

Table 7: Usage of IM.

Answer	Frequency	Valid Percent
No	24	16,9
Yes	88	62,0
Total	112	78,9
Missing answer	30	21,1
Total	142	100,0

Table 8: Reasons to use IM.

Answer	Frequency	Valid Percent
Business Purpose	88	62,0
Personal Reasons	71	50,0

6 CONCLUSIONS

Culture awareness is the crucial topic in international collaboration. Each culture has its own cultural values and style of communication. To better communicate with each other, one must distinguish some enormous difference between the cultural backgrounds. Most people must adapt to the technology rather than adapting to their needs (Day 1996). Since there is not enough effort to adapt software culturally, people from other cultures tend to adapt to the technology (Cagiltay 1999). Below is the summary on how cultural dimensions affect user's preference upon the usage of tools and feature in a synchronous groupware application: (a) In collectivistic culture polling or voting tools is useful as one of a tool for decision making and during running session will allow late joiners and early leavers; (b) In Individualistic culture, the limitation of group size is more preferred and will not allow late joiners nor early leavers; (c) In High UAI culture, user tend to work using the default setting, manuals and guidelines should be available since user insist to have clear instructions; (d) In Low UAI culture, the setting should be made flexible since user prefer to be able to set up the configuration manually based on their own taste and preferences and will use groupware as a negotiating tool; (e) In High PDI culture, the availability of user's profile information and differentiation of the video screen size window between boss and the subordinates; (f) In Low PDI culture, all the settings should be made flexible and not strictly defined prior to its use; (g) In High Context culture, the session timing should be made flexible, make most use of video conference rather than chatting tools, also use PowerPoint rather than long documentation reports to highlight pointers; (h) In Low Context culture, the session timing should be limited and will make use of notepad or word applications for collaboration.

As the result of this study, it will be use as a requirement set for next generation groupware PASSENGER 2 that is currently under development at the Institute of Computer Engineering, University Duisburg-Essen. By implementing the cultural dimensions analysis to the PASSENGER 2 system, it will make this new groupware as an intercultural collaboration supporting tool, as well as a flexible synchronous groupware that can adapt to user's preference setting.

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