

Cultural Difference in Nonverbal Behaviors in Negotiation Conversations: Towards a Model for Culture-adapted Conversational Agents

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Abstract. As the basis of generating nonverbal expressions in animated agents, this paper proposes factors that account for cultural difference in nonverbal behaviors in negotiation interaction. First, we introduce theories of negotiation and cultural characteristics. Then, our analysis of human interaction in negotiation conversations in CUBE-G corpus is described. Finally, by integrating cultural and negotiation parameters with empirical data obtained in the corpus analysis, we design a parameterized network model that generates culture specific nonverbal expressions in negotiation conversations.

Keywords: Negotiation, Nonverbal behaviors, Comparative corpus analysis

1 Introduction

Culture influences how people think, communicate and behave. It strongly affects the way they negotiate or make decisions. Many previous literatures [1, 2, 7, 9, 12] mentioned that culture affects negotiation process. Some cultures emphasize individual's decision making in negotiation while others stick in decision as a group. In some cultures, a negotiator with a formal style insists on addressing his/her conversation partner by her/his full name or titles, but that with an informal style tries to start conversation on a first name basis. Thus, there is no question about the existence of cultural influence on negotiation styles and nonverbal behaviors occurred there. However, in our knowledge, little has been studied about the models for generating culture-adapted negotiation communications, specifically in human-computer interaction (HCI). Moreover, quantitative data analysis is necessary as the basis of designing HCIs that support negotiation communication because there are many theoretical studies, but not empirical research on negotiation strategies [1]. Based on the motivations above, this paper aims at connecting theories of culture and negotiation interaction with empirical analysis.

As a theory of culture, we use a well known model introduced by Hofstede [6]. As the factors of characterizing culture, he proposed five dimensions: hierarchy, gender, identity, uncertainty, and orientation. As for the factors of characterizing negotiation

interaction, we studied previous literatures in social psychology [1, 2, 3, 9], we proposed four parameters that categorize negotiation: negotiation style, risk taking, degree of rapport, and negotiation goal.

In our empirical study, we use negotiation conversations in CUBE-G corpus [5] which is a standardized multimodal corpus of two cultures: German and Japanese. In this study, we focus on smile and head nod in our analysis. Finally, by integrating theories of culture and negotiation with empirical data, we will propose a computational model which generates culture specific nonverbal expressions in animated characters.

This paper is organized in the following way. In Section 2, previous studies will be reviewed, and in Section 3 theoretical background drawn from a literature study is briefly outlined. Section 4 will describe the empirical analysis of two cultures: German and Japanese in a negotiation interaction. Section 5 will present a computational model by integrating empirical data and cultural and negotiation characteristics. Section 6 will present concluding remarks and future directions of this research.

2 Related Work

A number of studies have identified the effect of culture on negotiation process. Adair et al. [12] claimed that, negotiators from different cultures enact different behavioral sequences at the bargaining table, leading to difficulty in synchronization and inefficient deals. So, they proposed a four stage model of negotiation that captures the progression of competitive and cooperative elements over time in mixed-motive negotiation. They also claimed that, particular behaviors that negotiators enact in each of the stages were shaped, in part, by negotiators' cultural backgrounds. Finally, they predicted the particular stages and behavioral sequences in order to generate efficient deals.

Comparing how negotiation styles differ depending on the culture, Jeswald [2] found that Japanese people always go for win-win process as negotiation outcome where as only thirty three percent of Spanish executives take this view. Moreover, [1] found that during negotiation interaction, the Japanese were using a relatively large number of proposals, compared to the US negotiators, and the US negotiators were using a whole array of direct communications relatively more frequently than the Japanese.

Brett [1] developed a model of how culture affects negotiation process. This study has identified three key factors leading to successful integrative and distributive agreements that are affected by culture. The first is a value for information sharing, the second is a means of searching for information, and the third is the motivation to search for information. Therefore, negotiators who are motivated to search for information and are flexible about how that search is carried out, can reach high-quality negotiated outcomes and culture at first place affects the norm and behavior of the negotiators.

Moreover, Teng et al.[9] found that the amount of time to make a decision depends on the cultural background. As western cultures are on the individualistic and

masculine sides in Hofstede's cultural dimension, they are more expected to take an aggressive approach to reach a solution. This claim is supported by the fact that, western cultures are short term cultures, and this suggests that they tend to solve problems quickly and in a sequential manner. Whereas eastern cultures that belong to a more holistic, long-term and collectivistic group are expected to solve problems much slower and more exhaustive.

Facial expression is one of the most important channels in conversational management. Mark et al [8] found that smiles are positive reinforcers that can change behavior of the conversational partner. Receiving a smile from someone can make the receiver more helpful toward the partner which in turn can initiate a better deal in conflict situations.

Although all these literatures provide a great deal of information as to how communicative behavior, style, and attitudes during negotiation are influenced by culture, yet precise quantitative data is virtually absent from such sources, and the data should be used in a technical way to model the culture computationally.

3 Literature on culture and negotiation

We employ Hofstede theory [6] to describe cultural characteristics, and exploit theories in social psychology and its related research [1, 2, 3, 9] to explain negotiation characteristics. In this section, we describe these factors in detail.

3.1 Cultural characteristic

Hofstede theory [6] consists of the following five dimensions, which are based on a broad empirical survey. The dimensions are:

a. Hierarchy (Small/Large): This dimension describes the extent to which different distribution of power is accepted by less powerful members.

b. Identity (Individualism/Collectivism): This dimension indicates the degree to which individuals are integrated into a group. On the individualist side ties between individuals are loose, and everybody is expected to take care of himself. On the collectivist side, people are integrated into strong and cohesive groups.

c. Gender (Masculinity/Femininity): The gender dimension describes the distribution of roles between the genders. In feminine culture the roles differ less than in masculine cultures, where competition is rather accepted and status symbols are of importance.

d. Uncertainty (Weak/Strong): The tolerance for uncertainty and ambiguity is defined in this dimension. It indicates to what extent the members of a culture feel either uncomfortable or comfortable in unstructured situations which are novel, unknown, surprising, or different from usual.

e. Orientation (Short/Long): This dimension distinguishes long and short term orientation. Values associated with long term orientation are thrift and perseverance whereas values associated with short term orientation are respect for tradition, fulfilling social obligations, and saving one's face.

Table 1 gives the Hofstede's ratings for three countries. For example, in Identity dimension, Germany (67) is more individual culture than Japan (46), and US (91) is the most individual culture among three.

Table 1: Hofstede ratings for three countries

	Hierarchy	Identity	Gender	Uncertainty	Orientation
Germany	35	67	66	65	31
Japan	54	46	95	92	80
US	40	91	62	46	29

3.2 Negotiation Characteristics

There have been many studies on how to manage inefficient deal during negotiation and how to anticipate misunderstanding during cross-cultural negotiation. They proposed factors of negotiation to identify cultural differences. We reviewed many socio-psychological studies [1, 2, 3, 9] and finally came up with the following four elements to characterize negotiations.

a. Negotiation style (Formal/Informal): Negotiation style concerns how politely way that a negotiator interacts with the other person. Culture strongly influences the style of negotiation. For example, American people more likely to use informal negotiation style, and they call someone by her/his first name to display the friendship. On the contrary, Japanese people with formal negotiation style use first name at a first time meeting to display disrespect [2].

b. Risk Taking (High/Low): This parameter indicates how willingly/easily the negotiator take a risk in negotiation interaction. For example, previous literature [2] claimed that the American are risk-takers whereas the Japanese try to avoid risk in a deal making.

c. Degree of Rapport (High/Low): Rapport is a social mechanism that serves as the function of enabling coordinate action in dyads and groups [3]. The degree of rapport rises through the coordination of expressive behaviors, such smile.

d. Negotiation goal (Long/Short): This is the purpose of a negotiation deal. Negotiators from different cultures view the goal of the negotiation differently. For some cultures, the goal of negotiation is a signed contract so they are fast in decision making. However, for some cultures, the goal is not only a signed contract but also the creation of a long-term relationship between two sides. They invest time getting to know each other which as a result slows down the process of decision making [2, 9].

4 Corpus analysis

This section reports the results of a comparative corpus analysis using CUBE-G corpus [5]. We analyzed 10 videos of negotiation conversations in each culture:

Table2. Analysis of smile

Culture	Total amount of time[s]	Ratio[%]	Frequency	Duration[s]
Japanese	212.85	35.98	36.50	7.28
German	142.77	22.28	33.70	3.98

Table 3 Analysis of head nod

Culture	Total amount of time[s]	Frequency
Japanese	92.15	123.30
German	57.68	50.44

4.1 Differences in smile

Table 2 shows the average frequency and duration of smile in both cultures. This shows that in Japanese data, the average amount of time for smiling per conversation was 212.9 sec. On the other hand, in German data, the amount of time for smiling per conversation was 142.8 sec. This means that the Japanese smiled much more than the German. Moreover, smiling behaviors were slightly more frequent in Japanese data (36.5 times) than the German data (33.7 times).

4.2 Differences in head nod

Table 3 shows the average amount of time for head nodding per conversation and the average frequency. As shown in the table, the frequency of head nod in Japanese data (123.3) is twice as much as German data (50.4), and the amount of time is also larger in Japanese data than in German data.

Next, we analyzed the types of head nods: single, double, and repeated. The ratios for each type of head nod are shown in Fig 2. An interesting finding is that the proportion of single head nod is higher in Japanese data than German data whereas the proportion of repeated head nod is higher in German data. There is no difference between these countries in double head nod. Note that in German data the

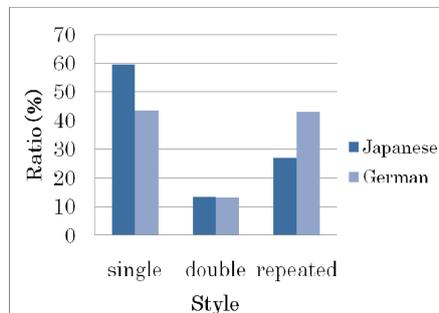


Fig2 The rate of head nod Style

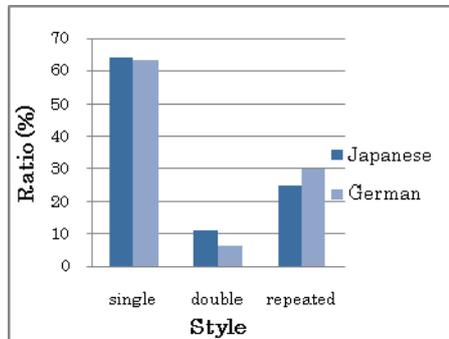


Fig3 Head nod during own utterance

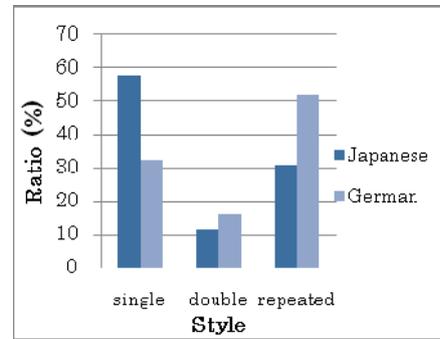


Fig4 Head nod during the partner's utterance

proportions for both single and repeated head nods are 41% where as the frequency of single head nod is more than twice as much as that of repeated head nods in Japanese data. This indicates that single head nod characterizes Japanese negotiation conversation.

To investigate the usage of each type of head nod more precisely, we analyzed head nods with respect to turn. The results are shown in Fig 3 and 4. Fig 3 shows the proportion of each type of head nod that occurred during own utterance. The proportions for all types of head nod are not very different between two cultures. Notable difference was found in Fig 4 showing the proportion of head nods that occurred during the partner's turn. While the partner was speaking, Japanese people frequently displayed single head nod. On the other hand, German people used repeated head nod which was less frequent than Japanese single head nod. This result suggests that such frequent single head nod as the feedback to the conversation partner contributes to relaxing the tension between the conversational participants and reducing the risk in the negotiation conversations.

5 Formulate a computational model

This section describes how empirical results from the comparative corpus analysis are connected with cultural and negotiation factors to design a network model that predicts nonverbal behaviors. We employ a Bayesian network for this purpose.

5.1 Designing of the model

In order to create a Bayesian network capable of predicting nonverbal behavior, the GeNie [4] modeling system was used. Fig 5 illustrates the Bayesian network created by using this tool. Based on the empirical analysis in section 4 and previous studies, we determined which factor or node should be linked to which node in the next layer. A summary of the network design is described below.

The Parent node

The parent node of the Bayesian network consists of two nodes Culture and Negotiation. Culture node is connected with Hofstede's dimensions and Negotiation node is connected with negotiation characteristics. In the current study, the Culture node has only two values: German and Japanese and the Negotiation node also has two values: high divergence and low divergence. Currently in this study, the high divergence value was assigned to our negotiation scenario and respected data were used in employing the model.

Cultural Parameters

As the cultural factors layer, we used Hofstede's five dimensions, which were described in Section 3.1, integrating all five dimensions: hierarchy, identity, gender, uncertainty avoidance, and orientation. The probabilities of each node are assigned based on the Hofstede's ratings for each culture given in Table 1.

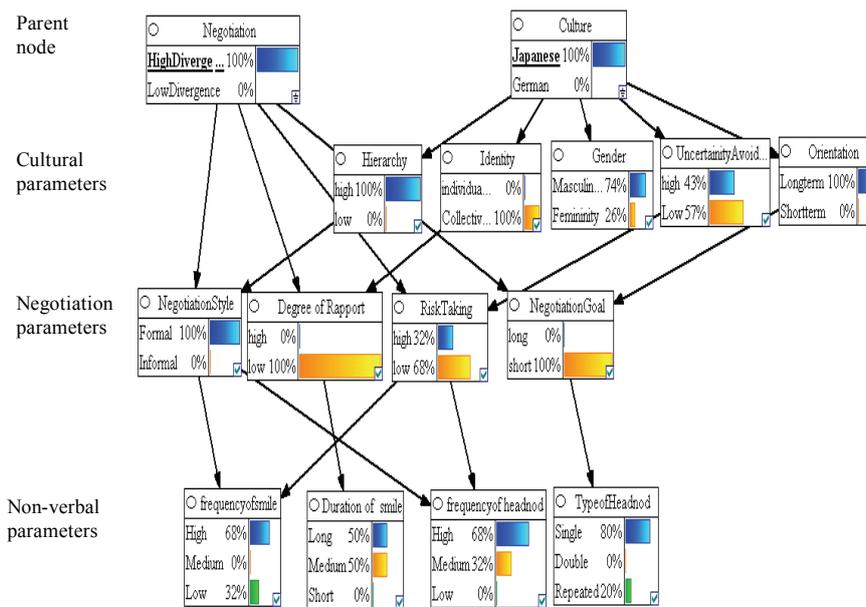


Fig5: A Network model connecting cultural and negotiation parameters with nonverbal

Negotiation Parameters

As the negotiation characteristics, we employed factors proposed in [1, 2, 3, 9], which were explained in Section 3.2. The linkage between the cultural parameters and the negotiation parameters were designed based on some previous studies [1,2,3,9], which provide enough evidences that culture influences how people think, communicate, and behave and it also strongly affects the negotiation process. The links for each node are described as follows.

a) *Negotiation style*: We linked Hofstede's dimension of "Hierarchy" with "Negotiation style". It is said that eastern cultures are high hierarchical societies where the attitudes in communication are formal, and they adopt formal procedures of addressing to counterpart [2].

b) *Degree of Rapport*: In face-to face interaction, rapport creates positive impression between the dyads, and affects the perception of another person [3]. Thus, we linked "Degree of Rapport" with "Identity". Since Japanese culture is collectivistic, it is more harmonious and conflict is less common compared to individualistic cultures [7].

c) *Negotiation goal*: Japan is a long term oriented society where their negotiation goal is not only to sign a contract, but to create a long term relationship [2, 9]. We therefore created a link between "Negotiation goal" and "Orientation".

d) *Risk Taking*: Since Japan is a high uncertainty avoidance society, they try to avert any risk in decision making [2]. So, we linked "Uncertainty avoidance" with "Risk Taking". On the contrary, cultures with weaker uncertainty-avoidance, risks are more easily accepted.

Nonverbal Parameters

The lowest layer consists of a number of different behavioral parameters that depend on cultural characteristics profiled by Hofstede's dimensions and the negotiation parameters. We draw some links between the negotiation parameters and the nonverbal behaviors. To assign the probability of each node, we employed EM (Estimation-Maximization) algorithm. The results of analyzing nonverbal behaviors (head nods and smile) were used as the input to the algorithm.

a) *Frequency of smile and Frequency of head nod*: We linked frequency of smile and frequency of head nods to "Risk management" and "Negotiation style". It can be assumed that since the Japanese are risk averse, they frequently use smile and head nod during negotiation to relax the tension with the conversational partner.

b) *Duration of smile*: We linked duration of smile with "Degree of rapport" since previous study [8] mentioned that facial expression influences the perception of trustworthiness.

c) *Type of head nod*: We linked the "Negotiation goal" with "Type of head nod". From our empirical data explained in section 4, it is found Japanese people do more single head nods than German which means the Japanese keep providing feedback to the conversation partner which enhances the relationship with the partner and a long-term relationship is ensured. In addition, from our analysis, we also found that German people do more repeated head nod than Japanese people. When German are sure about decision making, they confirm what they agreed on by nodding head repeatedly.

Output generated

The model predicts non-verbal parameters when culture and negotiation nodes are specified. As shown in Fig 5, when Japanese is chosen as an evidence for culture during a negotiation scenario, the results for frequency of smile is high (68%), duration of smile is long (50%), frequency of head nod is high (68%), and type of

head nod is single (80%). Then by selecting German culture, the result for frequency of smile is medium (100%), duration of smile short (98%), frequency of head nod is medium (50%), and type of head nod is repeated (66%).

6 Conclusion

This study attempted to provide theoretical background to characterize culture and negotiation interaction. We also analyzed comparative corpus for German and Japanese, and obtained statistical values of nonverbal behaviors with regard to negotiation scenario of dyadic conversations. We integrated the statistical information into a Bayesian network as well as the cultural and negotiation factors. As a future study, we will implement this model in Embodied Conversation Agents that can provide a means of identifying the nonverbal attributes for any culture in negotiation scenarios so that negotiators can cope with cross-culture negotiation deal and know other party's cultural background and behavior pattern. Such understanding of culture may help to adjust his/her negotiation strategies, and resolve conflict and uncertainties.

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