

# Investigating Communication Styles in Text-based CMC Using a Classification of Intention

## A Comparison of Same-Culture and Different-Cultures Context

*Pimnapa Atsawintarangkun & Takaya Yuizono*

*Japan Advanced Institute of Science and Technology*

### Abstract

We investigated how cultural differences influence communication style in text-based computer-mediated communication (CMC) and compared the context of communications within the same culture (Thai-Thai pairs) and different cultures (Thai-Japanese pairs and Thai-Chinese pairs) by examining significant differences in the number of text chats in each classification pertaining to intentions. The significant finding of this study is the large number of text chats in the Interrogation category in the context of different cultures. Results showed a significant difference in the number of text chats between Thai and Japanese participants in the Description and Interrogation categories. Further, we found a significant difference in the Interrogation classification between Thai and Chinese participants. The understanding of cultural differences in this work can be used to improve intercultural competencies.

**Keywords:** *Cross-cultural communication, Discourse analysis, Computer-mediated communication, Language-action perspective, Speech act theory, Text chat classification*

---

### Introduction

Technology provides conveniences and opportunities to communicate with people across the world via the Internet. For example, people can study and conduct business through this medium. As new technologies emerge, it is important to take a deeper look at the similarities and differences in usages of these communication tools. Computer-mediated communication (CMC), which refers to interaction between two or more individuals through computers, has become a part of daily life. Text-based CMC is considered as a potential tool for cross-cultural communication to share and reflect on ideas via a collaborator using non-native language. However, the environment provided by the Internet, such as the lack of non-verbal cues, may bring certain problems caused by different cultures. For example, some cultures rely more on information in the physical context to communicate with others.

To construct an effective information system for cross-cultural text-based CMC, we follow two principles based on the language-action perspective (LAP). First, linguistic communication involves a basic understanding of information systems. Second, people perform action through communication (Winograd 2006). In the context of text-based CMC, the collaborator attempts to communicate an idea using words and wants the partner to recognize that intention. The ability to recognize the intention of the partner in online communications would be advantageous for facilitating creative activities in society. Thus, this research aims to provide an understanding of how language is constituted based on intentions in text-based CMC with an experiment that compares communication style in terms of context for the same

culture and for different cultures. Understanding social and cultural differences is a key factor for enhancing intercultural competencies and designing the next generation of CMC tools to support intercultural communication. <sup>2</sup>

We treated the task of capturing intentions as a text classification problem, categorizing each sentence accordingly. Thus, we analyzed how collaborators used communications to express their intentions on CMC in the context of the same culture or different cultures. We classified text chats based on intention and compared the patterns of Thai collaborators in the context of the same culture (Thai-Thai pairs) and different cultures (Thai-Japanese pairs and Thai-Chinese pairs).

## Background

In this section, we explain theories applied in this research including the LAP and speech act theory. Then, we show previous works that use information technology in cross-cultural communications.

### Language-action Perspective

Language-action perspective (LAP) is considered as an approach for designing information systems according to how people use communication to perform actions. Winograd (1986) introduced a perspective based on language as the primary dimension of human cooperative activity. Language is not only used as a medium to exchange information between people but also to perform actions (Flores & Ludlow 1980; Schoop 2001). This perspective emphasizes that such actions should be the foundation of an effective information system (Winograd & Flores 1986).

Moreover, LAP has been receiving attention in the computer-supported cooperative work (CSCW) field (Bowers & Churcher 1988; Kensing & Winograd 1991), and many researchers have been motivated by this perspective (e.g., De Cindio et al. 1986; Kaplan et al. 1992; Whiteside & Wixon 1988). In the process of system design, we should observe actions in linguistic terms according to the claim from Flores et al. (1988: 156) that human beings are fundamentally linguistic beings; in other words, action happens in language in a world constituted through language. Thus, LAP is a basis for linguistic and social rules that govern use of language.

This study aims to investigate how language is constituted based on intention in text-based CMC to analyze the implications for the design of information systems. The LAP has its roots in of John Austin's speech act theory.

### Speech Act Theory

Speech act theory has been used as a theoretical approach in many studies in discourse analysis and pragmatics proposed by John L. Austin (1962); the theory was later developed by John R. Searle (1979). Over the past decade, the speech act theory has proved to be powerful for understanding, modeling, and changing organizations and information systems (e.g., Winograd & Flores 1986; Taylor 1993; Van Reijswoud 1996; Dietz & Widdershoven 1991).

A speech act is defined as an utterance or written text that performs action based on the illocutionary act. Whenever we talk or write to each other, we are performing an illocutionary act (Searle 1999); the intention is to transmit an utterance or text, such as an apology, complaint, promise, or request, between the speaker and listener (writer and reader in the case of writing). There are several information tools that apply the speech act theory such as Coordinator (Winograd & Flores 1986), the Speech-Act-based office Modeling aPprOach (SAMPO) (Auramäki, Lehtinen, & Lyytinen 1988), and CHAOS (De Cindio et al. 1986). Furthermore, many studies have used the speech act theory to analyze text. For example, researchers have classified sentences used in email messages (Cohen et al. 2004), message board posts (Qadir & Riloff 2011), and status messages in Facebook (Carr et al. 2012).

Since differences of thought among people of different languages and cultural backgrounds lead to different styles of communication, it is important for the collaborator to understand the style used in a

particular text chat and recognize the underlying purpose or intention. Such understanding leads to<sup>3</sup> effective construction of information systems for CMC.

## **Information Technology Aspects in Cross-cultural Communication**

Each culture has its own unique style of thinking and communicating. Diamant et al. (2009) has revealed that patterns of communication among people from different cultures are influenced by cultural norms, attitudes, and use of language. Culture involves the behaviors, beliefs, values, or practices that people who live in the same society use for living in that society. Techniques from the field of information technology have been used for supporting cross-cultural communication for decades.

Machine translation is one of the useful systems for cross-lingual communication. It allows users to write (speak) and read (listen) in their native language. Yamashita and Ishida (2006) proposed a study to understand how machine translation affects communication by considering referential communication among pairs using different languages. Then, Xia et al. (2011) introduced a bulletin board system based on machine translation mediation that enables monolinguals to collaboratively translate Wikipedia articles using their mother tongues. With the assistance of machine translation, there is a fair chance that non-bilingual speakers will contribute effectively to Wikipedia translation activities. For facilitating foreigners in the healthcare context, Fukushima et al. (2011) proposed a multilingual interview-sheet composition system that enables communication between medical workers and foreign patients by using parallel texts and machine translation.

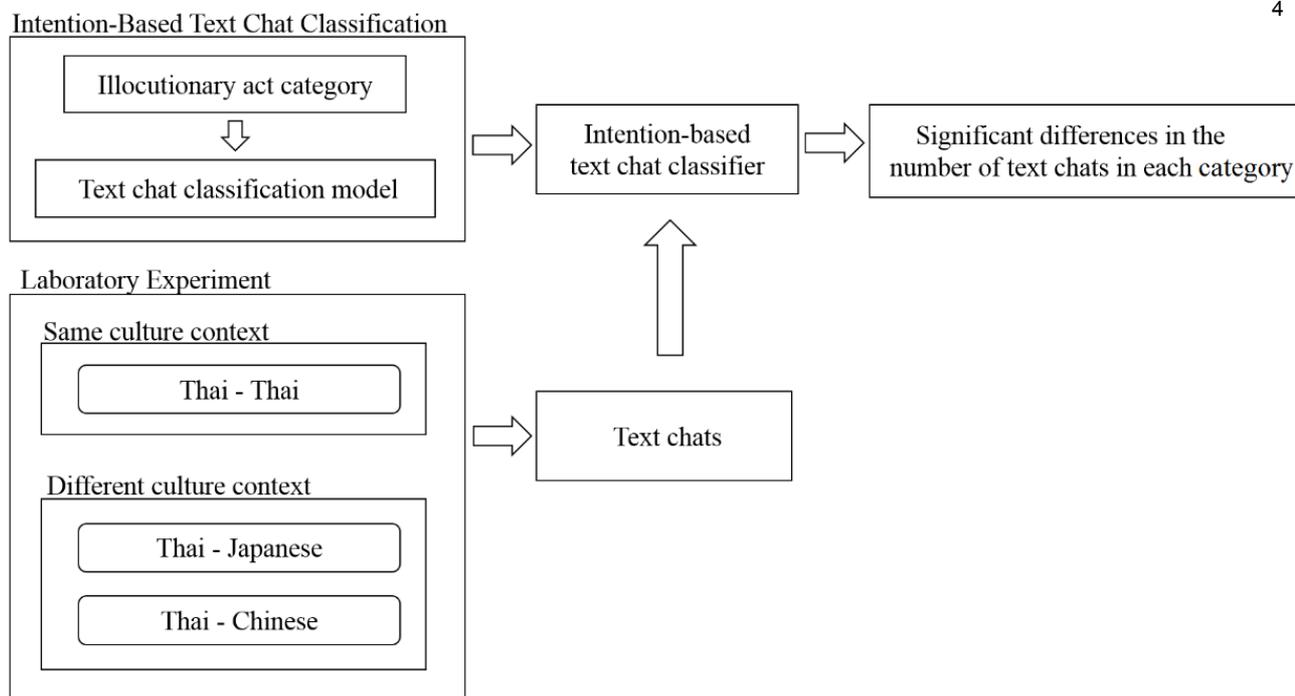
Another information technology that can be used to improve cross-cultural communication is automated speech recognition, which has been used to facilitate communication between native speakers and non-native speakers. Gao et al. (2014) studied the use of automated transcripts and possible effects on real-time group communication between non-native speakers and native speakers. Their findings suggest ways for improving automated speech recognition technologies and the quality of multilingual group communication. However, the design of a good information system requires an understanding of different behavioral patterns that are influenced by diverse cultures.

## **Methodology**

In order to investigate differences in how language is constituted based on intentions of collaborators in online communications within the same culture and between different cultures, a laboratory-based experiment was designed to collect discussion samples from participants. Then, we classified text chats based on intention and compared them for both contexts.

The methodology of this study consisted of two main processes: (1) text chat classification and (2) a laboratory experiment. The process used in this study is illustrated in Figure 1.

**Figure 1:** *The process for text chat classification and cultural analysis*



## Intention-based Text Chat Classification

In this work, we focused on analyzing the differences in intention-based text chats of collaborators in online communications in terms of context within the same culture and different cultures. The collaboration pattern refers to a way of arranging text chats to express ideas or opinions clearly. We applied the speech act theory and defined seven classes of intention based on illocutionary acts indicating the intention of the collaborator, as shown in Table 1, to capture different structures of text chats based on cultural differences. These seven classes indicate a logical relationship between ideas, how collaborators connect their ideas, and how they guide the reader in a desired direction. Based on the categories of illocutionary acts, the classification model using the machine learning method was used to automatically classify text chats.

**Table 1:** Classifications based on intention of the writer

Classification	Illocutionary act	Example
Cause and Effect	Show a relationship between events or concepts involving an action and the result of that action.	I cannot wake up in the morning <i>because</i> I am tired of my part-time job.
Description	Describe more information regarding events or concepts.	I <i>also</i> want to study Japanese.
Opinion	State an attitude, personal view, or belief.	<i>I think</i> every job can improve one's skills.
Sequence	Express events or concepts in a chronological order.	<i>Then</i> everything becomes something for living.
Contrast	Illustrate how two or more events or concepts are different.	<i>However</i> , there are trade-offs between working in a part-time job and only studying.
Interrogation	Ask a question to persuade the reader to think.	What do you think about your

		part-time job? <span style="float: right;">5</span>
Declaration	Give information with a statement of facts and always end it with a simple period. This class is not intended to elicit a response with a command or question. [F1]	In Japan, there are a lot of scholarships.

To create the classification model, we used data from the International Corpus Network of Asian Learners of English (ICNALE), developed by Dr. Shin'ichiro Ishikawa of Kobe University (Ishikawa 2013). For the data set, we randomly selected 776 essays consisting of 10,000 sentences. Each sentence was assigned to one or more of the seven classes shown in Table 1. We selected cue words/phrases as shown in Table 2 to facilitate and capture the intention of the writer. The cue words/phrases were adapted from the signal words in Fry's study (Fry et al. 1993). After categorizing the sentence into classes, we formatted the data set using the programming language Python (Rossum 1995).

The data set was trained and tested using the support vector machine (SVM), which has controlled learning models that analyze data and recognize patterns for classification. For the SVM tool, we selected a library for support vector machines (LIBSVM) (Chang & Lin 2011) that provides a simple user interface and supports a multi-class classification. We trained and tested our model based on unigram, bigram, and syntactic features with five-fold cross-validation. The performance evaluation revealed that the syntactic feature achieved the highest accuracy of 94.40%.

Then, we used the classification model to investigate differences between cultures in the use of various classes by analyzing significant differences in the number of sentences in each class. It can indicate how culture affects thought patterns in online communication.

**Table 2** Cue word/phrases used for facilitating classification

Classification	Cue word/phrase
Cause and Effect	because, since, consequently, lead to, if, thus, because of, due to, therefore, hence, so, accordingly, in order to, as a result of, caused by, cause, in response to, resulting in
Description	in addition, for example, for instance, such as, furthermore, also, another
Opinion	in my opinion, I think, I believe, I suppose, agree, disagree, personal view, point of view, personally, my view, in my eye, I feel, I admit
Sequence	first, second, third, fourth, fifth, firstly, secondly, thirdly, fourthly, before, after, next, initially, then, now, when, last, finally, following, preceding, recently
Contrast	on the other hand, however, but, as opposed to, although, in contrast, on the contrary, otherwise
Interrogation	Question Mark
Declaration	(None)

## Experimental Setting

Participants in a laboratory-based experiment included 20 Thais (Male = 10, Female = 10), 10 Japanese (Male = 9, Female = 1), and 9 Chinese (Male = 7, Female = 2). All were graduate school students in

Japan, ranging in age from 23 to 36 years. All had a TOEIC score higher than 600, which is the benchmark indicating the ability to satisfy most social demands.

In this experiment, an online chat program was provided for collecting discussion samples from participants. Respondents participating in the experiment were from different places, and they could not see their partners. They only saw codenames like T1, C1, and J1, referring to Thai, Chinese, and Japanese participant number 1, respectively, to recognize differences stemming from diverse cultures.

The experiment was based on two conditions for Thai participants: same culture and different cultures. Each Thai participant was randomly paired with a partner from the same culture or from a different culture, resulting in three combinations: 10 Thai-Thai pairs, 10 Thai-Japanese pairs, and 9 Thai-Chinese pairs. Since Thai participants were required to perform the experiment twice, counterbalancing was used to eliminate order effects in the experiment (Cozby & Bates 2011). Each pair had 20 minutes to discuss a topic such as “Is it important for college students to have part-time jobs?” via the text-based online chat program.

## Text Chat Analysis Results

In this section, we analyzed and compared text chats in online communications in terms of context related to the same culture and different cultures to investigate differences in communication styles. The classification model was applied to categorize text, and statistical data were analyzed using the Mann-Whitney U-test. We handled a text chat categorized into two or more classifications by counting it as  $1/n$ , where  $n$  is the number of classifications into which the text chat falls. Then, we added the calculated number into the particular categories.

Table 3 provides the number of words per text chat and the number of text chats per discussion by Thai participants with partners from the same culture and different cultures. There were no significant differences between the two experimental conditions in the number of words per text chat and the number of text chats per discussion.

The number of text chats in each classification for Thai participants in the context of the same culture and different cultures is displayed in Table 4. Table 5 shows the number of text chats (by classification) used by Thai participants when communicating with partners from the same culture and different cultures. The results indicated that when communicating with partners from different cultures, Thai participants wrote significantly more text chats classified under Interrogation than when communicating with partners from the same culture ( $p < 0.05$ ).

**Table 3** Statistical data regarding documented discussions of Thai participants

	Thai participants		
	Different cultures (N = 19)	Same culture (N = 20)	p-value
Number of words per text chat	8.8 ± 6.0	9.3 ± 6.7	n.s.
Number of text chats per discussion	24.9 ± 8.8	26.5 ± 6.4	n.s.

**Table 4:** Number of text chats by Thai participants

Classification	Thai participants
----------------	-------------------

	Different cultures (N = 19)	Same culture (N = 20)
<b>Cause and Effect</b>	45.5 (9.6%)	61.0 (11.5%)
<b>Description</b>	22.5 (4.8%)	25.5 (4.8%)
<b>Opinion</b>	42.0 (8.9%)	59.2 (11.2%)
<b>Sequence</b>	18.5 (3.9%)	23.3 (4.4%)
<b>Contrast</b>	20.5 (4.3%)	31.0 (5.9%)
<b>Interrogation</b>	98.0 (20.7%)	68.0 (12.9%)
<b>Declaration</b>	226.0 (47.8%)	261.0 (49.3%)

**Table 5:** Text chats: Mean, standard deviation, and p-value by class for Thai participants

Class	Thai participants		
	Different cultures (N = 19)	Same culture (N = 20)	p-value
<b>Cause and effect</b>	2.4 ± 1.4	3.0 ± 1.3	n.s.
<b>Description</b>	1.2 ± 2.1	1.3 ± 1.6	n.s.
<b>Opinion</b>	2.2 ± 1.8	3.0 ± 1.8	n.s.
<b>Sequence</b>	1.0 ± 0.9	1.2 ± 1.2	n.s.
<b>Contrast</b>	1.1 ± 0.9	1.5 ± 1.1	n.s.
<b>Interrogation</b>	5.2 ± 3.2	3.4 ± 2.3	< 0.05
<b>Declaration</b>	11.9 ± 5.5	13.1 ± 3.9	n.s.

We took a deeper look at how different cultures influence communication style in cross-cultural discussions between Thai-Japanese pairs and Thai-Chinese pairs. Table 6 presents the number of words per text chat and the number of text chats per discussion. The results reveal that Thai participants used significantly more words per text chat than Japanese and Chinese participants ( $p < 0.01$ ). We counted the number for each classification by comparing discussions involving Thai-Japanese pairs and Thai-Chinese pairs (Table 7).

**Table 6:** Statistical data from discussions involving Thai-Japanese and Thai-Chinese pairs

	Thai-Japanese			Thai-Chinese		
	Thai (n = 10)	Japanese (n = 10)	p-value	Thai (n = 9)	Chinese (n = 9)	p-value

<b>Number of words per text chat</b>	8.6 ± 6.0	6.7 ± 5.4	< 0.01	9.0 ± 6.1	6.9 ± 5.7	<sup>8</sup> < 0.01
<b>Number of text chats per discussion</b>	24.3 ± 9.9	21.9 ± 9.3	n.s.	25.6 ± 8.0	24.7 ± 8.8	n.s.

**Table 7:** Number of text chats by class for Thai-Japanese and Thai-Chinese pairs

<b>Classification</b>	<b>Thai-Japanese</b>		<b>Thai-Chinese</b>	
	<b>Thai (n = 10)</b>	<b>Japanese (n = 10)</b>	<b>Thai (n = 9)</b>	<b>Chinese (n = 9)</b>
<b>Cause and Effect</b>	23.0 (9.5%)	23.0 (10.5%)	22.5 (9.8%)	22.0 (9.9%)
<b>Description</b>	8.0 (3.3%)	2.5 (1.1%)	14.5 (6.3%)	7.0 (3.3%)
<b>Opinion</b>	24.5 (10.1%)	29.0 (13.2%)	17.5 (7.6%)	28.0 (12.8%)
<b>Sequence</b>	10.5 (4.3%)	4.0 (1.8%)	8.0 (3.5%)	12.0 (5.2%)
<b>Contrast</b>	8.0 (3.3%)	12.5 (5.7%)	12.5 (5.4%)	9.0 (4.2%)
<b>Interrogation</b>	44.0 (18.1%)	20.0 (9.1%)	54.0 (23.5%)	14.0 (6.1%)
<b>Declaration</b>	125.0 (51.4%)	128.0 (58.4%)	101.0 (43.9%)	130.0 (58.6%)

The results in Table 8 show that there were significant differences in the number of text chats in the Description and Interrogation classes for Thai-Japanese pairs. Thai participants had significantly more text chats in these classes than Japanese participants ( $p < 0.05$ ).

**Table 8:** Text chats: mean, standard deviation, and p-value in each class between Thai-Japanese and Thai-Chinese

<b>Classification</b>	<b>Thai-Japanese</b>			<b>Thai-Chinese</b>		
	<b>Thai (n = 10)</b>	<b>Japanese (n = 10)</b>	<b>p-value</b>	<b>Thai (n = 9)</b>	<b>Chinese (n = 9)</b>	<b>p-value</b>
<b>Cause and Effect</b>	2.3 ± 1.4	2.3 ± 1.4	n.s.	2.5 ± 1.5	2.9 ± 2.2	n.s.
<b>Description</b>	0.8 ± 0.6	0.3 ± 0.4	< 0.05	1.6 ± 3.0	0.8 ± 1.2	n.s.
<b>Opinion</b>	2.5 ± 2.3	2.9 ± 1.2	n.s.	1.9 ± 1.1	3.1 ± 2.0	n.s.
<b>Sequence</b>	1.1 ± 1.2	0.4 ± 0.7	n.s.	0.9 ± 0.5	1.3 ± 0.9	n.s.
<b>Contrast</b>	0.7 ± 0.8	1.3 ± 1.3	n.s.	1.3 ± 0.9	0.9 ± 0.9	n.s.
<b>Interrogation</b>	4.4 ± 2.9	2.0 ± 1.9	< 0.05	6.1 ± 3.4	1.2 ± 1.3	< 0.01

<b>Declaration</b>	12.5 ± 6.6	12.8 ± 6.9	n.s.	11.4 ± 4.2	14.4 ± 6.6	<sup>9</sup> < 0.05
--------------------	------------	------------	------	------------	------------	------------------------

As Table 8 shows, Thai-Chinese pairs had significant differences for the Interrogation and Declaration classifications. Thai participants had significantly more text chats in the Interrogation class than Chinese participants did ( $p < 0.01$ ). However, Thai participants used the Declaration class less than Chinese participants did ( $p < 0.05$ ).

## Discussion

In this section, we discuss how significant differences in the number of text chats in each classification may indicate different communication styles in online communications between cultures. Our findings are based on the interaction between cultures, which typically manipulate cultural behavior in online communications. Further, we discuss limitations of this study and explain future directions.

### Cultural Differences Analysis

Results of this research revealed that Thai participants often used the Interrogation classification in the context of different cultures, possibly because they were curious about topics related to different cultures and wished to maintain harmony in communications. To deal with Japanese participants who may not want to share detailed information in online communications, Thai participants used the Interrogation classification to encourage them to participate in the conversations. Moreover, Thai participants sometimes were confused by messages from both Japanese and Chinese participants since Japanese participants often used a small number of words in each text chat; further, the Japanese did not use the Description classification to explain their messages, and Chinese participants provided only general information. The communication style of Thais fosters strong group cohesion and the priority of group goals over individual goals. Harmony within the group must be maintained and open conflicts are avoided (Hofstede, Hofstede & Minkov 2010). Moreover, the “ego” of Thais is important since it is the baseline for other key values of Thais such as face-saving, criticism-avoidance, and the *Kreng jai* attitude, which roughly means “feeling considerate for another person, not wanting to impose or cause another person trouble, or hurt his/her feelings” (Komin 1990). Two examples in Figure 2 show that Thai participants started conversations by using interrogations to maintain harmony of communication when communicating with Japanese and Chinese participants, respectively. [F2]

Excerpt
<p><b>T2: What is the suitable amount that should be paid to part-time job workers in Japan?</b>  J2: Ahh, amount of money.  T2: Do you think the minimum wage is low?  J2: yes, it should be higher than fee for attending his/her lecture per hour.</p>
<p><b>T14: Are you doing any part-time job now?</b>  C4: there was a part-time job in convenient shop.  <b>T14: Did you mean you are doing the part-time job in Japan?</b>  <b>T14: or there is a job position at convenient store?</b>  C4: yes, but I stopped since last Oct.</p>

**Figure 2:** Two examples of chats from Thai-Japanese pairs (T2-J2) and Thai-Chinese pairs (T14-C4)

Table 6 reveals that Japanese participants used significantly less words per text chat than Thai participants. This style of communication refers to Japanese participants who were not familiar with the context of online communications. Communication with strangers in online communications is a novelty involving unfamiliarity, anxiety, and uncertainty. If anxiety is too high, people will not be motivated to communicate with others; in fact, they will try to avoid them (Turner 1988). Moreover, the general uncertainty of Japanese people in initial encounters with foreign strangers was significantly higher than with domestic strangers (Duronto et al. 2005). Because Japan is characterized as a country that avoids

uncertainty to a high degree, Japanese participants in the experiments used less words per text chat than Thai participants. [F3]

Additionally, Table 6 shows that Chinese participants used significantly less words per text chat than Thai participants. This style of communication is linked to the fact that the Chinese participants preferred silence over verbal communication. Chinese people typically communicate indirectly and rarely say no directly; rather, they try to maintain neutral expressions to avoid misunderstandings. Silence holds a strong contextual meaning. It may be a way of saying no, indicating offense, or simply waiting for more information (Deresky & Christopher 2011). It leads Chinese participants to use a small number of words per text chat to avoid misunderstandings.

Tables 7 and 8 show that Japanese participants used small numbers of texts in the Description classification, indicating that Japanese participants have a limited need for explanations during communication. They may not want to share detailed information about themselves and try to avoid unstructured situations because they assume that their own perceptions do not differ from those of others (Eto 1977). Meanwhile, Thai participants felt it necessary to send messages in the Interrogation classification to encourage Japanese participants to share more information in conversations. Figure 3 provides an example of a chat log from Thai-Japanese pairs that focuses on interrogations. [F4]

**Figure 3:** *An example of a text chat from a Thai-Japanese pair*

Excerpt	Class
T5: Why do you think that?	Interrogation
J1: I think main purpose of a student is studying.	Opinion
...	
T5: What is your opinion about that?	Interrogation
J1: I think money is the main factor.	Opinion

We also considered communications between Thai and Chinese participants. Chinese participants freely and directly expressed their personal views. They used the Declaration category for describing general information that might or might not have been related to the particular topic when chatting with Thai participants. This Chinese style of communication is influenced by history, tradition, and Confucian thought. The indirect oriental pattern of the Chinese is a spiral circling around a point (Kaplan 1966). The circle or gyre revolves around the subject and considers it from a variety of tangential views, but the subject is never looked at directly. Figure 4 displays an example of a chat log from Thai-Chinese pairs. It indicates that Chinese participants often used the Declaration classification to answer or respond to questions (Interrogation classification) from Thai participants.

**Figure 4:** *An example of the Declaration classification from Chinese participants*

Excerpt	Class
T13: have you been try a part-time job?	Interrogation
C3: in fact I am doing a part-time job.	Declaration
C3: I am a student from China	Declaration
C3: and I am studying in Japan	Declaration

Tables 4 and 7 reveal that the Declaration classification was used most frequently in text chats. We aimed to use this category to indicate text chats that simply relayed information. However, the text chat that belongs to the Declaration classification using our classifier may show other illocutionary acts beyond the provision of general information. For example, the excerpts from Chinese participants shown in Figure 4

can be assigned to other categories, such as Response or Agreement. Thus, the Declaration classification in our taxonomy should be reconsidered; we will discuss this point in terms of future directions. [F5]

## Limitations and Future Directions

Limitations of this study include the fact that participants were not balanced in terms of age (college students) and gender. College students do not make a truly representative sample of the overall population; therefore, results may be biased. However, Hofstede (2001) mentioned the participation of college students in all three cultures for psychological matching (Merkin 2009), indicating that the use of students in such studies limits variations in relevant demographic characteristics. The other limitation that needs to be mentioned is non-balanced gender. Even though our study focused on cultural differences based on nationality, gender might have affected culture-related behavioral patterns. Thus, these two limitations need to be taken into account when interpreting the results of this study. [F6]

For our classifier, the results show that the Declaration classification was the one most frequently used in text chats. This finding indicates that the taxonomy of the Declaration classification was not clear enough to differentiate data. Thus, our future work will focus on the vaguely defined Declaration classification and develop new classes that can be separated from it based on illocutionary acts. For example, we will improve taxonomy (such as the Response and Agreement classes) for analyzing cultural differences in CMC. [F7]

However, this study can enhance intercultural competencies since understanding social and cultural differences is a key factor for designing the next generation of CMC tools to support intercultural communications. The tools that will be designed in the future for collaborative work should address differences in intercultural interactions.

The main finding of this study was the significant number of text chats in the Interrogation classification in the context of different cultures. Chapanis (1988) indicated that the percentage of questions forms the parameter of the communication process among participants. To require an answer is an important activity for good communication. Thus, future research should investigate how high levels of texts in the Interrogation class from Thai participants that are related to different cultures may actually result in greater intercultural communication competencies and support the effective design of information systems.

## Conclusion

In this work, we analyzed cultural differences in communication styles. We adapted the speech act theory to develop illocutionary act categories. These categories captured the intentions of collaborators that were influenced by cultural differences including Cause and Effect, Description, Opinion, Sequence, Contrast, Interrogation, and Declaration. Then, the text chat classification model based on intentions was provided using a machine learning technique. This work also included an analysis to understand differences in communication styles in the context of same and different cultures.

Our findings revealed a significant difference in the number of text chats in the Interrogation classification for the same-culture context and different cultures context. Moreover, we took a deeper look at Thai-Japanese pairs and Thai-Chinese pairs. The results revealed a significant difference for Thai-Japanese pairs in the number of text chats in the Description and Interrogation categories. For Thai-Chinese pairs, we found a significant difference in the number of text chats in the Interrogation and Declaration classifications.

Regarding future directions, we will investigate how large numbers of texts in the Interrogation class from Thai participants in the context of different cultures result in greater intercultural communication competencies. Further, we will determine how to use our findings to support the design of information systems.

## References

- Auramäki, E., Lehtinen, E. and Lyytinen K. (1988). A Speech-Act Based Office Modelling Approach, *ACM TOIS*, 6, 2, 126-152.
- Austin, J. (1962). *How to Do Things with Words*, Harvard: Harvard University Press.
- Bowers, J. and Churcher, J. (1988). Local and global structuring of computer mediated communication: Developing linguistic perspectives on CSCW in COSMOS. In *Proceedings of the Conference on Computer-Supported Cooperative Work (September 26-28, Portland, OR)*, ACM SIGCHI and SIGOIS, NY, 125-139.
- Carr, C. T., Schrock, D. B. and Dauterman, P. (2012). Speech acts within Facebook status messages. *Journal of Language and Social Psychology*. Vol. 31, No. 2, 176–196.
- Chang, C.-C. and Lin, C.-J. (2011). LIBSVM: A library for support vector machines. *ACM Transactions on Intelligent Systems and Technology*, Vol. 2, 27:1-27:27.
- Chapanis, A. (1988). *Interactive human communication (Reprint)*. In *Computer-supported cooperative work: a book of readings*, Irene Greif (Ed.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA 127-140.
- Cohen, W. W., Carvalho, V. R. and Mitchell, T. M. (2004). Learning to classify email into speech acts. In *Proceedings of Empirical Methods in Natural Language Processing*.
- Cozby, P. and Bates, S. (2011). *Methods in Behavioral Research*, McGraw Hill Education.
- De Cindio, F., De Michelis, G., Simone, C., Vassallo, R. and Zanaboni, A. (1986). CHAOS as a coordination technology. In *Proceedings of MCC Conference on Computer Support for Cooperative Work (December 3-5, Austin, TX)*, MCC, Austin, TX, 325-342.
- Deresky, H. and Christopher, E. (2011). *International Management: Managing Cultural Diversity*. Pearson Higher Education AU.
- Diamant, E. I., Fussell, S. R. and Lo, F.-L. (2009). Collaborating across cultural and technological boundaries: Team culture and information use in a map navigation task. In *Proceedings of the 2009 International Workshop on Intercultural Collaboration*, New York, NY, USA, ACM, 175-184.
- Dietz, J. L. G. and Widdershoven, G. A. M. (1991). Speech acts or communicative action? In: L. Bannon, M. Robinson, K. Schmidt (eds.), *Proceedings of the Second European Conference on Computer Supported Cooperative Work ECSCW'91*. Kluwer, Dordrecht, 235-248.
- Duronto, P. M., Nishida, T. and Nakayama, S. (2005). Uncertainty, anxiety, and avoidance in communication with strangers. *International Journal of Intercultural Relations*, Vol. 29, No. 5, 549 -560.
- Eto, J. (1977). Japanese shyness with foreigners. In P. Norbury (ed.), *Introducing Japan* (pp. 74-77). New York: St. Martin Press.
- Flores, F. Graves, M., Hartfield, B. and Winograd, T. (1988). Computer systems and the design of organizational interaction. *ACM TOIS*, 2, 153-172.
- Flores, F., & Ludlow, J. (1980). Doing and speaking in the office. In G. Fick & R. H. Sprague (Eds.), *Decision support systems: Issues and challenges* (Vol. 11, pp. 95-118). New York: Pergamon Press.
- Fry, E., Kress, J. and Fountoukidis, D. (1993). *The reading teacher's book of lists*. Prentice Hall.

- Fukushima, T., Yoshino, T. and Shigeno, A. (2011). Development of multilingual interview-sheet <sup>13</sup> composition system to support multilingual communication in medical field, knowledge-based and intelligent information and engineering systems. Lecture Notes in Computer Science, Vol. 6882, Springer Berlin: Heidelberg, 31-40.
- Gao, G., Yamashita, N., Hautasaari, A. M., Echenique, A. and Fussell, S. R. (2014). Effects of Public vs. Private Automated Transcripts on Multiparty Communication Between Native and Non-native English Speakers. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, New York, NY, USA, ACM, 843-852.
- Hall, E. and Hall, M. (1990). Understanding Cultural Differences. Consortium Book Sales & Dist.
- Hofstede, G. (1980). Cultures Consequences, London: Sage.
- Hofstede, G. (2001). Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. Thousand Oaks, CA: Sage.
- Hofstede, G., Hofstede, G. and Minkov, M. (2010). Cultures and Organizations: Software of the Mind. 3rd ed., McGraw-Hill.
- Ishikawa, S. (2013). The ICNALE and sophisticated contrastive interlanguage analysis of Asian learners of English. S. Ishikawa (ed.), Learner Corpus Studies in Asia and the World, Vol. 1, 91-118.
- Kaplan, R. B. (1966). Cultural thought patterns in inter-cultural education. Language Learning, 16(1-2):1-20.
- Kaplan, S., Tolone, W., Bogia, D. and Bignoli, C. (1992). Flexible, active support for collaborative work with ConversationBuilder. In Proceedings of the Conference on Computer-Supported Cooperative Work (October 31-November 4, Toronto, Canada), ACM/SIGCHI and SIGOIS, NY, 378-385.
- Kensing, F. and Winograd T. (1991). *Operationalizing the Language/Action Approach to Design of Computer-Support for Cooperative Work*. In R. K. Stamper (ed.), Collaborative Work, Social Communications and Information Systems, North-Holland, The Netherlands, 311-331.
- Komin, S. (1990). Psychology of the Thai people: Values and behavioral patterns. Research Center, National Institute of Development Administration.
- Merkin, R. (2009). Cross-cultural communication patterns—Korean and American Communication. Journal of Intercultural Communication.
- Qadir, A. and Riloff, E. (2011). Classifying Sentences As Speech Acts in Message Board Posts. Proceedings of the Conference on Empirical Methods in Natural Language Processing, Stroudsburg, PA, USA, Association for Computational Linguistics, 748–758.
- Rossum, G. (1995). Python Reference Manual, Technical report. Amsterdam, The Netherlands,.
- Schoop, M. (2001). An Introduction to the Language-action Perspective. Vol. 22, No. 2, New York, NY, USA, ACM, 3-8.
- Searle, J. R. (1979). A Taxonomy of Illocutionary Acts. Cambridge University Press.
- Searle, J. (1999). Mind, Language and Society: Philosophy in The Real World. MasterMinds Series, Basic Books.
- Taylor, J. R. (1993). Rethinking the Theory of Organizational Communication: How to Read an Organization. Ablex, Norwood.

Van Reijswoud, V. E. (1996). *The structure of business communication: Theory, model and application*. Doctoral Thesis, Delft University of Technology.

Whiteside, J. and Wixon, D. (1988): Contextualism as a World View for the Reformation of Meetings. In: Greif, Irene (eds.) *Proceedings of the 1988 ACM Conference on Computer-supported Cooperative Work* (September 26-28, 1988, Portland, Oregon, United States), 369-376.

Winograd, T. (1986). *A Language/Action Perspective on the Design of Cooperative Work*. In *Proceedings of the 1986 ACM Conference on Computer-supported Cooperative Work*, New York, NY, USA, ACM, 203-220.

Winograd, T. (2006). *Designing a new foundation for design*. *Communications of the ACM*, Vol. 49, No. 5, 71-74.

Winograd, T. and Flores, F. (1986). *Understanding Computers and Cognition: A New Foundation for Design*. *Language and Being*. Ablex Publishing Corporation.

Xia, L., Yamashita, N. and Ishida, T. (2011). *Analysis on Multilingual Discussion for Wikipedia Translation*. *The Second International Conference on Culture and Computing (Culture and Computing 2011)* 104-109.

Yamashita, N. and Ishida, T. (2006). *Effects of machine translation on collaborative work*. In *Proceedings of the 2006 20th Anniversary Conference on Computer Supported Cooperative Work*, New York, NY, USA, ACM, 515-524.

## About the Authors

*Pimnapa Atsawintarangkun* is a doctoral student at school of knowledge science, Japan Advanced Institute of Science And Technology (JAIST) under the Graduate Research Program. Her research interests include cross-cultural communication and Natural Language Processing (NLP).

*Takaya Yuizono* received the B.E., M.E., and Dr. of Engineering from Kagoshima University, in 1994, 1996, 1999, respectively. He was a research associate in Kagoshima University, a lecturer and an associate professor in Shimane University, respectively. He has been an associate professor at School of Knowledge Science, JAIST since 2005. His research interests include in groupware, computer-supported cooperative work, and knowledge medium.

### Authors' Address

Pimnapa Atsawintarangkun (*Corresponding author*)  
School of Knowledge Science, Japan Advanced Institute of Science and Technology,  
1-1 Asahidai, Nomi, Ishikawa, 923-1292, Japan  
Email: [pimnapa.a@jaist.ac.jp](mailto:pimnapa.a@jaist.ac.jp)

Takaya Yuizono  
School of Knowledge Science  
Japan Advanced Institute of Science and Technology  
1-1 Asahidai, Nomi, Ishikawa, 923-1292, Japan  
Email: [yuizono@jaist.ac.jp](mailto:yuizono@jaist.ac.jp)

[F2] Response 5 about Thai participants using the Interrogation classification.

[F3] Response 6 about Thai-Japanese pairs.

[F4] Response 6 about Thai-Japanese pairs.

[F5] Response 4 about the Declaration classification.

[F6] Response 2 and Response 3 about social bias and non-balance gender should be taken into account when interpreting the results.

[F7] Response 4 about the Declaration classification.

---

Journal of Intercultural Communication, ISSN 1404-1634, issue 42, November 2016.

URL: <http://immi.se/intercultural>