A Study on Communication Style Differences in Intercultural Context by Intention-based Text Analysis

Pimnapa Atsawintarangkun

Japan Advanced Institute of Science and Technology

Doctoral Dissertation

A Study on Communication Style Differences in Intercultural Context by Intention-based Text Analysis

by

Pimnapa Atsawintarangkun

Supervisor: Assoc. Prof. Takaya, YUIZONO

School of Knowledge Science
Japan Advanced Institute of Science and Technology

September, 2016

Abstract

People use language as a medium of communication to express their thought, idea, and opinion. However, communication among people who have different cultural backgrounds may face problems such as misunderstanding in messages, linguistic problems, and negative feelings. To avoid failures in intercultural communication, intercultural communicative competence that is an ability to understand cultures to communicate with people from other cultures appropriately should to be acquired since such competence is able to support how we should perform toward intercultural context.

To acquire intercultural communicative competence, an analysis and comparison of communication style between cultures should be provided. Thus, this research provides an approach to understand differences in communication style based on theoretical consideration and specific empirical observations. Many studies that investigate communication style differences in CMC place emphasis only on communication between Western and Eastern and there are a few works aiming to analyze communication style differences between countries from Asia. Thus, this dissertation focuses on analyzing communication style differences based on intention of text among Asian countries. To begin with, a preliminary experiment is provided to confirm that Asian countries have differences of communication style by using theoretical consideration. Then, the evidence-based analyses are provided to understand communication style differences that influenced by different cultures.

This dissertation selects text analysis as an approach to study communication styles by capturing intention of text. Then, two categories of illocutionary act are defined based on two types of text that are continuous text and text chat in online communication. According to illocutionary act categories, two classification models are developed for automatically classifying text. The classification of sentences into such classes would have contribution for facilitating a process of text analysis. Then, these two classifiers are applied to analyze communication styles in writing essay and online chatting that influenced by cultural differences and find significant differences in each class of intention.

Our finding shows the differences of communication style in both continuous text and text chat used in online communication among countries in Asia. Then, we found that two intention-based classifiers give acceptable results to facilitate text analysis that is a technique for investigating communication style differences in this dissertation. Moreover, we compared our finding with the Hofstede cultural dimension to point out the differences. Understanding of differences in communication style can enhance intercultural communicative competence and such communicative competence that acquired through this study can support how to deal with others who have cultural differences toward the intercultural context.

Keywords: Communication style, Text classification, Intention-based classification model, Intercultural communicative competence

Acknowledgments

First, I would like to express the deepest appreciation to my advisor Associate Professor Takaya YUIZONO for the continuous support of my Ph.D study and research. His guidance helped me in all the time of research and writing of this thesis. Without his supervision and constant help, this dissertation would not have been possible.

I would also like to extend my appreciation to my committee members, Professor Youji KOHDA, Professor Kazushi NISHIMOTO, Associate Professor Hideaki KANAI, and Professor Takashi YOSHINO for their support and useful comments during my research.

I would like to express my sincere gratitude to my minor research supervisor, Dr. Choochart Haruechaiyasak for his helpful guidelines, discussions, and suggestions. I would like extend my sincere gratitude to all of participants in the laboratory experiments for their assistance and time contribution.

I devote my sincere thanks and appreciation to all of my colleagues for giving a lot of support and suggestion. I wish to show my gratitude to Thai student society for organizing many activities to relieve stress and anxiety during the hard times.

A special thanks to my family for encouragement and support in every day. Moreover, I would like to thank all staffs at Japan Advanced Institute of Science and Technology to support me during my Ph.D. life in Japan.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Introduction

In the era of globalization, people use language, a medium of communication, for the purpose of expressing thought, idea, opinion, etc. The patterns of communication are influenced by the cultural norms and attitudes. Each society has its own ways of thinking because of cultural differences and such differences can result in behavioral differences. The communication among people who come from different cultures may face problems such as misunderstanding in messages, linguistic problems, and negative feelings. To avoid failures in intercultural communication, a lack of intercultural understanding should be overcome to accomplish mutual understanding among people who use different languages and live in diverse cultures.

To accomplish mutual understanding in the intercultural context, intercultural communicative competence is required. Intercultural communicative competence is an ability to understand cultures to communicate with people from other cultures appropriately. An approach to improve intercultural communicative competence is analyzing and comparing differences between cultures in the particular domain to understand communication style differences. Thus, studying of intercultural communicative competence is an important factor for avoiding intercultural communication failure because such competence can prevent misunderstandings in the intercultural communication and can prepare people for what to expect from different cultures as well as how to perform toward the intercultural context.

Since language is the most important tool of communication and it is the area where cultural difference plays its role, text analysis is selected to be a strategy for studying communication style of people who have different cultures. The communication style of this work focuses on a way of using text to express ideas or opinions clearly and text in this work refers to an expression of thought on a subject in written form such as sentence in essay and online discourse (text chat).

In the intercultural context, performative function in language and communication should be considered instead of focusing on the structuring of text [6]. Speech act theory [7] is considered as a tool for analyzing linguistic communication. When a person writes/speaks something, he/she does so with some intention. If we can capture intentions and acknowledge the differences in intention between cultures, the level of understanding will increase and it can enhance communicative competence in the intercultural context.

1.2 Statement of Problem

Previous researches have focused only on analyzing and comparing communication styles between Western and Asian countries [8–13], comparing countries that are on opposite ends of the Hofstede scale [1], and comparing user behaviors between high-context style and low-context style [14]. It means that study of communication style differences between Western and Eastern country has been well studied. Meanwhile, there are a few works aiming to analyze communication style between countries from Asia in spite of there are clearly cultural differences among those countries [1]. Therefore, a study to investigate communication style within Asian countries that influenced by cultural differences should be considered.

This dissertation proposes an intention-based approach to understand communication styles of Asian countries that influenced by cultural differences by analyzing text in intercultural communication based on intention. We consider two types of text used in the intercultural communication that are continuous text and text chat in Computer-Mediated Communication (CMC). Each type of text has its own problem as follows:

Continuous text: Language that is the tool for communication depends on thought which differs among cultures and cultural differences lead to different expectations of writing [15]. In text, the writer attempts to communicate an idea using words and wants

the reader to recognize that intention. Thus, it is important to consider differences of writing styles among Asian countries, which have their own native languages as well as differences between native and non-native writers. For example, multicultural students in the college and university have different approaches and different expectations to think, read, and write. The writing styles of English as a foreign language (EFL) learner or non-native speakers (e.g., Asian students who studying abroad) that is in response to cultural patterned rhetorical constraints may be considered illogical, digressive, or circuitous by native-speaking reader. Thomas [16] explored that non-native writers often display inappropriate use of language. Thus, studying differences of communication styles between cultures can improve communicative competence for intercultural communication.

Text-based CMC: Text-based CMC is considered as a fundamental and potential tool for intercultural communication to share and reflect ideas by a collaborator in using non-native language. However, the environment provided by the Internet such as the lack of non-verbal cue brings some problems caused by different cultures because some cultures involve more of the information in the physical context to communicate with someone. In the context of text-based CMC, the collaborator attempts to communicate an idea using words and wants the partner to recognize that intention. Therefore, understanding about differences of collaborator's intention is a key for enhancing communicative competence and solving problems in intercultural communication. Moreover, it leads to effective construction of information system for intercultural CMC. A way to improve understanding is to correctly identify and classify thoughts, ideas, or opinions based on the collaborator's intention.

1.3 Research Objectives

The objective of this research is analyzing differences in communication style of countries from Asia in order to enhance communicative competence for communication toward intercultural context.

The dissertation proposes an intention-based approach to understand differences in communication style based on theoretical consideration and specific empirical observations. Since English is a global language that frequently used in intercultural context, the dissertation provides English language text analysis on two types of text including

continuous text (i.e. essay) and chatting text in CMC.

1.4 Research Methodology and Originality

To analyze communication style of countries from Asia, we select China, Japan, and Thailand to be subject for analyzing the communication style. To achieve the objectives, this dissertation requires six main parts as follows:

(1) **Intention-based Discourse Analysis toward Intercultural Context:** To begin with, a study to confirm that countries from Asian countries including China, Japan, and Thailand has own style of communication style toward intercultural context is provided by analyzing discourse in intercultural context.

(2) **Text Data-based Classification Model:** Text analysis is selected as a technique to study communication style in this dissertation. Thus, it is useful to have a system that facilitates the capturing process of intentions in text. We treat the task of capturing the intention as a text classification problem where each sentence can be classified into one or more categories of intention. The classification of text into these classes can contribute to the analysis of communication style. In this part, we name the classifier for continuous text (i.e., essay) "Text Data-based classifier" (TD-based classifier).

(3) **Analyzing Differences in English Essay Writing Style:** We analyze the writing style and point out the differences among cultures by providing a corpus-based experiment for indicating significant differences of the number of each class of intentions that classified by applying the TD-based classifier from the previous study.

(4) **Investigating Text-based Computer-Mediated Communication Styles Using Text Data-based Classification Model:** We consider communication as an intention that a collaborator would like to send to others. This research aims to analyze how collaborators use communication to express their intentions on CMC in the context of same-culture and different cultures by classifying text chats based on intention using TD-based classifier and comparing the style of collaboration between same-culture context and different cultures context.

(5) **Chat Data-based Classification Model:** The other classification model is developed to facilitate text analysis that is a technique to study communication style in this dissertation. This classification model focuses on analyzing the communication style in text chat on online communication. We name the classifier for text chat "Chat Data-based classifier" (CD-based classifier).

(6) **Investigating Text-based Computer-Mediated Communication Styles Using Chat Data-based Classification Model:** The study for investigating communication styles in intercultural text-based CMC is extended by using the same text chats as the previous part. We investigate how cultural differences influence communication style in text-based CMC and compare 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 that come from CD-based classifier.

The originality relates to the intention-based classification models including TD-based classifier and CD-based classifier. There have been some researches that propose the automated speech act classification model. However, most of them have different objectives and use different categories. In this work, we provide two illocutionary act categories to classify sentence and text chat based on intention for analyzing the communication style in both continuous text and text chat on online communication. Then, NLP technique that is machine learning is applied to create two models for automatically classifying sentences in continuous text and text chat in online communication. The classification of sentences into such classes would have contribution for facilitating a process of text analysis that is the strategy of our study to improve communicative competence.

The other originality is we provide the study for analyzing the differences of the communication style within Asian countries since previous works mostly focused on comparing between Western and Eastern [8–13]. Many studies to investigate communication style differences in CMC place emphasis only on communication between American and Chinese participants [17–19] and there are a few works that investigate directly on content [18]. This work selects China, Japan, and Thailand to be subject for analyzing the communication style. This analysis enhances communicative

competence in intercultural context among Asian countries (non-native speakers) by focusing on intention of text.

1.5 Chapter Organization

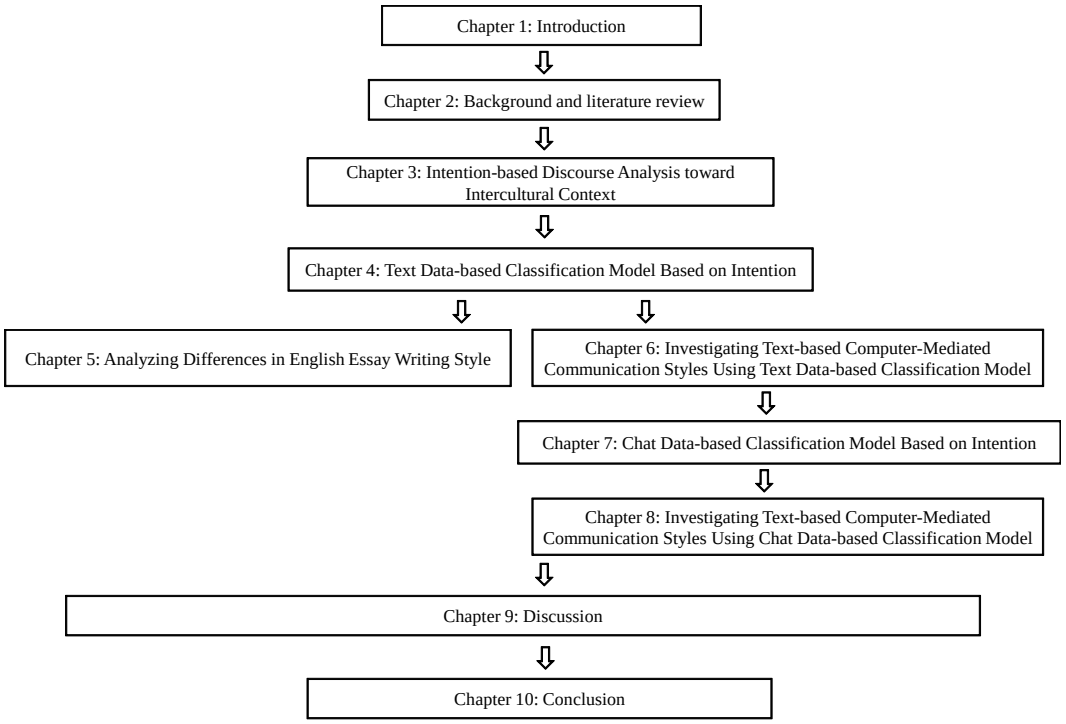

Figure 1.1: A chapter organization of dissertation

This dissertation is divided into 10 chapters as shown in Figure 1.1. Chapter 1 is introduction that gives statement of problems, research objectives, methodology, and originality. Chapter 2 focuses on backgrounds and theories that applied in the dissertation including cultural dimensions, communication styles, speech act theory, and Language-Action Perspective. Then, Chapter 3 describes the process of intention-based discourse analysis toward intercultural context. Chapter 4 explains the development of TD-based classification model. Next, Chapter 5 provides the analysis of differences in English essay writing style. An investigation of communication styles in intercultural text-based CMC using TD-based classifier is explained in Chapter 6. After that, Chapter 7 proposes classification model that can automatically classify sentences based on intention in chat data that is CD-based classifier. Then, Chapter 8 investigates communication styles in intercultural text-based CMC using CD-based classifier. Finally, Chapter 9 and Chapter

10 provide discussion and conclusion, respectively.

Chapter 2

Background and literature review

This chapter provides the characteristics of two theories for analyzing cultural differences. These two theories are the most frequently used classifications of cultures used by anthropologists and communication scholars including cultural dimensions and communication styles. Then, an approach called Language-Action Perspective (LAP) that used to design information system from the perspective of how people use communication to perform actions and the main theoretical foundation for the LAP approach that is the speech act theory are explained.

2.1 Cultural Dimensions

"Culture" has many definitions and has been widely discussed in researches. It leads to the definitions that range from very simple to very complex of the word culture. One well-known anthropological consensus defined culture as follows: Culture consists in patterned ways of thinking, feeling, and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values [20]. Kroeber and Parsons [21] defined a cross-disciplinary definition of culture as transmitted and created content and patterns of values, ideas, and other symbolic-meaningful systems as factors in the shaping of human behavior and the artifacts produced through behavior.

It can conclude that the definitions of culture depends on the context of where the

definition is applied or used and hence it is difficult to create one single definition. There is no comprehensive way to understand culture and its relationships to communication since culture is changing and evolving based on people within society and the context of that society.

Hofstede [22] defined culture as the collective programming of the mind that distinguishes the members of one group or category of people from others. He also explained further that the group or category in the definition could not only relate to a national society but also regions, ethnicities, age groups, genders, etc. He attempted to distinguish national cultures from each other by conducting detailed interviews with hundreds of IBM employees in 53 countries. Through standard statistical analysis of large data sets, he was able to determine patterns of similarities and differences among the replies. His focus was not on defining culture as refinement of the mind but rather on highlighting essential patterns of thinking, feeling, and acting that are well-established by late childhood. He developed the most frequently cited model for such cultural measures called national cultural dimension [22].

This model provides a pragmatic, structured framework for studying culture [23] and can be used to describe differences between cultures that affect human thinking, feeling, and acting in the context of organization and institutions in predictable ways. First, Hofstede identified four inter-cultural dimensions including power distance, individualism, uncertainty avoidance, and masculinity. After that, Hofstede and Bond added the fifth dimension: long-term orientation. Definitions of five cultural dimensions are as follows:

1. **Power distance (PDI)**

   The degree to which members of a society accept and expect that power is distributed unequally in particular society. People in societies exhibiting a large degree of Power Distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low Power Distance, people strive to equalize the distribution of power and demand justification for inequalities of power.

2. **Individualism (IDV)**

   The degree to which a society reinforces individual or collective achievement and interpersonal relationships. The high side of this dimension, called individualism, can

be defined as a preference for a loosely-knit social framework that everyone is expected to look after one's self or immediate family but no one else [24]. Collectivism represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we."

3. **Uncertainty avoidance (UAI)**

   The extent to which the members of a society feel uncomfortable with uncertainty and ambiguity. Countries exhibiting strong UAI maintain rigid codes of belief and behavior and are intolerant of unorthodox behavior and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles.

4. **Masculinity (MAS)**

   The degree to which a society depended on achievement, assertive and competitive as opposed to femininity, which is the extent that a society values cooperation, relationships and caring for others. Masculinity and femininity in this theory refer to gender roles, not physical characteristics. The Masculinity means a preference in society for achievement, heroism, assertiveness and material rewards for success. Society at large is more competitive. Femininity stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented. In the business context Masculinity versus Femininity is sometimes also related to as "tough versus tender" cultures.

5. **Long-term orientation (LTO)**

   The extent to which a society shows a pragmatic future-oriented perspective rather than a conventional historical short-term point of view. Societies who score low on this dimension, for example, prefer to maintain time-honored traditions and norms while viewing societal change with suspicion. Those with a culture which scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education as a way to prepare for the future.

2.2 Communication Styles

It is general knowledge that people from different countries tend to communicate in ways that often lead to misunderstandings. Hall [2] has classified styles of communication based on a key factor: "context." It relates to the framework, background, and surrounding situations in which communication or an event happens. This theory has been proved to be useful in intercultural studies [25–27] and it helps to improve understanding of the cultural differences. Based on Hall's theory, the cultures of the world can be compared on a scale from high to low context and two communication styles were introduced as low-context and high-context style.

Low-context style, typically Western, is logical, linear, individualistic, and action-oriented [28]. This style value Individualism that characterized by individual needs and goals over the needs of the group. The actions that are characteristic of this style are often verbally explicit and straightforward. Table 2.1 represents some of characteristics of low-context style.

Table 2.1: Characteristics of low-context style [2–4]

Low-context style
Low use of nonverbal elements: message is carried more by words than by nonverbal means.
Verbal message is explicit. Context is less important than words.
Verbal message is direct; one spells things out exactly.
Communication is seen as a way of exchanging information, ideas, and opinions.
Disagreement is depersonalized.
One withdraws from conflict with another and gets on with the task.
Focus is on rational solutions, not personal ones.
One can be explicit about anothers bothersome behavior.
Asking a question is considered to be polite.

High-context style (typically of Eastern cultures) is influenced by the closeness of interpersonal relationships, well-structured social hierarchy, and strong behavioral norms. It consists of communication with the following characteristics: indirect, formal, ambiguous,

Table 2.2: Characteristics of high-context style [2–5]

High-context style
High use of nonverbal elements such as voice tone,facial expression, gestures, and eye movement that carry significant parts of conversation.
Verbal message is implicit.
Context (situation, people, and nonverbal elements) is more important than words.
Verbal message is indirect; one talks around the point and embellishes it.
Communication is seen as an art form, a way of engaging someone.
Disagreement is personalized.
One is sensitive to conflict expressed in anothers nonverbal communication.
Conflict must be resolved before work can progress or must be avoided because it is personally threatening.
Asking a question often seem too personal and offensive.

and respectful. Table 2.2 shows some of the characteristics of high-context style.

Previous works have focused on comparing behaviors between "Western" and "Eastern", comparing countries that are on opposite ends of the Hofstede scale and comparing user behaviors between high-context style and low-context style in the online community. For example, Setlock et al. [29] found that American participants were relatively terse regardless of what medium they were using according to Americans style of low-context communication that is verbally explicit conversational style, whereas Chinese participants spoke much longer face-to-face than when using CMC, in keeping with the view that Chinese favor a high-context style that relies on contextual information. Wang et al. [19] studied that Chinese pairs were less talkative in a brainstorming task comparing with Americans. However, in negotiation task, Setlock et al [29] found that Chinese participants were more talkative than Americans. The literature suggests that understanding of how different cultures affect communication styles should be further discussed.

There are a few works aiming to analyze communication style between countries from Asia in spite of there are clearly cultural differences among those countries [1]. Therefore, a study to investigate communication style within Asian countries that influenced by the cultural differences should be considered. Moreover, countries in Asia is considered as

high-context style such as China and Japan [14] as well as Thailand [30–33]. However, the environment of text-based CMC requires characteristic of low-context style. Thus, this research put emphasis on analyzing CMC communication style of countries from Asia that influenced by high-context culture.

2.3 Language-Action Perspective

One of the important functionalities of information systems for the intercultural context is to support communication and information sharing among intercultural collaborators. For analyzing and designing the information systems is to use theories oriented toward actions performed via intercultural communication. The theory is the Language-Action Perspective.

Language-Action Perspective (LAP) is considered as an approach for designing information system from the perspective of how people use communication to perform actions. Winograd [34] 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 as in reports or statements, but also to perform action as in promises, orders, requests, and declarations. [35, 36]. This perspective emphasizes such actions should be the foundation of effective information system [34].

Moreover, LAP has been receiving attention in the Computer Supported Cooperative Work (CSCW) field [37,38] and many researchers have been motivated by this perspective [39–41]. In the process of system design, we should observe actions in linguistic terms as the following claim from Flores et al. [35] that human beings are fundamentally linguistic beings: action happens in language in a world constituted through language. Thus, LAP is a basis for the linguistic and social rules that govern the use of the language. This study aims to investigate how language is constituted based on intention in text-based CMC to analyze its implications for the design of information system.

2.4 Speech Act Theory

LAP adopted Searle's speech act theory, wherein language performs an action represented by the content and intent of the utterance. The speech act theory was originally proposed

by Austin [7] and later developed by Searle [42, 43]. Auntin [7] examined performative uses of language that means people perform something by saying. He classified speech act into five categories: verdictives, exercitives, commissives, behabitives, and expositives. However, this classification has been criticized for overlapping categories, too much heterogeneity in categories, ambiguous definitions of classes, and misfit between the classification of verbs and the definition of categories [44, 45].

According to Searle, a speech act was defined as utterance or written texts that perform actions based on illocutionary act. Whenever we talk or write to each other, we are performing illocutionary acts [46]. The illocutionary act is the intention in conveying 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). The success of a speech act depends on ability to perform a speech act that should be understandable and successful. Speech act are realized from culture to culture in different ways and that these differences may result in communication difficulties that range from the humorous to the serious [47].

Studies in speech act initially start from the field of philosophy (e.g., [7, 43, 48–51]) and have been extended in different fields such as linguistics [52], anthropology [53], and child language [54]. This theory has been used as a theoretical approach to many studies in discourse analysis and pragmatics [55–58]. Different speech act taxonomies have been used in different domains of application. For this reason, variations of speech act theory and alternative classifications of speech acts have been developed. There have been some researches that work on automated speech act classification in emails [59–64]. However, most of them have different objectives and uses different categories. It depends on the topic and these categories are too specific to be used for other research such as Leuski [61] proposed several categories of requests, or too general, focusing only on request identification and having no categories for other kinds of speech acts [64]. Table 2.3 represents examples of existing speech act taxonomies.

For the development of communication technologies, we need a good underlying theory. Over the past decade, the Speech Act theory has proved to be a powerful theory for understanding, modelling, and changing organizations and information systems [69–72].

There are several information tools that apply speech act theory such as Coordinator [69], Speech-Act-based office Modeling aPprOach (SAMPO) [73], and CHAOS [39].

Table 2.3: Existing speech act taxonomies

Name	**Main Classes**
Austin [7]	Expositives, Exercitives, Verdictives, Commissives, Behabitives
Searle [42]	Representatives, Directives, Commissives, Expressives, Declarations, Representative Declarations
DAndrade and Wish [65]	Assertions, Questions, Requests and Directives, Reactions, Expressive Evaluations, Commitment, Declaration
Rus et al. [66]	Statement, Request, Reaction, MetaStatement,Greeting, ExpressiveEvaluation, Question
Olney et al. [67]	Verification, Disjunctive, Concept Completion, Feature Specification, Quantification, Definition, Example, Comparison, Interpretation, Causal Antecedent, Causal Consequence, Goal Orientation, Instrumental/Procedural, Enablement, Expectational, Judgmental
VerbMobil [68]	Request, Suggest, Convention, Inform, Feedback

Furthermore, many studies used the speech act theory to analyze text. For example, researchers have classified sentences used in email messages [55], message board posts [58], and status messages in Facebook [74].

Since differences of thought among people of different language 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 purpose or intention. The understandings lead to effective construction of information system for CMC.

2.5 Conclusion

This chapter provides descriptions of related theories that used in this research. Two theories to analyze cultural differences including Hofstede's cultural dimensions and Hall's communication styles. Then, an approach called Language-Action Perspective (LAP) that is an approach used to design information system from the perspective of how people use communication to perform actions and the main theoretical foundation for the LAP approach that is the speech act theory are explained.

Chapter 3

Intention-based Discourse Analysis toward Intercultural Context

3.1 Introduction

Previous researches have focused only on analyzing and comparing communication styles between Western and Asian countries [8–13], comparing countries that are on opposite ends of the Hofstede scale [1], and comparing user behaviors between high-context style and low-context style [14]. Meanwhile, there are a few works aiming to analyze communication style between countries from Asia in spite of there are clearly cultural differences among those countries [1].

Thus, this chapter provides a study to confirm that countries in Asia have own style of communication style toward intercultural context by focusing on discourse analysis in the intercultural context. An experiment to investigate how different cultures affect patterns of online knowledge sharing was provided. The laboratory experiment was conducted to collect discourses in the process of online knowledge sharing between Thai and Chinese participants. We analyzed discourses posted by them by intention-based classifying in to one of six categories including declaration, interrogation, exclamation, opinion, acknowledgement, and agreement. Then, a significant difference in each class was examined. This study focuses on finding connections between the existing theory and our results to enhance understanding of the cultural variations.

3.2 Online Communication on Knowledge Sharing

Knowledge sharing is a process of knowledge being exchanged among people. Knowledge can be defined as personalized information related to facts, skills, suggestions, procedures, concepts, interpretations, ideas, observations, and judgments that may or may not be unique, useful, or accurate [75].

In the era of globalization, people can use online communication tools such as social media, online forums, and blogs to share knowledge with others. Therefore, user-generated content is becoming a valuable source of knowledge. However, a process to share or acquire knowledge among people who come from different cultures may involve problems such as misunderstanding messages, linguistic problems, and negative feelings. Moreover, we can assume that online knowledge sharing among people who have a high-context style of communication will face problems since the high-context style is often indirect, ambiguous, and uses nonverbal elements.

Thus, this work aims to enhance understanding of the cultural variations by examining connections between cultural dimensions and online knowledge sharing patterns of users who have the high-context communication style. Thai and Chinese participants are selected because they have obvious cultural differences and their communication styles are considered to be high-context style [10, 76].

3.3 Experiment

Participants in the laboratory experiment consist of twelve Thais (Male = 8, Female = 4) and twelve Chinese (Male = 7, Female = 5) ranging in age from 23 to 36 years (M = 26.92). They were studying at graduate school and all of them can use English fluently (average TOEIC score is 600).

In this experiment, WordPress [77] (an open source web-based software program that is used to build and maintain a website or blog) was provided to collect discussion samples from participants. Then, participants were randomly assigned into four groups consisting of three Thai and three Chinese participants. Each group was given 45 minutes to share and discuss the topics in their own styles. Participants were encouraged to share what they know, ask others to make mutual understandings, and compare their differences and

similarities. They were able to post any types of input such as pictures, emoticons, or links, but English has to be the common language in the exchange. At the end, participants had 10 minutes to fill out a questionnaire. The interface screen of online knowledge sharing in this experiment is shown in Figure 3.1.

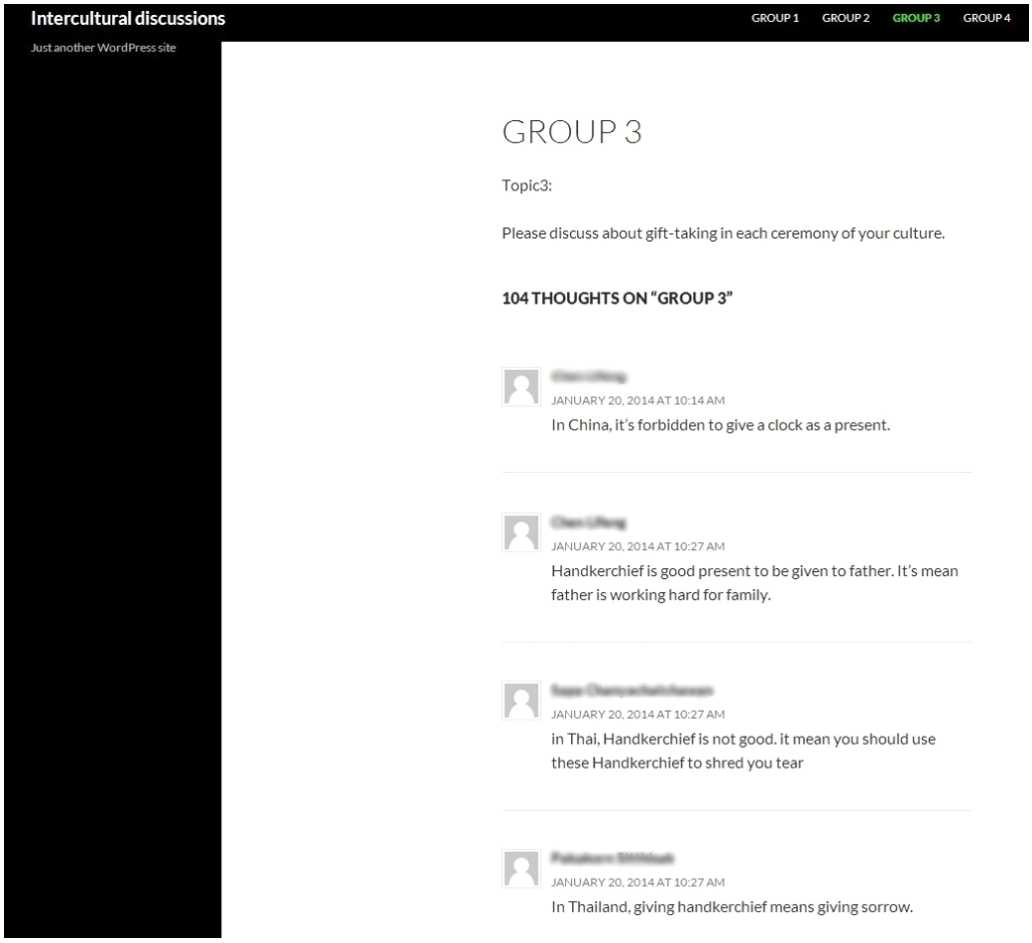

Figure 3.1: Interface screen of online knowledge sharing

3.4 Discourse Analysis

The discourses posted by participants were retrieved from the database and the patterns of those discourses were analyzed by the author. The discourses can be classified into six classes:

1. Declaration: A phrase or a sentence of fact or knowledge that participants had shared in the online knowledge sharing.

   Example: "In China, liquor is just one of the popular presents."

2. Interrogation: A phrase or a sentence of inquiry that asks for a reply.

   Example: "In Thailand, do girls often wear white ornaments?"

3. Exclamation: A phrase or a sentence that expresses strong emotion or feeling and often contains an exclamatory mark.

   Example: "Interesting!","Oh."

4. Opinion: A phrase or a sentence that shows opinion or comment of audience.

   Example: "I think Thais like white because of their religion."

5. Acknowledgment: A phrase or a sentence that acknowledges or recognizes an-other person or statement.

   Example: "Yes","Thank you"

6. Agreement: A phrase or a sentence that expresses agreement between participants.

   Example: "I agree with you."

Then, we analyzed the connections between cultural dimensions and patterns of online knowledge sharing based on the six classes as mentioned above.

3.5 Result Analysis

For the discourse analysis, the number of discourses in each class and each nationality was counted as shown in Table 3.1 and Table 3.2. The percentage of each discourse class from Chinese and Thai participants is displayed in Table 3.3. Then, a nonparametric statistic test (Mann-Whitney U Test) was used for analyzing a significant difference between Chinese and Thai participants in the number of discourses in the six classes.

The statistical result in Table 3.4 reveals significant difference in two classes including Interrogation and Exclamation. After that, a post-questionnaire was provided to support our analysis as shown in Table 3.5 by Mean, Standard Deviation, and p-value. It investigates participants' attitudes toward the online knowledge-sharing experience. This questionnaire consists of seven questions, with responses varied on 1 (Very low) 5 (Very high) Likert scale.

Table 3.1: Number of discourses from Chinese participants

Class	**Chinese participant No.**												**Total**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
Declaration	9	4	2	5	9	9	8	14	7	28	33	11	**139**
Interrogation	0	0	0	0	1	3	5	2	1	0	4	1	**17**
Exclamation	0	0	0	0	0	0	1	1	1	0	1	0	**4**
Opinion	2	0	2	1	0	1	1	2	0	0	2	0	**11**
Acknowledgment	1	1	1	0	1	2	0	2	0	1	0	1	**10**
Agreement	2	0	0	0	0	1	2	0	0	0	0	0	**5**
Total	**14**	**5**	**5**	**6**	**11**	**16**	**17**	**21**	**9**	**29**	**40**	**13**	**186**

After analyzing discourses, we investigated how cultural differences influence Chinese and Thai participants to have the different patterns of online knowledge sharing. The cultural dimensions used in the analysis consist of power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation proposed by Hofstede. The connections between cultural dimensions and the patterns of online knowledge sharing are as follows.

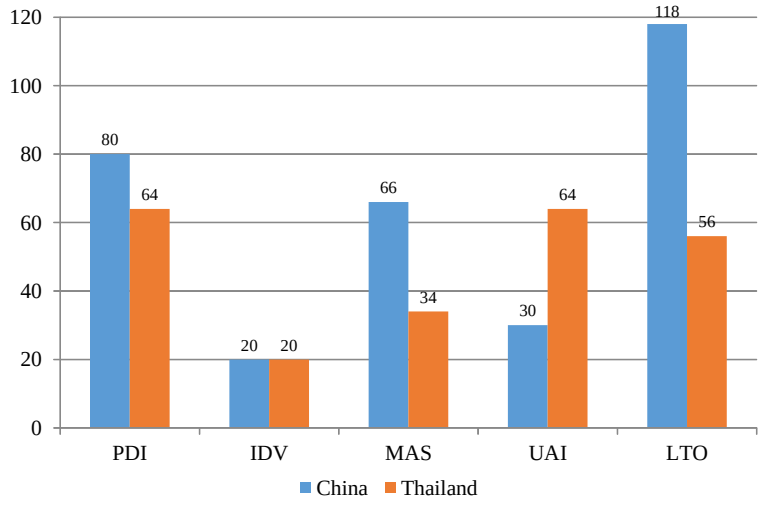

Figure 3.2: Cultural Dimensions scores of China and Thailand [1]

Power distance.

The scores of 80 and 64 as shown in Figure 3.2 are evidence that China and Thailand

Table 3.2: Number of discourses from Thai participants

Class	**Chinese participant No.**												**Total**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
Declaration	9	6	14	5	4	6	16	3	4	13	19	2	**101**
Interrogation	2	1	9	8	3	4	14	6	3	15	4	12	**81**
Exclamation	5	1	2	1	2	1	1	3	0	1	1	4	**22**
Opinion	4	3	4	1	1	0	0	1	2	0	2	2	**20**
Acknowledgment	4	1	5	0	2	2	2	0	0	2	2	0	**20**
Agreement	1	2	3	1	0	1	1	0	0	0	1	0	**10**
Total	**25**	**14**	**37**	**16**	**12**	**14**	**34**	**13**	**9**	**31**	**29**	**20**	**254**

are societies in which inequalities are accepted. We cannot find an explicit connection between this dimension and the patterns of online knowledge sharing. This is because the experiment was conducted as an online communication, not face-to-face communication and our participants did not know information about other participants. They did not have concerns about seniority, hierarchy, or authority when communicating with others online.

However, the result of Q1 from Table 3.5 reveals that if the participants (both Thai and Chinese participants) are noticed that they had different social statuses from one other, their patterns of online knowledge sharing will be different.

Individualism.

The score of 20 on this dimension as displayed in Figure 3.2 shows that both China and Thailand are collectivist cultures that consider the group as the primary element. Communication between people in this culture is indirect. A society with a low score in this dimension has strong group cohesion and the priority of group goals is higher than individual goals. The harmony of the group has to be maintained and open conflicts are avoided. From the discourse analysis, it shows that both Thai and Chinese participants did not directly dispute others. They often expressed their ideas with opinions to avoid making someone to lose face. Moreover, they often used agreement discourses and acknowledgment discourses to represent their cooperation,

Table 3.3: A percentage of discourses written by Chinese and Thai participants (* p <0.01)

Content classes	**Chinese**	**Thai**
Declaration	139 (74.73 %)	101 (39.76 %)
Interrogation*	17 (9.14 %)	81 (31.90 %)
Exclamation*	4 (2.15 %)	22 (8.66 %)
Opinion	11 (5.91 %)	20 (7.87 %)
Acknowledgment	10 (5.38 %)	20 (7.87 %)
Agreement	5 (2.69 %)	10 (3.94%)
Total	186 (100%)	254 (100%)

Table 3.4: Mean, Standard Deviation and p-value in each discourse class

Content classes	**Chinese**	**Thai**	**p-value**
Declaration	11.58 ± 9.44	8.42 ± 5.68	n.s
Interrogation	1.42 ± 1.73	6.75 ± 4.81	<0.01
Exclamation	0.33 ± 0.49	1.83 ± 1.47	<0.01
Opinion	0.92 ± 0.90	1.67 ± 1.44	n.s
Acknowledgment	0.83 ± 0.72	1.67 ± 1.61	n.s
Agreement	0.42 ± 0.79	0.83 ± 0.94	n.s
Total	15.50 ± 10.43	21.17 ± 9.62	n.s

modesty, and deference. The results of Q2-Q6 shown in Table 3.5 can support the connection between this dimension and patterns of online knowledge sharing. It shows that both Chinese and Thai participants have respect and trust for others in their own group/culture. Furthermore, it can represent a preference for group work.

Masculinity.

In Figure 3.2, China scores 66 on this dimension and it can be considered a society that respects masculinity. The culture values competitiveness, assertiveness, ambition, and power. This society is success oriented and driven which can indicate that Chinese participants worried about their success in sharing knowledge. From Ta-

Table 3.5: Questionnaire results of participants' attitudes

Question	Chinese	Thai	p-value
Q1. If you know that you and others have different social statuses, ways of your knowledge sharing will be different?	4.17 ± 0.72	3.92 ± 0.79	n.s
Q2. How much do you trust in others knowledge?	4.00 ± 0.74	4.17 ± 0.39	n.s
Q3. How do you respect for others' knowledge?	4.25 ± 0.87	4.33 ± 0.65	n.s
Q4. Sharing knowledge with others can make your ideas increase more than individual thinking?	4.50 ± 0.67	4.58 ± 0.51	n.s
Q5. Sharing knowledge with others can make your ideas better than individual thinking?	4.33 ± 0.78	4.17 ± 0.72	n.s
Q6. When you share knowledge with others, you expect that you will receive useful knowledge from others?	4.25 ± 0.75	3.83 ± 0.72	n.s
Q7. Would you try to persuade others to agree with your thinking?	4.00 ± 0.85	2.83 ± 1.03	<0.01

ble 3.4, the Mann-Whitney U Test shows no significant difference between Chinese and Thai participants in the Declaration. However, the number in the Declaration category for Chinese participants accounts for 74.73 percent of total as displayed in Table 3.3. This indicates that Chinese participants fully use their abilities in contributing their own knowledge. Moreover, the result of Q7 in Table 3.5 can support this analysis because Chinese participants tried to persuade others to agree with them to show their conviction.

With a score of 34, Thailand represents a society that values feminine characteristics. People in this society are less assertive, and competitive. Moreover, this society shows for a preference for cooperation, modesty, and caring for others. Most of the Chinese expressions in the discussion were declarative sentences, whereas Thai participants often used agreement sentences and acknowledgment sentences to represent their cooperation, modesty, and deference.

Uncertainty avoidance.

As shown in Figure 3.2, Thailand scores an intermediate 64 on this dimension; however, it is also indicating a slight preference for avoiding uncertainty. It means that Thai participants do not handle unexpected stories or events well. Thai participants felt doubtful during the online discussion because this experiment encouraged exchange of cultural knowledge that is different between cultures.

The statistical analysis using the Mann-Whitney U Test reveals a significant difference between Chinese and Thai participants ($p < 0.01$) in the number in the Interrogation and Exclamation categories. Thai participants expressed interrogative sentences more than Chinese participants did in order to reduce doubt and uncertainty during the knowledge-sharing process. Moreover, Thai participants often expressed exclamatory sentences more than Chinese did because of their amazement and doubtfulness in other expressions.

Compared with Thailand, China has a low score in this dimension (score = 30). It can indicate that Chinese have high tolerance of deviant persons and ideas. The discourse analysis shows that Chinese participants seldom used interrogative sentences and exclamatory sentences compared to Thai participants. Moreover, this score suggests that the Chinese participants felt free to share knowledge and used informal language in expressing with others. According to discourse analysis, Chinese participants used expressions containing abbreviations, slang words, and symbols more than Thai participants did in online exchanges. The number of those words from Chinese participants is twice the number of words from Thai participants.

Long-term orientation.

Long-Term Orientation is the fifth dimension of Hofstede that was added after the original four to try to distinguish the difference in thinking between the East and West. For the dimension of long-term orientation, there were no good connections between online knowledge sharing patterns and this dimension because both Thailand and China are in the East.

Besides the cultural characteristics mentioned above, the style of communication can affect online knowledge sharing patterns. Based on Hall's concept of context, both Thai and Chinese participants have a high-context communication style. In the high-context style, people often use nonverbal elements such as voice tone, facial expression, gestures, and eye movement as parts of communication. Verbal message is indirect and implicit in this style. Words and sentences may be collapsed and shortened. However, online communication requires characteristics of a low-context communication style that is direct and explicit because it is not a face-to-face communication and the nonverbal elements are more effective. Thus, online knowledge sharing between Thai and Chinese participants

might face problems since they use fewer non-verbal elements to express themselves. Another problem is that Thai and Chinese participants might not be able to interpret symbolic language or abbreviations that are emerging in the present online culture (although they are familiar with indirect message). It leads to misunderstandings and negative feelings in communication. The other problem is that the high-context style is comfortable with a considerable amount of silence. People who are accustomed to utilizing the high-context style tend to leave a lot of space or dead air in conversation.

3.6 Conclusion

This chapter explored the connections between cultural dimensions and online knowledge sharing patterns of users who have the high-context communication style. The laboratory experiment was conducted to collect discourses in the process of online knowledge sharing between Thai and Chinese participants. From the discourse analysis, we discovered that cultural differences can influence the way knowledge is contributed. The major cultural dimensions that influence Thai and Chinese participants to have the different patterns of online knowledge sharing are individualism, masculinity, and uncertainty avoidance. Our findings help to enhance intercultural communication competencies and improve understanding of the cultural variations. This can be fundamental for designing new tools for intercultural communication.

This study provided in this chapter focus on theoretical consideration. Only theoretical consideration may not enough to study the cultural differences. To conduct effective intercultural research, there must be strong theory and good methodology. Thus, we should provide empirical evidence-based researches for analyzing communication style toward intercultural context.

Chapter 4

Text Data-based Classification Model Based on Intention

4.1 Introduction

Since language is considered as the most important tool of communication, text analysis is selected to be a strategy for studying communication style of people who have different cultures. In this chapter, speech act theory is used for analyzing linguistic communication. When a person writes/speaks something, he/she does so with some intention. It is useful to have a system that facilitates us to understand intentions. The task of capturing the intention is treated as a text classification problem where each sentence/text chat can be classified into one or more categories of intention.

Thus, this chapter provides the classification model by using text data. To develop the text data-based classification model (TD-based classification model) based on intention, we adapted a concept of speech act and defined seven classes of intention based on illocutionary acts indicating the intention of the writer, as listed in Table 4.1, to capture different styles of writing based on cultural differences.

We started with the data preparation, in which we categorized each sentence into one of the recognized classes. Then, experiment for developing the model was set. Finally, we analyzed the evaluation results from the experiment.

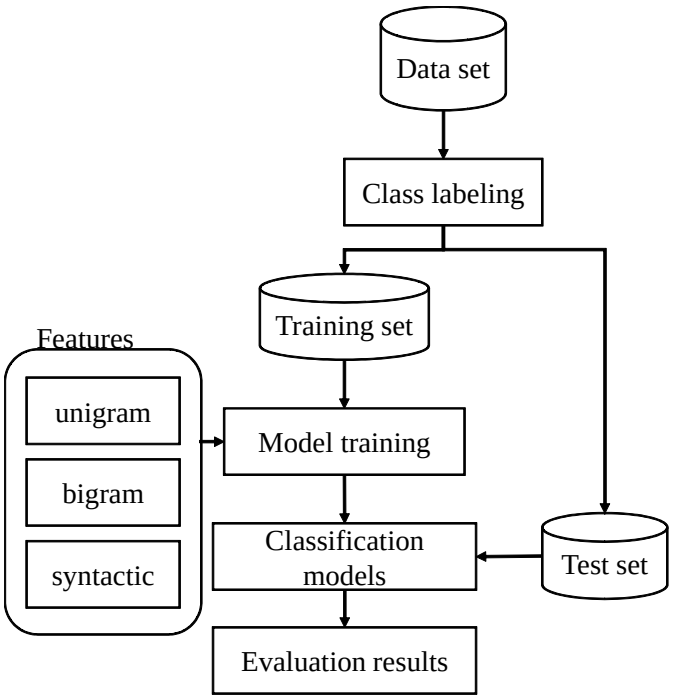

Figure 4.1: The process of training and evaluating classification models

4.2 Data Preparation

To create the TD-based classification model, we performed experiment using data from the International Corpus Network of Asian Learners of English (ICNALE), developed by Dr. Shin'ichiro Ishikawa of Kobe University [78]. This corpus contains 1.3 million words of English essays written by college students from 10 Asian countries and native speaker countries. For the data set, we randomly selected 776 essays from writers who have TOEIC scores higher than 670, which together consist of 10,000 sentences. Each sentence can be assigned into one or more of the seven classes shown in Table 4.1. We used the cue words in Table 4.2 as hint for labeling each sentence by two raters. The agreement between two raters was about 0.85 kappa value. After categorizing the sentences into classes, we formatted the data set using the programming language Python [79]. Each word in the data set was assigned a unique index and given an original weight as term frequency (tf) in each sentence for training and testing.

Table 4.1: TD-based 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 ***because*** I am tired of my part-time job.
Description	Describe more information regarding events or concepts.	I ***also*** want to study Japanese.
Opinion	State an attitude, personal view, or belief.	***I think*** every job can improve one's skills.
Sequence	Express events or concepts in a chronological order.	***Then*** everything becomes something for living.
Contrast	Illustrate how two or more events or concepts are different.	***However***, 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***?***
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.	In Japan, there are a lot of scholarships.

4.3 Experiments

The data set was trained and tested using the Support Vector Machine (SVM) which has supervised learning models that can analyze data and recognize patterns for classification. For the SVM tool, we selected a library for Support Vector Machines (LIBSVM) [80] that provides a simple user interface and supports multi-class classification.

At the beginning, the data set with the original weight was trained and tested based on unigram and bigram features with 5-fold cross-validation. k-fold cross validation is a common technique for estimating the performance of a classifier. The data set is divided into k subsets, and the training process is repeated k times. Each time, the k-1 subsets are put together to be a training set and the other one of the k subsets is used as the test set. Then, a syntactic feature was applied to improve the accuracy. We selected

cue words/phrases as shown in Table 4.2 to capture the intention of the writer. The cue words/phrases were adapted from the signal words in Fry's study [81].

Table 4.2: Cue word/phrases used for facilitating TD-based classification

Class	**Cue word/phrase**
Cause and Effect	because, since, consequently, lead to, if, thus, because of, due to, therefore, hence, 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)

The syntactic feature provided two main processes. First, this feature merged cue phrases containing two or more words into one token with a new and unique index. Also, it combined the cue phrases in the Opinion class as follows.

When we see a pattern of words as shown in Figure 4.2, such as "I strongly believe..." or "I do not think...," the pattern will be treated the same as that for the cue phrases "I think...," "I suppose...," "I admit...," "I believe...," and "I feel...."

The second process of this feature is assigning a new weight for every cue word/phrase that is merged in the first process by initially giving the weight of the processed cue word/phrase as (0.9 * tf), while the other words in the particular sentence are assigned

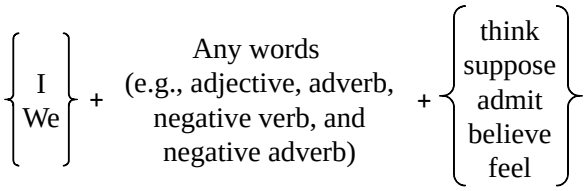

Figure 4.2: The pattern of the syntactic feature

(0.1 * tf). This can be represented by the ordered pair (0.1,0.9). Then, we trained repeatedly by adapting the weight to (0.2,0.8),...,(0.9,0.1) to find the optimized weight.

For example, consider the sentence "In my opinion, it is good." The initial approach formatted this sentence using the original weight for training and testing by unigram and bigram. The syntactic feature added the ID for the cue phrase "In my opinion" and assigned the syntactic weight as shown in 4.3.

`In my opinion, it is good.`

unigram and bigram features

Index	Weight	Word
1	1	In
2	1	my
3	1	opinion
4	1	it
5	1	is
6	1	good

syntactic feature

Index	Weight	Word
1	0.1	In
2	0.1	my
3	0.1	opinion
4	0.1	it
5	0.1	is
6	0.1	good
7	**0.9**	**In my opinion**

Figure 4.3: A syntactic feature formatted sentence

4.4 Performance Evaluation

The performance evaluation of the unigram and bigram features is shown in Table 4.3, while the results of syntactic features are presented in Table 4.4. The learning curve of accuracy based on the amount of training data is displayed in Figure 4.4.

We used unigram and bigram as the initial approach. With these features, we conducted an error analysis and can indicate some errors as follows:

Table 4.3: Performance of TD-based classification model using the unigram and bigram features

Size of data set	Unigram				Bigram			
	Accuracy	**Precision**	**Recall**	**F-measure**	**Accuracy**	**Precision**	**Recall**	**F-measure**
1000	66.30	80.44	70.71	75.25	63.40	76.18	67.00	72.15
2000	76.95	89.64	80.91	85.05	71.30	85.78	74.94	79.99
3000	81.10	92.26	84.48	88.20	77.00	90.93	79.67	84.92
4000	82.30	92.51	85.89	89.07	80.58	93.00	83.01	88.16
5000	83.90	93.30	87.34	90.22	82.64	95.34	84.79	89.75
6000	84.63	93.46	87.91	90.60	83.62	95.67	85.86	90.50
7000	85.71	94.34	88.89	91.53	85.59	96.64	87.75	91.98
8000	86.30	94.53	89.41	91.90	86.55	96.92	88.65	92.60
9000	86.76	94.75	89.90	92.26	87.17	97.14	89.16	92.98
10000	87.61	95.25	90.45	92.79	87.68	97.23	89.67	93.30

- Some cue phrases such as "such as" were separated as "such" and "as." This led to the incorrect classified of sentences that contain the words "such" or "as."
- Some sentences that are not questions contain interrogative pronouns (who, whom, what, which, etc.). In these cases, the pronouns are not interrogative.
- Some sentences that have the pattern "Some people **think**..." should not be considered an opinion because they do not give the writer's opinion. However, those sentences were classified as opinions, which is incorrect.

Table 4.4: Performance of the TD-based classification model using syntactic feature

Syntactic feature				
Size of data set	**Accuracy**	**Precision**	**Recall**	**F-measure**
1000	76.80	88.32	81.15	84.57
2000	79.50	89.89	83.98	86.84
3000	84.77	93.42	88.48	90.87
4000	88.78	95.91	91.87	93.84
5000	88.94	95.86	92.26	94.03
6000	89.42	96.22	92.39	94.26
7000	90.11	96.44	92.80	94.58
8000	90.33	96.41	93.06	94.70
9000	90.67	96.50	93.42	94.94
10000	90.85	96.54	93.53	95.01

Then, we trained the data set by applying the syntactic feature to improve accuracy. Table 4.4 shows the accuracy using syntactic feature when weight equals (0.1,0.9).

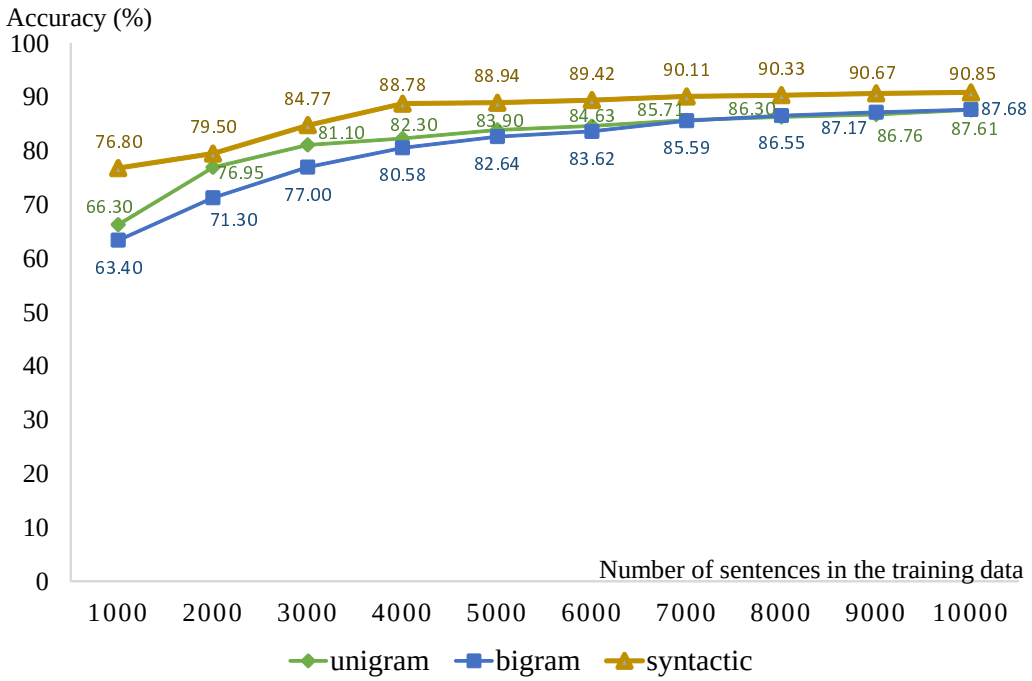

Figure 4.4: The learning curve of accuracy

Figure 4.4 presents the learning curve of the three features. The graph shows the accuracy in the percentage of unigram, bigram, and syntactic features when the number of sentences in the training data equals 1,000 to 10,000 sentences. Overall, this graph illustrates that the accuracy of the three features increased over the size of the training data, especially in the case of the syntactic feature. The syntactic feature achieved the highest accuracy among of the three features, beginning at 76.80% and rising sharply to 88.78% when the training data contained 4,000 sentences. After that, the accuracy rose gradually to 90.85%.

After that, we trained the training data by adapting weight from (0.1,0.9) to (0.9,0.1) to investigate the optimized weight. The results of the weight optimization are displayed in Figure 4.5. As the figure shows, the optimized weight was (0.3,0.7), and the accuracy increased to 94.4%.

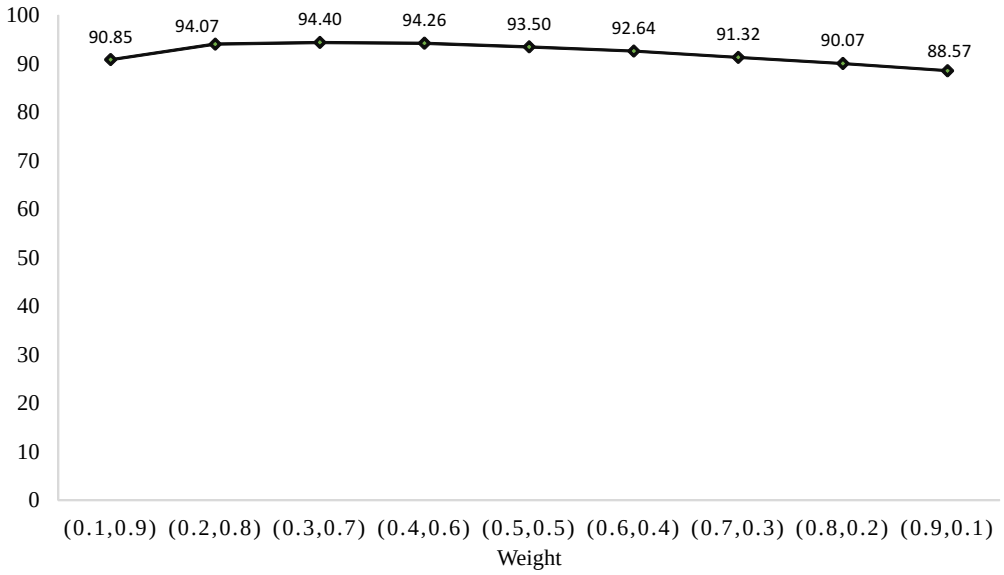

Figure 4.5: Weight optimization

4.5 Conclusion

We adapted the concept of speech act to develop the illocutionary act category (speech act taxonomy) for analyzing communication style in continuous text and chatting text. The illocutionary act that used for developing the TD-based classifier consists of seven classifications including Cause and Effect, Description, Opinion, Sequence, Contrast, Interrogation, and Declaration. Then, the classification model based on the intention was provided by using machine learning technique, namely, SVM. The classification model was trained and tested based on unigram, bigram, and syntactic features. The syntactic feature achieved the highest accuracy.

Chapter 5

Analyzing Differences in English Essay Writing Style

5.1 Introduction

For decades, the relationship between language and culture has been interested in a variety of perspectives. Language depends on thought which differs among cultures and cultural differences lead to different expectations of writing [15]. For example, writing styles of English as a foreign language (EFL) learner or non-native speakers in response to cultural patterned rhetorical constraints may be considered illogical, digressive, or circuitous by native-speaking reader [16]. Thus, it is important to consider how culture plays a large role in writing style. Understanding about differences of the intention is a key to solving problems in intercultural communication [82]. A way to facilitate understanding is to correctly identify and classify thoughts, ideas, or opinions based on intention or the illocutionary act [83].

Since analyzing differences cannot be recognized by using one culture alone [84], this study focuses on corpus-based analyzing the essay writing styles of Chinese, Japanese, Thai, and American writers. We analyzed and pointed out the differences among cultures by identifying significant differences in the number of sentences used in each category of intention. This work provided analysis of writing styles among Chinese, Japanese, Thai, and American writers to capture differences among Asian countries, which have their own native languages as well as differences between native and non-native writers.

5.2 Methodology

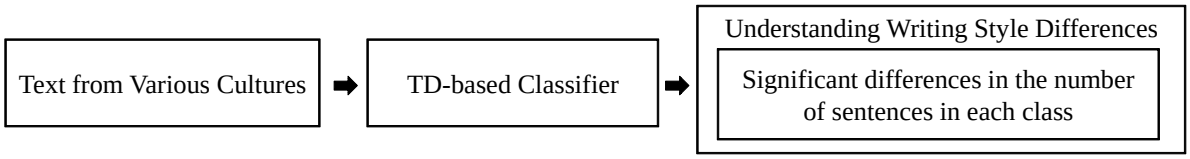

Figure 5.1: The process for analyzing differences in writing styles

In this chapter, we analyzed the essays from Chinese, Japanese, Thai, and American writers to investigate the differences of essay writing styles among the four cultures as shown in Figure 5.1. The proposed TD-based classification model was applied to classify sentences in the selected essays that come from the ICNALE corpus [78]. The essay topic was "It is important for college students to have a part-time job." The statistics of the data that were analyzed by ANOVA are shown in Table 5.1. All the non-native writers (i.e., the Chinese, Japanese, and Thai writers) had a TOEIC score higher than 670, which is the benchmark that indicates an ability to satisfy most social demands.

Table 5.1: Statistical data of the essays written by Chinese, Japanese, Thai, and American writers

	Chinese (n = 105)	**Japanese (n = 49)**	**Thai (n = 100)**	**American (n = 82)**	**p-value**
Total number of sentences	1592	766	1315	659	-
Number of sentences per essay	15.16	15.63	13.15	8.04	<0.001
Total number of words	28482	11892	24273	19007	-
Number of words per sentence	17.89	15.52	18.46	28.84	<0.001

Table 5.1 represents significant differences in the number of sentences per essay [$F(3, 332) = 84.81, p < 0.0001$] and number of words per sentence [$F(3, 4328) = 215.89, p < 0.0001$] among the four cultures. A post-hoc test indicated the number of sentences per essay was higher for non-native writers, including the Chinese, Japanese, and Thai participants, than for native writers (Americans), while native writers used significantly more words per sentence than non-native writers ($p < 0.0001$).

5.3 Sentence Analysis Results

The number of sentences in each class and each nationality was counted as shown in Table 5.2, where the numbers in parentheses represent the percentage of each class out of the total sentences used by writers of each nationality. Then, an ANOVA was carried out to analyze differences in the number of sentences in the seven classes used by writers from the four cultures and the results are represented in Table 5.3. Then, we used the Bonferroni method to find which pairs of cultures differed significantly from each other. We handled a sentence categorized into two or more classes by counting it as $\frac{1}{n}$ where n is the number of classes into which the sentence falls. Then, we added the calculated number into the particular classes.

Table 5.2: Number of sentences in essays written by participants from the four cultures

Class	**Chinese**	**Japanese**	**Thai**	**American**
Cause and Effect	228.8 (14.4%)	143.7 (18.8%)	268.2 (20.4%)	181.1 (27.5%)
Description	113.5 (7.1%)	62.9 (8.2%)	102.7 (7.8%)	70.4 (10.7%)
Opinion	115 (7.2%)	122.2 (16.0%)	106.9 (8.1%)	89.6 (13.6%)
Sequence	260.8 (16.4%)	159 (20.8%)	196.8 (15.0%)	73.2 (11.1%)
Contrast	134.7 (8.5%)	48.2 (6.3%)	100.2 (7.6%)	58.7 (8.9%)
Interrogation	26.2 (1.6%)	3 (0.4%)	10.2 (0.8%)	1 (0.2%)
Declaration	713 (44.8%)	227 (29.6%)	530 (40.3%)	185 (28.1%)

Table 5.3: Mean, standard deviation, and p-value (ANOVA) in each class

Class	**Chinese**	**Japanese**	**Thai**	**American**	**ANOVA**
Cause and Effect	2.18 ± 1.39	2.93 ± 1.95	2.68 ± 1.83	2.21 ± 1.45	< 0.01
Description	1.08 ± 0.99	1.28 ± 1.36	1.03 ± 0.80	0.86 ± 0.76	*n.s.*
Opinion	1.10 ± 0.83	2.49 ± 1.08	1.07 ± 0.79	1.09 ± 0.55	< 0.01
Sequence	2.48 ± 2.81	3.24 ± 2.56	1.97 ± 2.40	0.89 ± 0.97	< 0.01
Contrast	1.28 ± 0.68	0.98 ± 0.65	1.01 ± 0.82	0.72 ± 0.37	< 0.01
Interrogation	0.25 ± 0.28	0.06 ± 0.04	0.10 ± 0.14	0.01 ± 0.01	< 0.01
Declaration	6.79 ± 3.06	4.63 ± 2.25	5.30 ± 3.40	2.26 ± 2.04	< 0.01

The ANOVA results in Table 5.3 reveal that there was significant difference in the number of sentences in the Cause and Effect class among the four cultures [$F(3, 332) = 6.05, p < 0.001$]. The post-hoc test using Bonferroni method showed the Japanese writers used this class significantly more than the American writers did ($p < 0.01$). Moreover, the Japanese and Thai writers wrote significantly more sentences using this class than the Chinese writers did ($p < 0.01$). The results indicated no significant difference in the Description class among the four cultures.

For the Opinion class, there was significant difference among the four cultures [$F(3, 332) = 35.26, p < 0.0001$]. A post-hoc test revealed that the Japanese writers provided the largest number of sentences in the Opinion class among the four cultures ($p < 0.01$).

ANOVA revealed a significant difference in the Sequence class [$F(3, 332) = 30.29, p < 0.0001$] and the post-hoc test showed that the Thai writers used this class significantly less than the Japanese writers did ($p < 0.01$). Nevertheless, the Chinese, Japanese, and Thai writers wrote significantly more sentences in this class in their essays than the American writers did ($p < 0.01$).

The p-value in Table 5.3 shows that there were significant differences among the Chinese, Japanese, Thai, and American writers in terms of Contrast [$F(3, 332) = 7.77, p < 0.0001$] and Interrogation [$F(3, 332) = 7.10, p < 0.0005$]. The post-hoc test indicated the Chinese writers used sentences in these classes significantly more than the American writers ($p < 0.01$).

As Table 5.3 shows, the four cultures had significant differences in the Declaration class [$F(3, 332) = 39.64, p < 0.0001$]. The post-hoc test revealed the Chinese, Japanese, and Thai writers used sentences in this class significantly more than the Americans writers did ($p < 0.01$), and the Chinese writers used it the most ($p < 0.01$).

5.4 Discussion

In this work, we explored how culture influences writing styles among four cultures including Chinese, Japanese, Thai, and American by determining significant differences in the number of sentences in each class. The results in Table 5.4 represent the differences in writing essay among four cultures.

First, we considered in case of native writer and non-native writer. Non-native writers

Table 5.4: Significant differences of the number of each class in each pair of cultures

	Japanese	**Thai**	**American**
Chinese	Cause and Effect** Opinion** Declaration***	Cause and Effect*	Sequence*** Contrast*** Interrogation*** Declaration***
Japanese	-	Opinion** Sequence**	Cause and Effect* Opinion** Sequence*** Declaration***
Thai	-	-	Sequence*** Declaration***

*** p <0.0001, ** p <0.001, * p <0.005

(i.e., the Chinese, Japanese, and Thai writers) wrote sentences in the Declaration class and the Sequence class significantly more than the American writers did. The American style is more apparently linear and explicit than the Asian style that is non-native writers [2]. Americans' writing style is a straight line [85], which means that it follows a direct and linear organization. This style leads to the American writers directly explicate the main idea that is their own opinion. We found that the beginning part of essay written by the American writers was expressed by using the Opinion class or a combination of Opinion and Cause and Effect classes.

The characteristic of the Sequence class is unambiguously logical connections between sentences in chronological order. Thus, ideas and opinions of the American writer will support the topic, making the whole text a coherent unit, without using the Sequence class. For the large number of words per one sentence of American writer as shown in Table 5.1, it can refer to the style of thinking pattern is hypotaxis [86]. This style conveys logical, causal, or temporal connections between pieces of information in the sentence by using subordinate clauses or the use of complex or compound-complex sentences. It leads to the style of Americans that often used a long sentence and multi-classes to describe the topic.

In contrast, the Asian writing style is a spiral circling around the central point [85].

It can be explained as indirectness, since readers have to read between the lines and infer the implications to understand the message. Thus, this style requires more use of the Sequence class. Nevertheless, English essays written by non-native writers not only differed from those written by native writer but writing styles are organized differently, depending upon the respective native languages and cultures of the writers. Then, we considered how cultural differences affect essay writing style among four cultures. As the largest number of uses in the Declaration class was by Chinese writers, accounting for 44.8% of the total, as displayed in Table 5.2. The Chinese writers did not state their own opinion directly. They often give background information since the Chinese cultural way of thinking emphasizes that everything is mutually reinforced by focusing on boundaries [87].

Table 5.5 shows that the Chinese writers used the Contrast and Description in a sentence to manipulate the flow of essay. First, they wrote about advantage of part-time job and then they used the Description and the Contrast classes to change the flow of essay for writing about disadvantages.

Table 5.5: Excerpt from the essay written by the Chinese writer

Excerpt	**Class**
In the future, we must step into the society and face a variety of difficulties, having a job can help us gain the life experience.	Declaration
We can make our own money and we may realize it is hard for parents to earn money.	Declaration
But it **also** has unfavorable aspect.	**Description and Contrast**
The main task for students is study, having a job may possess most of the free time and may affect students' daily life.	Declaration

Table 5.4 shows no significant differences in the number of the Declaration class between the Chinese and Thai writers. It assumes that the Thai writers used the Declaration class often. Furthermore, they used cause-and-effect sentences to give reasons for the general information. The percentage of the number of sentences in the Cause and Effect class written by the Thai writers reached 20.4%, as displayed in Table 5.2. This style of giving a reason is the same as that used by the Japanese writers, who used the Opinion class more often than the writers from other cultures, as represented in Table 5.4. They thus used cause and effect and sequence to give the reasons for their opinions. It leads to no significant difference in the number of the Cause and Effect class between the Thai and

Japanese writer.

Table 5.6: The number (percentage) of essays with rhetorical functions in the beginning part

Rhetorical functions	**Chinese (n = 105)**	**Japanese (n = 49)**	**Thai (n = 100)**	**American (n = 82)**
Beginning with Cause and Effect class	7 (6.7%)	1 (2.0%)	11.5 (11.5%)	9 (11.0%)
Beginning with Description class	1 (0.9%)	0 (0.0%)	4.5 (4.5%)	1.5 (1.8%)
Beginning with Opinion class	23 (21.9%)	43.5 (88.9%)	29 (29.0%)	30.5 (37.2%)
Beginning with Sequence class	12 (11.4%)	3 (6.1%)	12 (12.0%)	3 (3.7%)
Beginning with Contrast class	2 (1.9%)	0 (0.0%)	3.5 (3.5%)	4 (4.9%)
Beginning with Interrogation class	3 (2.9%)	0.5 (1.0%)	0.5 (0.5%)	1 (1.2%)
Beginning with Declaration class	57 (54.3%)	1 (2.0%)	39 (39.0%)	33 (40.2%)

As represented in Tables 5.2 and 5.3, Japanese writers stated their own opinion directly by using the Opinion class more than the other cultures. This is because the Japanese have a writing strategy called "Return to baseline theme" [88, 89], in which writers focus on introducing their opinion early before progressing to a different perspective. The Japanese writers not only used the Opinion class in the beginning part of essay as shown in Table 5.6 but also in the ending part as represented in Table 5.7. However, in the ending part, the Japanese writers often used the Opinion class and sometime combined with the Cause and Effect class to conclude their opinion again. The excerpts presented in Table 5.8 are an evidence for this case.

Nevertheless, the results in Table 5.2 represent the largest percentage of the Sequence class used by Japanese. Those results mean that the Japanese writers often use sequential structure to express their opinion and reason. Table 5.9 shows excerpts from essays that written by Japanese. The first essay shows the sequence of two classes which are Sequence class and Cause and Effect class while the second essay represents a sentence that contains both Sequence and Opinion classes. The style of Japanese thought pattern is consistent with point/dot/space orientation, as explained by ORourke and Tuleja [90]. This pattern of thinking is like stepping stones in a courtyard, where each point is autonomous and connected to another with gaps [91]. In the Japanese culture, people follow strict rules, laws, regulations, policies, and procedures to avoid uncertain events and situations.

Table 5.7: The number (percentage) of essays with rhetorical functions in the ending part

Rhetorical functions	**Chinese (n = 105)**	**Japanese (n = 49)**	**Thai (n = 100)**	**American (n = 82)**
Ending with Cause and Effect class	23.5 (22.4%)	12 (24.5%)	25.5 (25.5%)	29.5 (36.0%)
Ending with Description class	3 (2.9%)	0 (0.0%)	3.5 (3.5%)	5 (6.1%)
Ending with Opinion class	8 (7.6%)	26 (53.1%)	12 (12.0%)	15 (18.3%)
Ending with Sequence class	12 (11.4%)	2.5 (5.1%)	11.5 (11.5%)	5.5 (6.7%)
Ending with Contrast class	9.5 (9.0%)	1.5 (3.1%)	13 (13.0%)	4 (4.9%)
Ending with Interrogation class	2 (1.9%)	0 (0.0%)	0.5 (0.5%)	0 (0.0%)
Ending with Declaration class	47 (44.8%)	7 (14.2%)	34 (34.0%)	23 (28.0%)

Table 5.8: Excerpts from the essays to show sequential structure written by the Japanese writers (1)

Excerpt	**Class**
Essay 1:	
I agree with this statement, and I actually do a part time job after my classes.	**Opinion**
I think it necessary to do a part time job.	Opinion
..	..
Therefore, I think it important for college students to have a part time job.	**Cause and Effect, Opinion**
Essay 2:	
First of all, I think it is really important for a student to experience what society's system is like.	**Opinion, Sequence**
..	..
For these reason I give, **I think** a college student should have a part time job.	**Opinion**

Japanese take comfort in structure and system [1]. This indicates that thinking pattern of Japanese is logical and orderly processes, and procedures.

5.5 Conclusion

This chapter provided an analysis to explore writing styles of English essay written by Chinese, Japanese, Thai, and American writers, and then demonstrated how culture influences writing styles to enhance intercultural communicative competence. The writing style in this work indicates a way of arranging sentences to express ideas or opinions clearly that is influenced by different cultures. We used a corpus-based approach to point out how culture influences English writing styles among Chinese, Japanese, Thai, and

Table 5.9: Excerpts from the essays to show sequential structure written by the Japanese writers (2)

Excerpt	Class
Essay 1:	
I disagree with the statement that it is important for college students to have a part time job.	Opinion
I'll show reasons which support my opinion.	Declaration
First of all, the most important thing for college students is studying.	**Sequence**
If we have a part time job, we will learn a lot from the experience, too.	**Cause and Effect**
However, I think we must spend most time on studying.	Opinion, Contrast
..	..
Essay 2:	
I agree.	Opinion
There are two reasons.	Declaration
First, I think that it must be a very good experience for college students to have a part time job.	**opinion, Sequence**
..	..
Second, college students get money by having a part time job.	**Sequence**
..	..

American writers by applying the TD-based classifier to classify sentences in essay and then examining significant differences in the number of sentences in each class of intention to capture the differences between native and non-native writers as well as differences among Asian countries, which have their own native languages.

The analysis results revealed a significant difference in the number of sentences in all classes except the Description class. Non-native writers (i.e., the Chinese, Japanese, and Thai writers) wrote sentences in the Declaration class and the Sequence class significantly more than the American writers did to explicitly make logical connections between sentences. The Chinese writers showed indirectness of writing essay using the Declaration class. The Japanese writers may appear inconsistent with the "Oriental" style based on Kaplan's theory since they stated their own opinion directly in the initial part by using the Opinion class more than the other cultures.

Chapter 6

Investigating Text-based Computer-Mediated Communication Styles Using Text Data-based Classification Model

6.1 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 intercultural 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 intercultural 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 [92]. 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 enhancing communicative competence and 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 communication style differences is a key factor for enhancing intercultural communicative competence and designing the next generation of CMC tools to support intercultural communication.

6.2 Methodology and Experimental Setting

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 by using the TD-based classifier as mentioned in Chapter 4 and compared them for both contexts. An overall process of the study is illustrated in Figure 6.1.

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

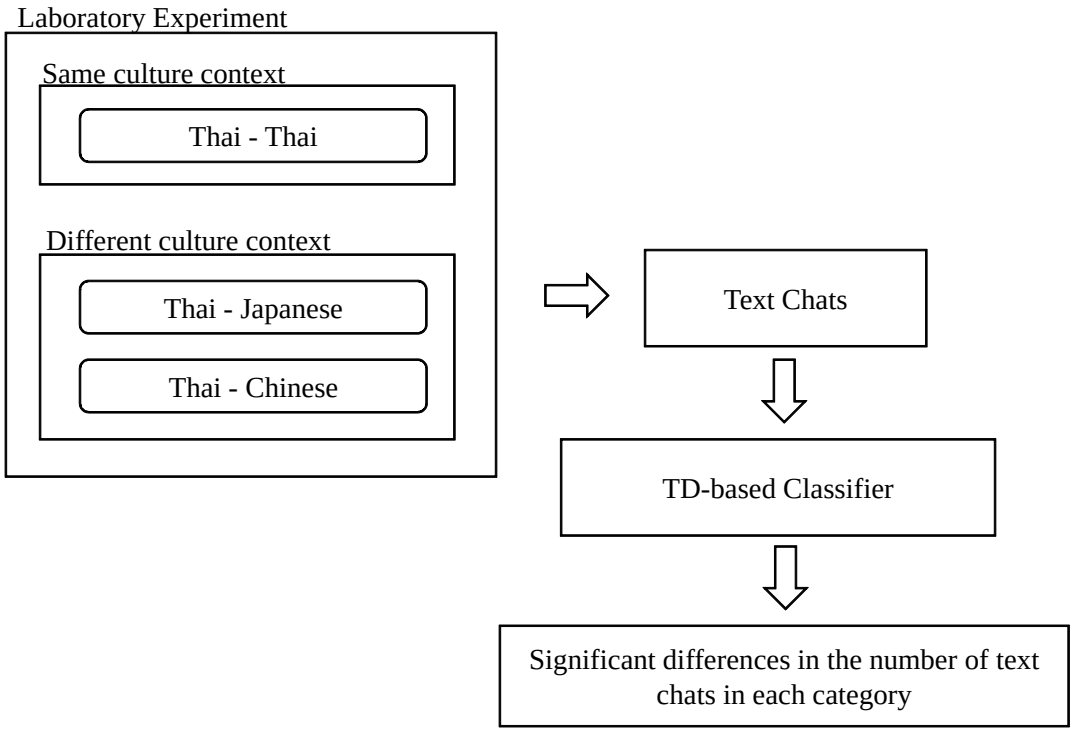

Figure 6.1: The process of text chat classification using TD-based classifier and cultural analysis

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 [93]. Each pair had 20 minutes to discuss a topic such as 'Is it important for college students to have a part-time job?' via the text-based online chat program.

6.3 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 TD-based 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 $\frac{1}{n}$ where n is the number of classifications into which the text chat falls. Then, we added the calculated number

Table 6.1: 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 6.2: Number of text chats by Thai participants

Class	**Thai participants**	
	Different cultures (N = 19)	**same culture (N = 20)**
Cause and effect	45.5 (9.6%)	61.0 (11.5%)
Description	22.5 (4.8%)	25.5 (4.8%)
Opinion	42.0 (8.9%)	59.2 (11.2%)
Sequence	18.5 (3.9%)	23.3 (4.4%)
Contrast	20.5 (4.3%)	31.0 (5.9%)
Interrogation	98.0 (20.7%)	68.0 (12.9%)
Declaration	226.0 (47.8%)	261.0 (49.3%)

Table 6.3: 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**
Cause and effect	2.4±1.4	3.0±1.3	n.s.
Description	1.2±2.1	1.3±1.6	n.s.
Opinion	2.2±1.8	3.0±1.8	n.s.
Sequence	1.0±0.9	1.2±1.2	n.s.
Contrast	1.1±0.9	1.5±1.1	n.s.
Interrogation	5.2±3.2	3.4±2.3	<0.05
Declaration	11.9±5.5	13.1±3.9	n.s.

Table 6.4: 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**
Number of words per text chat	8.6±6.0	6.7±5.4	<0.01	9.0±6.1	6.9±5.7	<0.01
Number of text chats per discussion	24.3±9.9	21.9±9.3	n.s.	25.6±8.0	24.7±8.8	n.s.

Table 6.5: Number of text chats by class for Thai-Japanese and Thai-Chinese pairs

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

Table 6.6: Text chats: mean, standard deviation, and p-value in each class between Thai-Japanese and Thai-Chinese

Class	**Thai - Japanese**			**Thai - Chinese**		
	Thai (n = 10)	**Japanese (n = 10)**	**p-value**	**Thai (n = 9)**	**Chinese (n = 9)**	**p-value**
Cause and effect	2.3±1.4	2.3±1.4	n.s.	2.5±1.5	2.9±2.2	n.s.
Description	0.8±0.6	0.3±0.4	<0.05	1.6±3.0	0.8±1.2	n.s.
Opinion	2.5±2.3	2.9±1.2	n.s.	1.9±1.1	3.1±2.0	n.s.
Sequence	1.1±1.2	0.4±0.7	n.s.	0.9±0.5	1.3±0.9	n.s.
Contrast	0.7±0.8	1.3±1.3	n.s.	1.3±0.9	0.9±0.9	n.s.
Interrogation	4.4±2.9	2.0±1.9	<0.05	6.1±3.4	1.2±1.3	<0.01
Declaration	12.5±6.6	12.8±6.9	n.s.	11.4±4.2	14.4±6.6	<0.05

into the particular categories.

Table 6.1 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 6.2. Table 6.3 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 ($p < 0.05$).

We took a deeper look at how different cultures influence communication style in intercultural discussions between Thai-Japanese pairs and Thai-Chinese pairs. Table 6.4 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 6.5).

The results in Table 6.6 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 ($p < 0.05$).

As Table 6.6 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 ($p < 0.05$).

6.4 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.

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 [1]. 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' [94]. Two examples in Table 6.7 show that Thai participants started conversations by using interrogations to maintain harmony of communication when communicating with Japanese and Chinese participants, respectively.

Table 6.7: Two examples of chats from Thai-Japanese pairs (T2-J2) and Thai-Chinese pairs (T14-C4)

Excerpt
T2: What is the suitable amount that should be paid to part-time job workers in Japan?
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.
T14: Are you doing any part-time job now?
C4: there was a part-time job in convenient shop.
T14: Did you mean you are doing the part-time job in Japan?
T14: or there is a job position at convenient store?
C4: yes, but I stopped since last Oct.

Table 6.4 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 [95]. Moreover, the general uncertainty of Japanese people in initial encounters with foreign strangers was significantly higher than with domestic strangers [96].

Additionally, Table 6.4 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 [97].

Tables 6.5 and 6.6 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. Meanwhile, Thai participants felt it necessary to send messages in the Interrogation classification to encourage Japanese participants to share more information in conversations. Table 6.8 provides an example of a chat log from Thai-Japanese pairs that focuses on interrogations.

Table 6.8: 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 [85]. 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. Table 6.9 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.

Table 6.9: 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

6.5 Conclusion

In this chapter, a laboratory-based experiment was set to collect discussion samples from participants. Then, text chats were classified based on intention by using TD-based classification model and compared the styles of collaborators in the context of the same culture (Thai-Thai pairs) and different cultures (Thai-Japanese pairs and Thai-Chinese pairs) by investigating significant differences in each classification of intention.

Our findings reveal 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 reveal 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.

Moreover, the results 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 the TD-based classifier may show other illocutionary acts beyond the provision of general information. Thus, the Declaration classification in our taxonomy should be reconsidered and we will discuss this point in next chapter.

Chapter 7

Chat Data-based Classification Model Based on Intention

7.1 Introduction

Due to the TD-based classifier based on essay corpus indicates that the taxonomy of the Declaration classification was not clear enough to differentiate data for CMC as shown in Chapter 6. Thus, This chapter focuses on the vaguely defined Declaration classification and develop new classes that can be separated from it based on illocutionary acts. It leads to the other classifier that uses chat data as training set in the development of the classification model. This classification model called Chat Data-based classification model (CD-based classifier).

In this model, we focused on analyzing the differences in intention-based text chats of collaborators in online communications. The collaboration style refers to a way of arranging text chats to express ideas or opinions clearly. The speech act theory was applied and nine classes of intention based on illocutionary acts were defined for indicating the intention of the collaborator, as shown in Table 7.2, in order to capture different structures of text chats based on cultural differences. These nine 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 category of illocutionary acts, the classification model using machine learning method was developed to automatically classify text chats.

Table 7.1: Speech act taxonomy in the NPS online chat corpus

Classification	**Example**
Greet	Hi all
Statement	I'll check after class
Accept	I agree
Reject	I dont think so.
Bye	See you later
Clarify	I mean the pepper steak
Continuer	And i dont even know what that means.
Emotion	lol
Emphasis	I do believe he is right.
No Answer	Nope
Yes Answer	Yep
Wh-Question	Where did everyone go?
Yes/No Question	Any women from Nashville in here?
System	JOIN
Other	*********

7.2 Data Preparation

To create the CD-based classification model, we performed experiment using data from the NPS chat corpus, created by Eric Forsyth, Jane Lin, and Craig Martell [98].

This corpus contains 10,567 posts from different online chat rooms in English. The speech act taxonomy of this corpus contains 15 categories consisting of Accept, Bye, Clarify, Continuer, Emotion, Emphasis, Greet, No Answer, Other, Reject, Statement, System, Wh-Question, Yes Answer,and Yes/No Question [99, 100] as illustrated in Table 7.1.

As shown in Table 7.1, the System, Emotion, and Other posts are not selected to use in the training and testing of the classification model since the correctness of our approach should be investigated on the real posts only and they are not natural language.

On the remaining 6,794 posts of our data set, we rearranged and assigned each post

Table 7.2: CD-based classification based on intention of the collaborator

Classification	**Illocutionary act**	**Example**
Greeting	Welcome someone with particular words.	Hello
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.	It's a good learning experience before you have your own business.
Description	Describe more information regarding events or concepts.	I also want to study Japanese.
Interrogation	Ask a question to persuade the collaborator to think.	What do you think about your part-time job?
Opinion	State an attitude, personal view, or belief.	I think every job can improve ones skills.
Exclamation	Express strong emotion or feeling and often contains an exclamatory mark	oh!! great
Acknowledgment	Acknowledge or recognize another person or statement.	I see.
Yes Answer	Express agreement between participants.	I agree with you.
No Answer	Show disagreement between participants.	No. I cannot.

based on our illocutionary act category. Each post can be assigned into one or more of the nine classes shown in Table 7.2. To label posts, we use the cue words in Table 7.3 as hint for labeling by two raters. The agreement between two raters was about 0.8 kappa.

After categorizing the posts into classes, each word in the data set was assigned a unique index and given an original weight as term frequency (tf) in each sentence for training and testing.

7.3 Experiments

The data set was trained and tested using the Support Vector Machine (SVM), which has supervised learning models that can analyze data and recognize patterns for classification. For the SVM tool, we selected a library for Support Vector Machines (LIBSVM) [80] that provides a simple user interface and supports multi-class classification.

Both word and Part-Of-Speech (POS) were utilized in the training and testing with

Table 7.3: Cue word/phrases used for facilitating CD-based classification

Classification	**Cue word/phrase**
Greeting	Hi, Hello, Hey, whats up, Yo
Declaration	(none)
Description	and, or, but, such as, furthermore, also, another, since, because, if, moreover
Interrogation	Question Mark
Opinion	I think, I feel, I guess, I believe
Exclamation	oh!, wow!, oops!, omg
Acknowledgment	Ok, I see, Hmm, Umm, Thanks
Yes Answer	yes, ya, alright, I do, me too, I agree, of course, yeah, sure
No Answer	no, nope, disagree, not sure

unigram, bigram, and syntactic features. At the beginning, the data set was trained and tested based on unigram and bigram features. Then, a syntactic feature was applied to improve the accuracy.

We considered several variations of combinations with 5-fold cross-validation. The features are listed as follows:

- Word: unigram, bigram, and syntactic
- POS: unigram and bigram
- Word + POS: unigram, bigram, and syntactic

7.4 Performance Evaluation

The performance evaluation of the word and POS based on unigram, bigram, and syntactic features is shown in Table 7.4 and Table 7.5, respectively. Table 7.6 shows the performance of the combination of word and POS (word + POS) using unigram, bigram, and syntactic features. The learning curve of accuracy of word using syntactic feature based on the amount of training data is displayed in Figure 7.1.

Table 7.4: Performance of CD-based classification model using word based on unigram, bigram, and syntactic features

Size of data set	unigram				bigram				syntactic			
	Accuracy	**Precision**	**Recall**	**F1**	**Accuracy**	**Precision**	**Recall**	**F1**	**Accuracy**	**Precision**	**Recall**	**F1**
1000	64.20	65.77	64.42	65.09	64.20	65.90	64.42	65.15	77.50	79.22	77.52	78.35
2000	66.60	69.09	67.61	68.34	67.75	70.48	68.49	69.47	79.35	82.09	80.11	81.09
3000	69.67	71.47	70.09	70.77	70.30	72.28	70.84	71.55	80.67	82.57	81.00	81.77
4000	71.28	73.08	71.76	72.41	70.95	72.91	71.94	72.22	81.20	83.22	81.58	82.39
5000	71.86	73.53	72.60	72.96	72.56	74.33	72.96	73.64	81.74	83.53	82.19	82.85
6000	72.22	73.77	72.60	73.18	73.27	74.91	73.65	74.27	82.68	84.47	83.09	83.77
6794	73.05	74.57	73.44	74.00	73.70	75.32	74.11	74.71	**83.02**	84.73	83.37	84.04

Table 7.5: Performance of CD-based classification model using POS based on unigram and bigram features

Size of data set	unigram				bigram			
	Accuracy	**Precision**	**Recall**	**F1**	**Accuracy**	**Precision**	**Recall**	**F1**
1000	55.40	62.69	55.52	56.10	54.00	55.67	54.83	55.25
2000	58.35	60.55	58.79	59.66	59.60	61.42	60.18	60.79
3000	61.37	62.90	61.62	62.25	62.67	64.06	62.94	63.49
4000	61.00	62.54	61.23	61.87	64.18	65.60	64.47	65.03
5000	60.32	61.74	60.47	61.10	63.44	64.81	63.69	64.25
6000	60.57	61.89	60.71	61.31	63.90	65.20	64.19	64.69
6794	60.08	61.27	60.15	60.70	63.69	64.87	63.89	64.54

Figure 7.1 presents the learning curve of the three features. The graph shows the accuracy in the percentage of word using unigram, bigram, and syntactic features when the number of sentences in the training data equals 1,000 to 6,794 sentences. Overall, this graph illustrates that the accuracy of the three features increased over the size of the training data, especially in the case of the syntactic feature. The syntactic feature achieved the highest accuracy among of the three features, beginning at 77.50% and rising sharply to 81.20% when the training data contained 4,000 sentences. After that, the accuracy rose to 83.02%.

Table 7.6: Performance of CD-based classification model using word+POS based on unigram and bigram features

Size of data set	unigram				bigram				syntactic			
	Accuracy	Precision	Recall	F1	Accuracy	Precision	Recall	F1	Accuracy	Precision	Recall	F1
1000	70.20	71.80	70.19	70.98	69.10	70.70	69.11	69.90	70.40	72.00	70.38	71.18
2000	72.40	74.50	72.62	73.55	71.90	74.26	72.13	73.18	72.45	74.55	72.67	73.59
3000	75.93	77.58	76.05	76.80	75.17	76.77	75.10	75.92	76.10	77.74	76.21	76.96
4000	76.03	77.84	76.43	77.12	75.05	76.93	75.33	76.12	76.20	78.02	76.60	77.30
5000	76.48	78.10	76.72	77.40	75.62	77.21	75.70	76.45	76.46	78.08	76.70	77.38
6000	77.15	78.74	77.42	78.08	76.68	78.26	76.88	77.56	77.30	78.83	77.58	78.23
6794	77.89	79.45	78.19	78.82	76.76	78.26	77.00	77.62	77.98	79.54	78.28	78.89

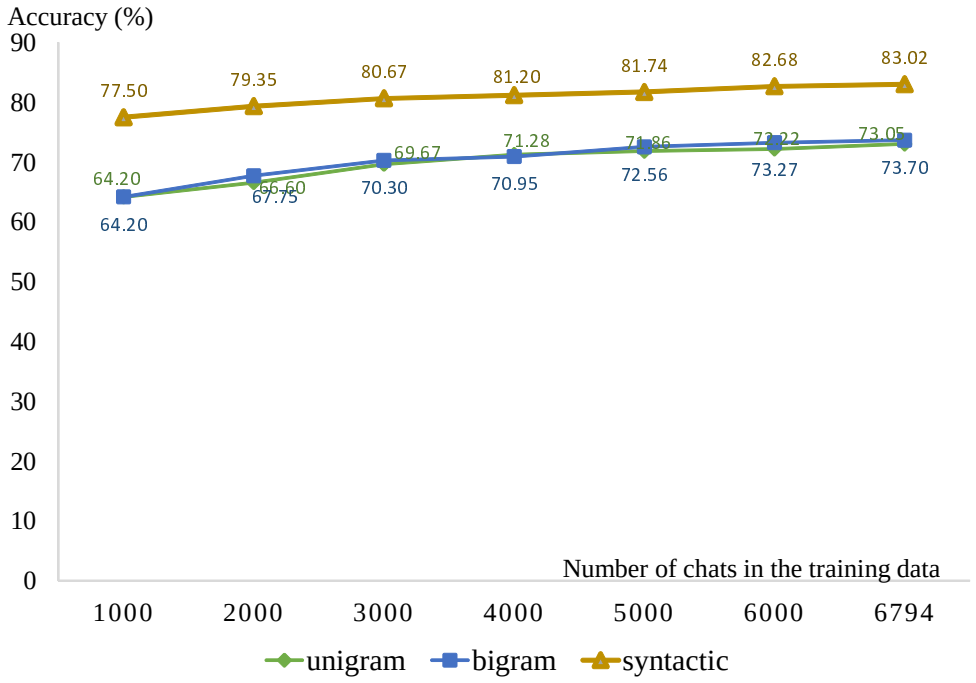

Figure 7.1: The learning curve of accuracy of word based on unigram, bigram, and syntactic features

7.5 Conclusion

In this chapter, the speech act theory was adapted to develop the other illocutionary act category. This category is able to capture the intentions of collaborators including Greeting, Declaration, Description, Interrogation, Opinion, Exclamation, Acknowledgment, Yes Answer, and No Answer. Then, the CD-based classification model was provided using a machine learning technique. The data set was trained and tested based on unigram, bigram, and syntactic features. The result shows that the syntactic feature using word

achieved the highest accuracy.

Chapter 8

Investigating Text-based Computer-Mediated Communication Styles Using Chat Data-based Classification Model

8.1 Introduction

This chapter focuses on the same goal with the chapter 6 that is investigating differences in how language is constituted based on intentions of collaborators in online communications within the same culture and between different cultures. However, we applied the CD-based classification model instead of the TD-based classification model since the taxonomy of the Declaration classification in the TD-based classification model may not clear enough to differentiate data from interaction as explained in Chapter 6.

Using the same text chats, 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 illocutionary act used in this study consists of nine classifications including Greeting, Declaration, Description, Interrogation, Opinion, Exclamation, Acknowledgment, Yes Answer, and No

Answer.

8.2 Methodology and Experimental Setting

We used the same discussion samples as used in Chapter 6 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. However, we classified text chats based on intention by using the CD-based classifier as mentioned in Chapter 7 instead of the TD-based classifier and compared them for both contexts. An overall process of the study is illustrated in Figure 8.1.

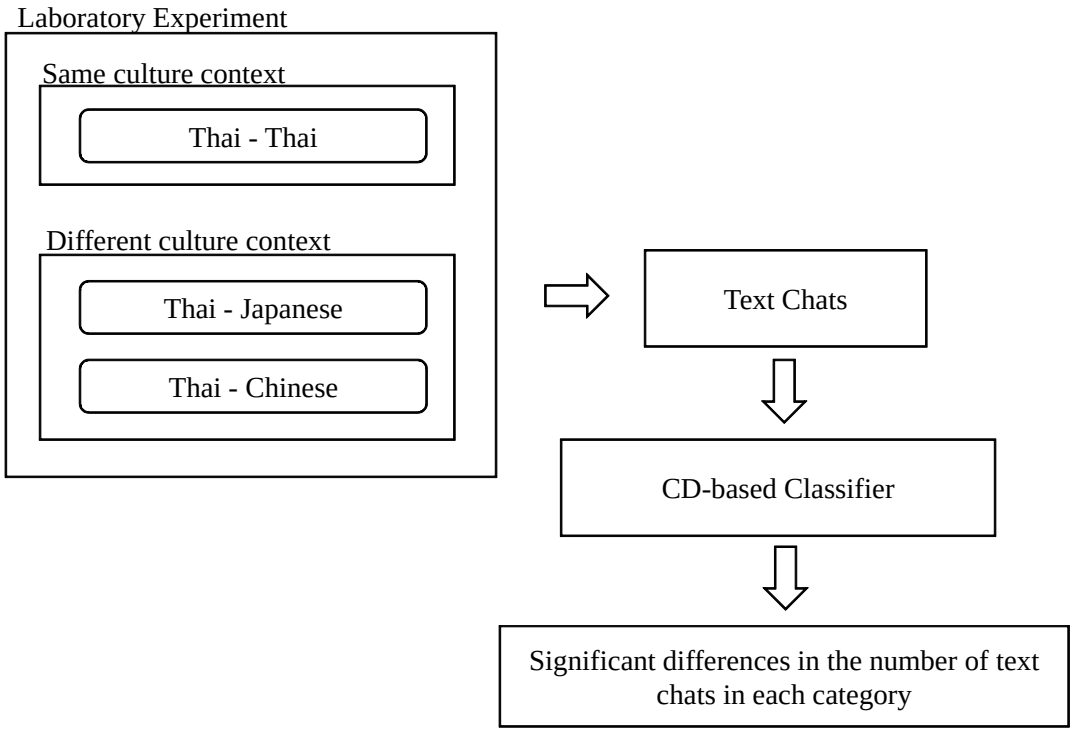

Figure 8.1: The process of text chat classification using CD-based classifier and cultural analysis

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 [93]. Each pair had 20 minutes to discuss a topic such as 'Is it important for college students to have a part-time job?' via the text-based online chat program.

8.3 Text Chat Analysis Results

Table 8.1: 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.

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 CD-based 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 $\frac{1}{n}$ where n is the number of classifications into which the text chat falls. Then, we added the calculated number into the particular categories.

Table 8.1 provides the number of words per text chat and the number of text chats

Table 8.2: Number of text chats by Thai participants

Class	Thai participants	
	Different cultures (N = 19)	**Same culture (N = 20)**
Greeting	22.0 (4.6%)	29.0 (5.5%)
Declaration	156.5 (32.9%)	252.0 (48.0%)
Description	49.0 (10.3%)	17.0 (3.2%)
Interrogation	114.0 (24.0%)	78.0 (14.9%)
Opinion	43.0 (9.0%)	47.0 (9.0%)
Exclamation	23.5 (4.9%)	3.5 (0.7%)
Acknowledgment	36.5 (7.7%)	36.5 (7.0%)
Yes Answer	30.0 (6.3%)	53.0 (10.1%)
No Answer	1.0 (0.2%)	9.0 (1.7%)

Table 8.3: 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**
Greeting	1.2±0.8	1.5±0.6	n.s.
Declaration	8.2±4.3	12.6±3.6	<0.01
Description	2.6±1.7	0.9±0.8	<0.01
Interrogation	6.0±3.5	3.9±2.4	<0.05
Opinion	2.3±2.0	2.4±1.5	n.s.
Exclamation	1.2±1.3	0.2±0.4	<0.01
Acknowledgment	1.9±1.8	1.8±1.4	n.s.
Yes Answer	1.6±2.2	2.7±1.9	n.s.
No Answer	0.1±0.2	0.5±0.8	<0.05

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.

Table 8.4: 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**
Number of words per text chat	8.6±6.0	6.7±5.4	<0.01	9.0±6.1	6.9±5.7	<0.01
Number of text chats per discussion	24.3±9.9	21.9±9.3	n.s.	25.6±8.0	24.7±8.8	n.s.

Table 8.5: Number of text chats by class for Thai-Japanese and Thai-Chinese pairs

Class	**Thai - Japanese**		**Thai - Chinese**	
	Thai (n = 10)	**Japanese (n = 10)**	**Thai (n = 9)**	**Chinese (n = 9)**
Greeting	13.0 (5.3%)	8.0 (3.6%)	9.0 (3.9%)	9.0 (4.1%)
Declaration	84.0 (34.6%)	78.0 (34.8%)	72.5 (31.2%)	104.0 (46.8%)
Description	27.0 (11.1%)	24.0 (10.7%)	22.0 (9.5%)	22.0 (9.9%)
Interrogation	48.0 (19.8%)	23.0 (10.3%)	66.0 (28.4%)	20.0 (9.0%)
Opinion	24.0 (9.9%)	24.0 (10.7%)	19.0 (8.2%)	26.0 (11.7%)
Exclamation	7.5 (3.1%)	5.0 (2.2%)	16.0 (6.9%)	2.0 (0.9%)
Acknowledgment	19.5 (8.0%)	23.0 (10.3%)	17.0 (7.3%)	6.0 (2.7%)
Yes Answer	20.0 (8.2%)	36.0 (16.1%)	10.0 (4.3%)	31.0 (14.0%)
No Answer	0.0 (0.0%)	3.0 (1.3%)	1.0 (0.4%)	2.0 (0.9%)

Table 8.6: Text chats: mean, standard deviation, and p-value in each class between Thai-Japanese and Thai-Chinese

Class	**Thai - Japanese**			**Thai - Chinese**		
	Thai (n = 10)	**Japanese (n = 10)**	**p-value**	**Thai (n = 9)**	**Chinese (n = 9)**	**p-value**
Greeting	1.3±1.1	0.8±0.8	n.s.	1.0±0.5	1.0±0.5	n.s.
Declaration	8.4±5.3	7.8±4.6	n.s.	8.1±3.3	11.6±5.3	n.s.
Description	2.7±2.0	2.4±2.6	n.s.	2.4±1.5	2.4±2.9	n.s.
Interrogation	4.8±2.8	2.3±1.9	<0.05	7.3±3.9	2.2±1.8	<0.01
Opinion	2.4±2.4	2.4±1.3	n.s.	2.1±1.6	2.9±1.8	n.s.
Exclamation	0.8±0.8	0.5±0.9	n.s.	1.8±1.6	0.2±0.4	<0.05
Acknowledgment	2.0±2.2	2.3±1.8	n.s.	1.9±1.2	0.7±0.9	<0.05
Yes Answer	2.0±3.0	3.6±3.4	n.s.	1.1±0.9	3.4 ±1.7	<0.01
No Answer	0.0 ±0.0	0.3 ±0.5	n.s.	0.1±0.3	0.2 ±0.4	n.s.

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 8.2. Table 8.3 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, Exclamation, and Description than when communicating with partners from the same culture ($p < 0.05$, $p < 0.01$, $p < 0.01$, respectively). The results also reveal that Thai participants when communicating with partners from different cultures used significantly less text chats than when communicating with partners from the same culture in the Declaration class ($p < 0.01$) and No Answer class ($p < 0.05$).

We took a deeper look at how different cultures influence communication style in intercultural discussions between Thai-Japanese pairs and Thai-Chinese pairs. Table 8.4 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 8.5).

The results in Table 8.6 show that there were significant differences in the number of text chats in the Interrogation class for Thai-Japanese pairs. Thai participants had significantly more text chats in this class than Japanese participants ($p < 0.05$).

As Table 8.6 shows, Thai-Chinese pairs had significant differences for the Interrogation, Exclamation, Acknowledgment, and Yes Answer classifications. Thai participants had significantly more text chats in the Interrogation, Exclamation, and Acknowledgment classes than Chinese participants did ($p < 0.01$, $p < 0.05$, and $p < 0.05$, respectively). However, Thai participants used the Yes Answer class less than Chinese participants did ($p < 0.01$).

8.4 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.

Results of this research revealed that Thai participants often used the Interrogation, Exclamation, and Description classifications in the context of different cultures. For the Interrogation class, Thai participants possibly used it because they were curious about topics related to different cultures and wished to maintain harmony in communications.

Thai participants used the Interrogation classification to encourage others to participate in the conversations. Moreover, Thai participants sometimes were confused by messages from both Japanese and Chinese participants. Thai participants sometimes did not know that both Japanese and Chinese participants can understand them or not because they often used a small number of words in each text chat in the communication. This style leads Thai participants often used the Interrogation and Description classifications. Thai participants used large numbers of texts in the Description classification, indicating that Thai participants have a need for explanations during communication in the context of different cultures.

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 [1]. 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' [94]. However, Thai participants did not worry to express No Answer in the context of same culture. They can express their own disagreement to Thai partner directly. Furthermore, Thai participants assume that their own perceptions do not differ from those of other Thai participants. They did not have to express their own opinion directly. It leads they often used the Declaration class in the context of same culture communication to explain their story.

Table 8.4 shows that Japanese participants used significantly less words per text chat than Thai participants because Japan is characterized as a country that avoids uncertainty to a high degree. 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 [95]. Moreover, the general uncertainty of Japanese people in initial encounters with foreign strangers was

significantly higher than with domestic strangers [96]. This style of communication refers to Japanese participants who were not familiar with the context of online communications. Then, Japanese participants in the experiments used less words per text chat than Thai participants. Meanwhile, Thai participants felt it necessary to send messages in the Interrogation classification to encourage Japanese participants to share more information in conversations. Table 8.7 provides an example of a chat log from Thai-Japanese pairs that focuses on interrogations.

Table 8.7: An example of a text chat from a Thai-Japanese pair focusing on Interrogations

Excerpt	**Class**
T1: have you ever do the part-time job?	Interrogation
J1: Yes	Yes Answer
T1: Which kind of job?	Interrogation
J1: In grocery market	Declaration
T1: doing when you were undergrad student?	Interrogation
J1: last high school student year to university 4th	Declaration

Additionally, Table 8.4 reveals 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 [97]. It leads Chinese participants to use a small number of words per text chat to avoid misunderstandings and dispute others. On the other hand, Chinese participants often used the Agreement classification to represent their cooperation and agreement while Thai participants used Acknowledgment classification to show their deference and modesty as shown in Table 8.8.

Table 8.8: An example of a text chat from a Thai-Chinese pair

Excerpt	Class
T15: in the present, part-time job also be a new trend.	Declaration
T15: new generation want to have part-time jobs for training themselves	Declaration
C5: yes, it is not just about money now	Yes Answer
C5: training, knowing new people, something	Declaration
T15: ok, thanks for your opinion	Acknowledgment

8.5 Conclusion

This chapter provided a study to investigate how cultural differences influence communication style in text-based CMC and compare the context of communications within the same culture (Thai-Thai pairs) and different cultures (Thai-Japanese pairs and Thai-Chinese pairs). Instead of using the TD-based classifier, the CD-based classifier was applied in the same chat sample as Chapter 6.

The results reveal that Thai participants often used the Interrogation, Exclamation, and Description classifications in the context of different cultures. Results show a significant difference in the number of text chats between Thai and Japanese participants in the Interrogation category. Further, we found a significant difference in the Interrogation, Exclamation, Acknowledgment, and Yes Answer classifications between Thai and Chinese participants.

Chapter 9

Discussion

This research provided an intention-based text analysis to understand differences in communication style based on theoretical consideration and specific empirical observations in both continuous text and chatting text. The communication style in this work refers to a way of using sentences/text chats to express ideas or opinions clearly. The research aims to analyze and compare communication style that influenced by cultural differences in order to enhance communicative competence.

9.1 Overview of Communication Style Differences

This dissertation focuses on analyzing and comparing communication style between countries from Asia including Chinese, Japanese, and Thai participants. In the beginning, we provided a study to confirm that countries from Asia have own style of communication style toward intercultural context by analyzing connection between the existing theories and our results. This study provides a preliminary experiment that is discourse analysis in the intercultural communication as described in Chapter 3. The intercultural communication in the experiment refers to knowledge sharing that is an activity to exchange knowledge (namely, information, skills, or expertise) among people, friends, families, communities [101] which can occur via face-to-face communication or written correspondence in online communication. This study focuses on finding connections between exist theories and our results to enhance communicative competence.

The experiment to investigate how different cultures affect communication style of

knowledge sharing was provided. The laboratory experiment was conducted to collect discourses in the process of online knowledge sharing between Thai and Chinese participants. Discourses posted by them were analyzed by using six categories of intention including declaration, interrogation, exclamation, opinion, acknowledgement, and agreement. The discourse analysis shows that there was a significant difference in the number of interrogation and exclamation discourses. Then, connections between the discourse analysis results and cultural dimensions conducted by Hofstede were examined. A post-questionnaire was provided to investigate participants' attitudes during online knowledge sharing. The experiment reveals that the main cultural dimensions that influence Thai and Chinese participants to have the different patterns of online knowledge sharing are individualism, masculinity, and uncertainty avoidance. It can conclude that cultural differences among participants can influence the ways knowledge is shared in the online communication. The results from this study confirm that there are differences among Asian countries.

However, findings the connections between our results and exist theory that is cultural dimension of Hofstede that is theoretical consideration may not enough for research of differences in communication style in intercultural context. The Hofstede theory focuses on the context of applications for understanding international business. Meanwhile, this work focuses on different objectives that are analysis of communication styles. An empirical evidence-based research should be considered for analyzing differences in communication style. Thus, the intention-based approach to analyzing how different cultures affect communication style in both writing text and text chats in intercultural context using text analysis is provided.

Text analysis is selected to be a strategy for studying communication style of people who have different cultures because language is the most important tool of communication and it is the area where cultural difference plays its role. Text in this dissertation refers to an expression of thought on a subject in written form such as online discussion/conversation or essay. Speech act is considered as a tool for analyzing linguistic communication. When a person writes/speaks something, he/she does so with some intention. The level of understanding will increase if the intention can be captured. For facilitating text analysis, the classification model using the machine learning method was

provided to automatically classify sentences in text based on the illocutionary act category. The task of capturing the intention is treated as a text classification problem where each sentence can be classified into one or more categories of intention. A machine learning method was used for developing a model to classify sentences/text chats according to the intention.

There have been some researches that work on automated speech act classification. However, most of them have different objectives and uses different categories. It depends on the topic and these categories are too specific to be used for other research such as Leuski [61] proposed several categories of requests, or too general, focusing only on request identification and having no categories for other kinds of speech acts [64].

To facilitate analysis of communication styles, intention-based classifier according to two types of text that are continuous text and text chat is provided (Chapter 4). First, we developed the TD-based classifier that uses essay corpus as a training set. This classification model consists of seven classifications including Cause and Effect, Description, Opinion, Sequence, Contrast, Interrogation, and Declaration. These seven classes indicate a logical relationship between ideas, how writers connect their ideas, and how they guide the reader in a desired direction.

Table 9.1 represents the overview of our method and result to analyze cultural differences in communication style. Using the TD-based classifier, differences in written communication style were analyzed (Chapter 5). This work explored writing styles of English essay written by Chinese, Japanese, Thai, and American writers, and then demonstrated how culture influences writing styles. Based on the findings in different styles of writing that are influenced by culture, a significant difference in the number of each class was examined and the analysis results reveal a significant difference in the number of sentences in all classes except the Description class. Non-native writers (i.e., the Chinese, Japanese, and Thai writers) wrote sentences in the Declaration class and the Sequence class significantly more than the American writers did to explicitly make a logical connection between sentences. The Chinese writers showed indirectness of writing essay using the Declaration class.

Besides writing text, we continued using the TD-based classifier to analyze how cultural differences influence communication style in text-based computer-mediated commu-

nication (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 (Chapter 6). The significant finding of this study is the large number of text chats in the Interrogation category in the context of different cultures. Results show 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 results from Chapter 6 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 from interaction. Thus, we focused on the vaguely defined Declaration classification and develop new classes that can be separated from it based on illocutionary acts. It leads to the other classifier using chat data as training set in the process of developing the classification model called CD-based classifier (Chapter 7). The illocutionary act category of the CD-based classifier indicate a logical relationship between ideas, how collaborators connect their ideas, and how they guide the partner in the interaction in a desired direction.

In Chapter 8, we applied the CD-based classifier (Chapter 7) with the same data as Chapter 6. The results reveal that Thai participants often used the Interrogation, Exclamation, and Description classifications in the context of different cultures. Results showed a significant difference in the number of text chats between Thai and Japanese participants in the Interrogation category. Further, the result revealed a significant difference in the Interrogation, Exclamation, Acknowledgment, and Yes Answer classifications between Thai and Chinese participants.

The impact of this study is to support the effective communication among people of different cultures based on understandings that are investigated from this research since understanding communication style differences leads us to understand in others' action and it gains communicative competence.

Our findings about differences in written communication styles can be applied to the social life (e.g., [102] and [103]). Understanding communication style differences is important for intercultural communication because such communicative competence can

prevent misunderstandings in the communication between interlocutors of different cultures. For example, the finding about different styles of writing between cultures is useful in reporting news or writing essay in the intercultural context such as at an international university. We have learnt how to write in the suitable form for the particular culture.

In the teaching context, teachers who work with non-native students have to deal with cultural and linguistic differences of their students and they sometimes think that non-native students are often display inappropriate use of language. Our findings assist teachers identifying the differences among patterns in the writing. The analysis of how Chinese, Japanese, and Thai students construct the essay is useful the teaching and creating more appropriate curricula for intercultural context. It can be used for designing tasks and materials for teaching writing. For example, the finding about different styles of writing between cultures is useful in reporting news or writing essay in the intercultural context such as at an international university. We have learnt how to write in the suitable form for the particular culture.

Research findings can contribute to improve quality and reduce negative feelings in intercultural context. For example, the Chinese writers often used the Declaration class and they did not directly express their opinions. If Japanese speakers read an essay written by a Chinese writer, they might feel confused since the style of Japanese culture, in our finding, is to express opinions directly. Thus, communicative competence based on the finding of this work can eliminate this confusion. Moreover, understanding communication style 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 communication style differences in intercultural interactions.

Table 9.1: Overview of method and result in the dissertation

	Chapter 3	Chapter 5	Chapter 6	Chapter 8
Objective	Investigating how different cultures affect patterns of online knowledge sharing and finding connections between exist theories and our results	Exploring how culture influences writing styles of English essay written by American (Native), Chinese, Japanese, and Thai (Non-native) writers	Analyzing 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)	
Method	Theoretical consideration	Empirical observations		
	Classifying discourses **by hand**. The discourses can be classified into six classes as follows: Declaration, Interrogation, Exclamation, Opinion, Acknowledgment, and Agreement	Using the **TD-based classifier** to automatically classify sentences and text chat. The illocutionary category consists of seven classes as follows: Cause and Effect, Description, Opinion, Sequence, Contrast, Interrogation, and Declaration		Using the **CD-based classifier** to automatically classify text chat. The illocutionary category consists of nine classes as follows: Greeting, Declaration, Description, Interrogation, Opinion, Exclamation, Acknowledgment, Yes Answer, and No Answer
Result	**Thai - Chinese pairs** *Thai >Chinese* • Interrogation (p <0.01) • Exclamation (p <0.01)	**Cause and Effect class** • Japanese >American (p <0.005) • Japanese >Chinese (p <0.001) • Thai >Chinese (p <0.005) **Opinion class** • Japanese used it the most (p <0.00001) **Sequence class** • Japanese >Thai (p <0.001) • Non-native >Native (p <0.0001) **Contrast class** • Chinese >American (p <0.0005) **Interrogation class** • Chinese >American (p <0.0001) **Declaration class** • Non-native >Native (p <0.0001) • Chinese used it the most (p <0.0001)	**Thai participants** *Different cultures >Same culture* • Interrogation (p <0.05) **Thai - Japanese pairs** *Thai >Japanese* • Description (p <0.05) • Interrogation (p <0.05) **Thai - Chinese pairs** *Thai >Chinese* • Interrogation (p <0.01) *Thai <Chinese* • Declaration (p <0.05)	**Thai participants** *Different cultures >Same culture* • Interrogation (p <0.05) • Exclamation (p <0.01) • Description (p <0.01) *Different cultures <Same culture* • Declaration (p <0.01) • No Answer (p <0.05) **Thai - Japanese pairs** *Thai >Japanese* • Interrogation (p <0.05) **Thai - Chinese pairs** *Thai >Chinese* • Interrogation (p <0.01) • Exclamation (p <0.05) • Acknowledgment (p <0.05) *Thai <Chinese* • Yes Answer (p <0.01)

Table 9.4 represents the summary of evidence based results from this research. The finding about communication style differences that influenced by cultures can be used to enhance intercultural communicative competence in order to prepare people for what to expect from different cultures as well as how to perform toward the intercultural context. A factor for avoiding conflicts in intercultural context is the recognition of the intention of writer/collaborator in a particular culture. Speech act theory indicates what the writer is doing in uttering a particular form of words, focusing on intention. Since cultural differences lead to different styles of communication, it is important for the reader to understand the style used in a particular text and recognize the purpose or intention of the writer. Thus, the proposed intention-based classifiers in this research are able to identify differences in communication style.

9.2 Intention-based Classification Models

In this dissertation, the intention-based classification models have been developed including TD-based classification model and CD-based classification model. First, the TD-based classification model has been developed. The objective of the TD-based classifier is to handle both continuous text and chatting text. This classifier is trained and tested by using the essay data corpus that is well-structural data. Then, to handle with unstructured data like chat corpus, the CD-based classifier has been developed. However, it gives the lower performance than the TD-based classifier.

The accuracy of the CD-based classifier is about 84%. This is because of unstructured and noisy data in the training set of the CD-based classification model, especially sentences that contain long words or uncommon words. For the text chat data that used in Chapter 6 and Chapter 8 to investigate the communication style differences in this dissertation, Table 9.2 shows the number of each class of chat data by using TD-based classifier, CD-based classifier, and human annotator.

Table 9.2 represents a significant difference between the CD-based classifier and human annotator in the Description class. Then, we took a deeper look at the data and found that error is mostly come from the Description class. Examples of this type of error are shown in Table 9.3 such as the first excerpt should be classified as the Declaration class but the CD-based classifier returned as Description classification.

Table 9.2: Comparison of the number in each class of chat data classified by TD-based classifier, CD-based classifier, and human annotator

Class	**TD-based classifier**	**CD-based classifier**	**Human annotator**
Greeting	-	68	72
Declaration	745	590	592
Description	58	**112**	**72.5**
Interrogation	200	235	231
Opinion	159	140	156
Exclamation	-	34	28.5
Acknowledgment	-	101	107.5
Yes Answer	-	150	175.5
No Answer	-	15	10
Sequence	58	-	-
Contrast	34	-	-
Cause and Effect	152	-	-

Table 9.3: Examples of the incorrect classification of the Description class

Excerpt	**Actual classification**	**Result classification**
Everything is getting more and more expensive every day.	Declaration	Description
yes, not only financial	Yes Answer	Description
and money you got at that time is enough for you or not????	Interrogation	Description
yes we can learn more and to improve ourselves	Yes Answer	Description

However, using Kappa statistic that used to test inter-rater reliability, Kappa value between the classified sentences generated from the CD-based classifier and manual classified sentences by human annotator is 0.86. This value indicates the high consistency between the CD-based classifier and human annotator and it is acceptable value.

Finally, it can conclude that the TD-based classifier yield the high accuracy but it is not suitable for classifying text chat data in interaction while the CD-based classifier is able to handle with text chat data but its performance is lower than the TD-based classifier because of incorrect classified of the Description classification. Thus, the hybrid of these two classifiers should be considered as the future work.

9.3 Relation to Cultural Dimensions

Table 9.4 represents our evidence-based findings and Hofstede model to represent that only theoretical consideration is not enough since the existing theory is not proposed to be directly used for analyzing communication style. The Hofstede model focuses on business and organization domains such as entrepreneurial behavior, training design, conflict resolution, and leadership style. However, we can found some points of Hofstede model that are related to our finding.

For the dimension of Power Distance (PDI), this dimension is not able to be used for communication style in writing form and online communication since the writer/collaborator did not know information about reader and other collaborators. Thus, they did not have concerns about seniority, hierarchy, or authority when writing and communicating with others online.

Next dimension is individualism. A society with a low score in this dimension has strong group cohesion and the priority of group goals is higher than individual goals. The harmony of the group has to be maintained and open conflicts are avoided. The three cultures in this work are considered as collectivism. Japan, scores 46 on this dimension, is not as collectivistic as most of Thailand and China (score 20 on this dimension). This dimension indicates the group as the primary element. They foster strong group cohesion and the priority of group goals is higher than individual goals. The harmony of the group has to be maintained and open conflicts are avoided. For Table 9.4, it shows that Chinese participants often used the Agreement classification to represent their cooperation and agreement while Thai participants used Acknowledgment classification to show their deference and modesty in the online communication.

Table 9.4: Summary of evidence-based results

	Chinese	**Japanese**	**Thai**
Writing style (Chapter 5)	• Using combination of the Contrast and Description classifications • Using the Declaration classification	• Using the Opinion classification • Using the Cause and Effect classification • Using the Sequence classification	• Using the Cause and Effect classification
Online communication style (Chapter 6, Chapter 8)	• Using the Declaration classification • Using less words per text chat • Using the Agreement classification	• **NOT** using the Description classification • Using less words per text chat	• Using the Interrogation classification • Using the Exclamation classification • Using the Acknowledgment classification
Hofstede dimension model	• Inequalities are accepted • Considering the group as the primary element • Tolerating deviant persons and ideas • Success oriented and driven	• Borderline hierarchical society • Considering the group as the primary element but it is not as collectivistic as China and Thailand • Low tolerance for dealing with uncertainty • Success oriented and driven	• Inequalities are accepted • Considering the group as the primary element • Moderately comfortable in dealing with uncertainty • Caring for others and quality of life, saving and giving face

Another dimension is uncertainty avoidance that expresses the degree to which the numbers of a society feel uncomfortable in unstructured situations. Japan is considered as one of the most uncertainty avoiding countries in the world (scores 92 on this dimension). People in Japanese culture follow strict rules, laws, regulations, policies, and procedures to avoid uncertain events and situations. Japanese take comfort in structure and system. This indicates that writing style are orderly processes, and procedures using the Sequence classification. Moreover, communication with strangers in the online communication is one kind of situations that face with novelty, unfamiliarity, anxiety, and uncertainty. Turner [95] explained that if anxiety is too high, they will not be motivated to communicate with others and then they will try to avoid them. Duronto et al. [96] showed that uncertainty of Japanese in initial encounter with foreign strangers was significant higher than with conational strangers. For the results, we found that Japanese used a small number of the Description class when communicating with Thai participants.

For masculinity dimension, Thailand represents a society that values feminine characteristics. People in this society are less assertive and competitive. Moreover, this society shows support for others. Collaborators often express feelings of sympathy and understanding. Thai participants often used agreement sentences and acknowledgement sentences to represent their cooperation, modesty, and deference. China and Japan score 66 and 95 on this feminine dimension and it can be considered a society that respects masculinity. This society is success oriented and driven that values competitiveness, assertiveness, ambition, and power. The masculinity society tends to talk more and at greater length than femininity [104]. However, our finding shows inconsistency since the results from Table 9.4 indicate that Chinese and Japanese participants used less words per text chat. Moreover, the masculinity society tends to direct, exert control, and preserve independence in the communication. Chinese writer and collaborator often used the Declaration classification in both writing style and communication style. They did not directly state their own opinion. This style of Chinese participants is inconsistent with this concept indicating the direct communication. Japanese writer is also inconsistent with the concept that the masculinity society tends to preserve independence in the communication. The result in Table 9.4 shows that Japanese writer often used the Sequence classification to sequentially connect their idea.

9.4 Limitations

Limitations of this study include the fact that participants in each experiment 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 [22] mentioned the participation of college students in all three cultures for psychological matching [105], indicating that the use of students in such studies limits variations in relevant demographic characteristics.

Another 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.

The other limitation in this research relates to Japanese cultural background of Chinese and Thai participants since both of them were studying at graduate school in Japan, which is culturally diverse in some ways, but is relatively homogeneous in terms of age and occupation. Moreover, they have left their countries of origin more than a year ago and have absorbed other cultural characteristics from colleagues, especially Japanese culture. This means they may not represent the larger population of Thais and Chinese.

Thus, these three limitations need to be taken into account when interpreting the results of this study.

9.5 Contribution to Knowledge Science

Knowledge science is composed of many academic disciplines to promote new innovation and knowledge comes from everywhere depending on situation. One main point of knowledge science is knowledge creation. Communication is the essential skill for obtaining or sharing knowledge. Knowledge is context-specific and it needs a shared context to be meaningful and communication is a crucial part of knowledge creation. Communication among people who have different background or culture may lead to create interesting or innovative knowledge since a way to create new knowledge is like collaboration with other people in many fields. We can systematize the availability and use of existing knowledge to increase value of knowledge. However, cultural differences have been said to generate conflicts between individuals in communication.

The importance of communication style differences that influenced by cultures has become more critical especially for intercultural communication. As we communicate using different cultural backgrounds, both conflict and harmony are possible occurred in any interaction. The approach presented in the thesis is able to explain how different groups of people make sense of their world. Becoming aware of different communication style among cultures can reduce conflict in the intercultural communication.

In order to have an effective communication across world, it is necessary to have knowledge of cultural variables that affect communication style to enhance intercultural communicative competence. Intercultural communicative competence is an ability to understand cultures to communicate with people from other cultures appropriately. This dissertation contributes intercultural communicative competence to help individuals to become familiar with people from other cultures. It also can reduce miscommunication, conflict, and failure in intercultural communication [106].

This thesis focuses on understanding of different communication styles that influenced by cultures in verbal communication both written text and text chat in intercultural context in order to improve intercultural communicative competence and avoid failures in intercultural communication.

Chapter 10

Conclusion and Future works

10.1 Conclusion

This dissertation aims to enhance intercultural communicative competence for communication in intercultural context by proposing the approach to understand differences in communication style based on intention of text. Providing analysis and comparison of communication style between cultures is a way to understand such differences and it can enhance intercultural communicative competence.

This research places emphasis on analyzing differences in communication style of Asian countries since there are a few works aiming to analyze communication style between countries from Asia in spite of there are clearly cultural differences among those countries. The research starts with providing a study to confirm that countries in Asia have own style of communication style toward intercultural context by analyzing text that they use in online communication. However, we found that only theoretical consideration may not enough to study the communication style differences. We have to develop empirical evidence-based experiment to conduct effective intercultural research.

Text analysis was selected as an approach to study communication style by capturing intention of text. We defined two illocutionary act categories for capturing intention of text consisting continuous text and text chat in online communication. To facilitate the process of analyzing text, we proposed the automated classification models to classify sentences according to two illocutionary act categories. Then, two classifiers were applied to analyze communication style in writing essay and online chatting that influenced by

cultural differences and find significant differences in each class of intention. Our finding shows the different style of communication among countries in Asia. Understanding of different communication styles in both written text and text chat in the intercultural context improves communicative competence and such communicative competence support for avoiding failures in intercultural communication.

10.2 Future Works

In this work, we focused on participants from three Asian countries including China, Japan, and Thailand. For the future direction, we plan to provide some discussion about the reusability of two classification model based on the proposed illocutionary categories to study the differences in the communication styles in intercultural context. Moreover, the hybrid of two classifiers will be considered even though two intention-based classifiers give acceptable results in this research. Since the TD-based classifier yield the high accuracy but it is not suitable for classifying text chat data in interaction while the CD-based classifier is able to handle with text chat data but its performance is lower than the TD-based classifier because of incorrect classified of the Description classification as described in the discussion chapter. Thus, the hybrid of these two classifiers will be considered as the future work.

In this research about essay writing styles, the intentions of speech acts are coded automatically and then counted in each essay. Then, we manually analyzed the hierarchical organization or rhetorical patterns. Thus, our future plan is to automatically generate the hierarchical organization to analyze rhetorical patterns relating to cultural differences. For example, the writing strategy called "Return to baseline theme" [88, 89], in which writers focus on introducing their opinion early before progressing to a different perspective. The style of thought pattern is point/dot/space orientation, as explained by O'Rourke and Tuleja [90]. This pattern of thinking is like stepping stones in a courtyard, where each point is autonomous and connected to another with gaps [91]. Our future work will focus on automatically constructing and detecting the essay that matched with this style in order to analyze differences in the writing style that influenced by different cultures.

The finding of the differences in the online communication style is the significant

number of text chats in the Interrogation classification in the context of different cultures. Chapanis [107] 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. We will determine how to use our findings to support the design of information systems.

Appendix

Attitudes toward knowledge sharing in the Intercultural and high-contextual cooperative learning

Cooperative learning is an effective educational approach that involves small groups of learners using a variety of learning activities for sharing their own knowledge to complete a task, solve a problem or accomplish a common goal [108]. However, a process to share knowledge in a cooperative learning among people from different countries and cultures may face communication problems such as negative feelings and lead to misunderstandings.

Even though Thai, Japan, and China belong to Asian countries, there are clearly cultural differences among these countries. Besides the different cultures, Thai, Japanese and Chinese share the similar style of high-context communication. A face-to-face communication between them may lead to misunderstandings because the high-context style is often indirect, ambiguous and sensitive to the context [109].

In order to solve these problems, it is necessary to look more closely at how participants, who have different cultures, feel during the knowledge sharing process in a cooperative learning. In this work, we conducted an experiment to investigate attitudes toward the knowledge sharing among Thai, Japanese, and Chinese participants and then examined the effect of cultural background and cultural dimensions proposed by Hofstede on learning outcome.

Cooperative learning: Jigsaw technique

Cooperative learning is a successful learning strategy in which small groups use various learning activities to enhance their understandings. The small groups consist of participants who have different levels of ability and different cultures. There are five elements for creating an effective cooperative group including positive interdependence, individual accountability, promotive interaction, social skills and group processing [110].

Jigsaw technique is developed by Elliot Aronson [109]. The Jigsaw is a cooperative learning strategy which supports learners to build their own understanding and then share acquired knowledge with the group. This technique allows learners to create their own knowledge by interactive communication and discussion in group. Moreover, the Jigsaw can encourage cooperation, active learning as well as promote all learners' knowledge contributions or knowledge sharing. However, it is not easy to share knowledge in cooperative learning among people who have different nationalities and cultures.

Experiment

In order to understand how cultural differences influence the interaction of participants, the Jigsaw technique can easily indicate participants' attitudes toward the knowledge sharing in the cooperative learning within intra-cultural group and inter-cultural group. Participants in the experiment consist of three Thais (T), three Japanese (J) and three Chinese (C). They are studying at graduate school. All of them have TOEIC score more than 600 and they can speak fluent or near-fluent English. Each participant is separated randomly into inter-cultural groups consisting of one Thai, one Japanese, and one Chinese participant. Four materials were provided as follows:

- **Pre-questionnaire** This questionnaire was created to measure a level of cultural background in other participants' countries including level of understanding and level of interest.

- **Learning topic** The negotiation style was selected to be the learning topic in the experiment because it required a deep level of cultural knowledge to understand [111]. There were three segments of the topic consisting of the negotiation style of

Thai, Japanese and Chinese. Each segment then was assigned to each intra-cultural group for discussing. Three learning segments were extracted from the negotiator's reference guide [112] and summarized into 500-550 words in each segment.

- **Quiz** - The quiz was created to test participants' understanding of acquired knowledge from the knowledge sharing process in the inter-cultural cooperative learning. This quiz contain three parts which each part is correspond to negotiation style in each country.

- **Post-questionnaire** - Participants completed post-questionnaire that asking about their interactions to the learning task and other participants in both intra-cultural group and inter-cultural group. The post-questionnaire consists of six task-related questions and five participant-related questions. For the task-related questions, there are 5-point scales adjusted from the NASA Task Load Index [113] to indicate levels of mental effort, physical effort, time pressure, difficulty, achievement, and discouragement. The 5-point scales participant-related questions examine about levels of participants' feelings including tension, annoyance, interest, understanding and involvement. This post-questionnaire also provide space for participants to share their comments or suggestions.

Figure 1: Inter-cultural group consisting of Thai, Japanese and Chinese participants

For procedure of the experiment, participants first filled out the pre-questionnaire to

measure a level of cultural background. Based on the Jigsaw technique, each participant was randomly assigned to Jigsaw group which can be called "Inter-cultural group" consisting of one Thai, one Japanese, and one Chinese participant as illustrated in Figure 1. The groups' structure is shown in Figure 2.

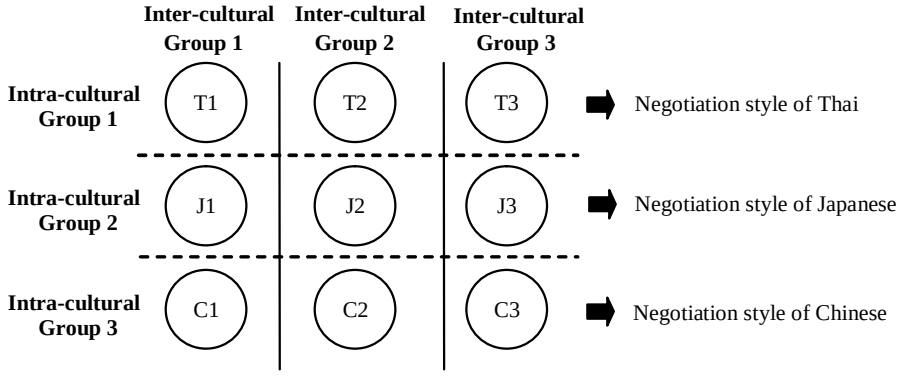

Figure 2: The groups' structure

Then, the temporary "expert groups" or "Intra-cultural groups" were formed by having three participants from the same country. A learning segment was assigned to each intra-cultural group. Each intra-cultural group then discussed in mother tongue for 30 minutes.

After that, participants in each intra-cultural group went back to their own inter-cultural groups. They then shared and discussed their own knowledge acquired from the intra-cultural discussion using English. At the end of task, each participant separately filled out the quiz and the post-questionnaire.

Result Analysis

In order to investigate attitudes toward the knowledge sharing process among Thai, Japanese, and Chinese participants, it was accomplished by using Wilcoxon T test to determine significance in differences between participants' attitudes in intra-cultural group and those in inter-cultural group. We considered on 11 factors which can be separated into six task-related factors and five participant-related factors.

The scores in Figure 3 are the mean scores of six task-related factors including mental effort, physical effort, time pressure, difficulty, achievement, and discouragement.

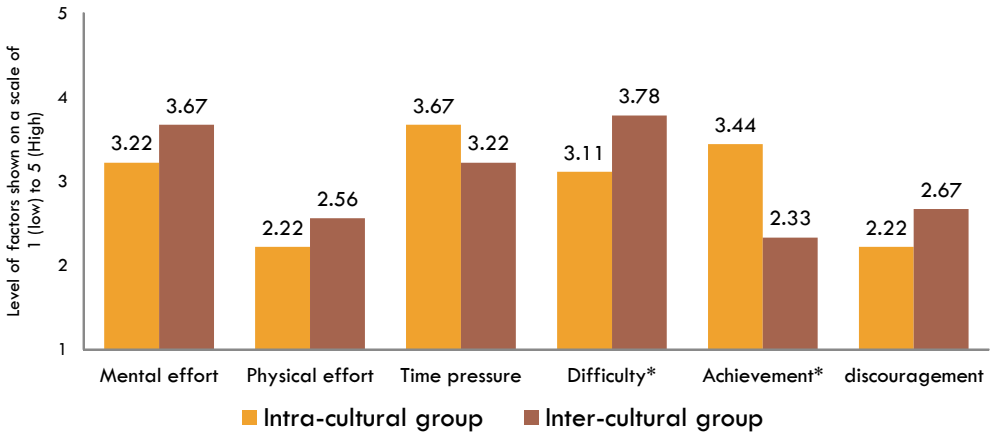

Figure 3: The mean scores of six task-related factors (* p <0.05)

Wilcoxon Signed Ranks Test reveals a significant difference in two factors which are difficulty and achievement (p <0.05). The results show that participants faced more difficulties when learning with partners from different cultures than when learning with partners from the same culture.

Since participants encountered with difficulties, it decreases achievement of communication with people from different cultures. Besides the different cultures, the similar style of communication which is a high-context style increases difficulty of communication. The high-context style lead to misunderstandings and the low achievement in knowledge sharing because this style often speak indirectly and ambiguously as well as information may be implicitly transferred.

Furthermore, the learning topic was a cause for increasing difficulty in the task. Since the learning topic in the experiment was negotiation style of each country, participants who are studying at graduate school have less experience and knowledge in this field and this topic requires a deep level of cultural knowledge to understand. Thus, the selected learning topic was one of causes that increases difficulty of learning task and lead to low achievement.

For the mean scores on participant-related factors as shown in Figure 4, we considered five feeling factors during the knowledge sharing consisting of levels of tension, annoyance, interest, understanding, and involvement. The results show that three factors including level of annoyance, level of interest, and level of understanding have significant difference (p <0.05).

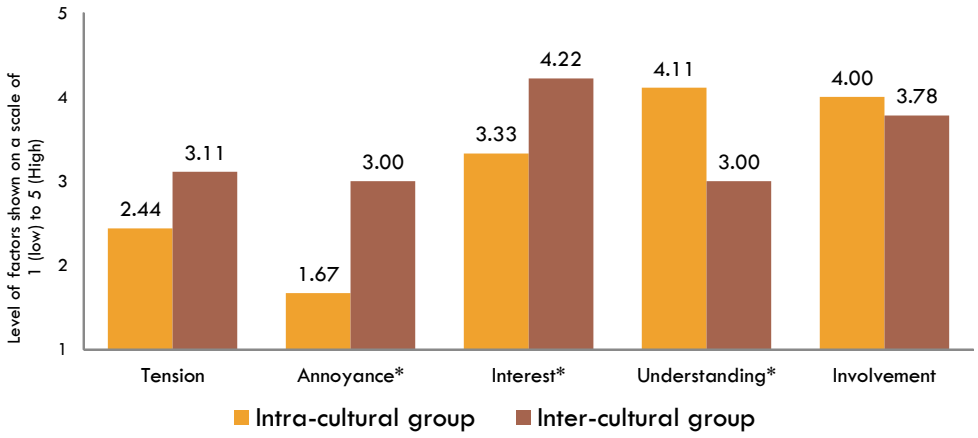

Figure 4: The mean scores of five participant-related factors (* p <0.05)

According to cultural dimensions theory [1], uncertainty avoidance (UAI) represents a level of acceptance for uncertainty and ambiguity within a society. From Hofstede's theory [1], it reports that Japan has the highest score of UAI among three countries which is 92 while Thai and China have 64 and 30, respectively. It means that they have unequal levels of tolerant for unpredictable events and then they felt annoyed when communicating with other countries. Thus, it can indicate that participants felt more annoyed when communicating with partners from different cultures whom we cannot predict their actions than communicating with partners from the same culture.

For the level of interest, knowledge sharing among people from different cultures is very helpful for building cultural intelligence and it can improve cultural competence. Paying attention to surroundings and guessing in communication among high-context style are more important than words because high-context style often showed or spoke indirectly and ambiguously as well as sometimes used non-verbal communication such as facial expression and eye contact. Moreover, the learning topic in the experiment was negotiation style of each country. It is an interesting topic for participants who were studying in graduate school to enhance their own experience and knowledge that can be used in worldwide organization in the future. Therefore, participants showed more interest in communicating with partners from different cultures than communicating with partners from the same culture.

According to the level of understanding, the results report that participants can understand partners from the same culture better than partners from different cultures. By the

comments from participants, they reported that linguistic problems lead to a low level of understanding. All of them were not native speaker of English. They sometimes confused about words or speeches from their partners since one word can represent many meanings. Moreover, participants sometimes misinterpreted because of partners' pronunciation of words.

Not only problems of the different languages can generate misunderstandings in the intercultural environment, but also the differences in ways to think and perspective can generate it. In the inter-cultural groups, participants might have different expectations in their interactions and different learning understandings from their partners [114]. Therefore, cultural differences can lead to misinterpretations of the communicated messages in the inter-cultural context and cause a low level of understanding.

For investigating the effect of cultural background and cultural dimensions on learning outcome, a pre-questionnaire and a quiz were provided to investigate cultural background of participants and to test learning outcome of inter-cultural knowledge sharing, respectively. Then, we analyzed the effect of cultural back-ground and cultural dimensions on outcome of knowledge sharing. Table 1 shows the average scores of quiz.

Table 1: Participants' average scores of quiz

Participant	**Thai participants**		**Japanese participants**		**Chinese participants**	
Part	Japanese	Chinese	Thai	Chinese	Japanese	Thai
Score (5)	4.67	2.67	3.67	2.00	4.00	4.00
Total (10)	7.34		5.67		8.00	

From the pre-questionnaire of Thai participants, it reveals that Thai participants had no cultural background of China while Thai had cultural background of Japan. Since Thai had more cultural background in Japan than in China, they can get a good score in the Japanese part of quiz. It can refer to cultural background can improve inter-cultural competence in cooperative learning. For the cultural dimensions, Thai is in the middle between Japan and China in case of UAI and have the lowest score in Masculinity (MAS) which is 34 while Japan and China score 95 and 66, respectively [1]. It can indicate that Thai participants can acquire knowledge from the unpredictable people in the middling level and can indicate that Thai is in a society with less assertiveness and competitiveness.

Thus, Thai participants can learn from their partners smoothly.

For Japanese participants, the pre-questionnaire shows that Japanese participants had no cultural background of Thai culture. Compared to Thai, Japanese had more cultural background of China. In this case, we cannot truly conclude that cultural background can improve inter-cultural learning abilities because average scores of Japanese participants in both Thai part and Chinese part were not related to level of cultural background in each country. However, according to the mean scores of quiz, both Thai and Japanese got the low score in Chinese part because some Chinese did not focus on the learning topic. From the comments of participants, they complained that some Chinese participants did not share knowledge about the learning topic but they shared about experiences in their life that not corresponding to the learning topic. It caused Thai and Japanese getting the low score in Chinese part. Thus, it can conclude in this case that cultural background can improve inter-cultural learning competence but it sometimes depended on partners' personality in the group. Furthermore, we can explain about why Japanese got the lowest score among three countries after we investigated the cultural dimensions of Japan. Even though Japan have the highest score in MAS (95) which means that Japanese will be driven by competition, achievement, and success, Japan also have the highest score in UAI (92). The cultural dimension of Hofstede in UAI mentioned that countries which have high score in UAI are less comfortable and have a low tolerance for events and unpredictable people. Moreover, Kelly [115] found that moods and emotions can affect team performance and it lead to low outcome. Since the Japanese participants have the highest score of UAI and the highest level of annoyance in inter-cultural group, these caused Japanese participants got the lowest quiz score among three countries.

Based on the pre-questionnaire of Chinese, it indicates that Chinese participants had cultural background of Japan while Chinese participants had no cultural background of Thai. In this case, we can conclude that both of cultural background and cultural differences affect outcome of inter-cultural learning because Chinese participants got the highest quiz score in Japanese part due to the cultural background. Besides the cultural background, Chinese participants had the lowest score of UAI which is equal to 30. It means that Chinese had a high tolerance for events and unpredictable people. At 66 scores of MAS, China is a masculine society which success oriented and driven. It can

indicate that Chinese participants worried very much about their quiz scores and ranking as this is the main criteria to achieve success or not. Thus, they tried to learn from their partners as much as they can and they then can acquire knowledge well from different cultural partners. It lead to Chinese participants had the highest total score in the quiz.

Finally, the following comments from Thai and Chinese participants can support that cultural background in other participants' countries can enhance understanding and lead to a high outcome of learning.

"If I did not know details of partners' culture, it was very hard for me to think about what we are talking."

"If we got some information about culture of each country before communicating, it can help us in learning with partners from different cultures."

Bibliography

[1] G. Hofstede, G. Hofstede, and M. Minkov, *Cultures and Organizations: Software of the Mind, Third Edition*. McGraw-Hill Education, 2010.

[2] E. T. Hall, *Beyond Culture*. Anchor books, Anchor Books, 1989.

[3] E. Hall, *The Hidden Dimension*. Anchor Books, 1992.

[4] E. Hall, *The silent language*. Doubleday, 1990.

[5] S. Tella, "Multi-, inter- and transdisciplinary affordances in foreign language education: From singularity to multiplicity," in *Multicultural Communities, Multilingual Practice: Monikulttuuriset yhteisöt, monikielinen käytäntö* (E. L. . R. d. C. J. Smeds, K. Sarmavuori, ed.), p. 6788, Turku: Annales Universitatis Turkuensis, 2005.

[6] T. van Dijk and W. Kintsch, *Strategies of discourse comprehension*. Monograph Series, Academic Press, 1983.

[7] J. Austin, *How to Do Things with Words*. Clarendon Press, 1962.

[8] J. Fong and S. Burton, "A cross-cultural comparison of electronic word-of-mouth and country-of-origin effects," *Journal of Business Research*, vol. 61, no. 3, pp. 233 – 242, 2008. Cross-Cultural Business Research.

[9] N. Hara, P. Shachaf, and K. F. Hew, "Cross-cultural analysis of the wikipedia community," *Journal of the American Society for Information Science and Technology*, vol. 61, no. 10, pp. 2097–2108, 2010.

[10] D. T. Nguyen and S. R. Fussell, "How did you feel during our conversation?: Retrospective analysis of intercultural and same-culture instant messaging conversations,"

in *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work*, CSCW '12, (New York, NY, USA), pp. 117–126, ACM, 2012.

[11] U. Pfeil, P. Zaphiris, and C. S. Ang, "Cultural differences in collaborative authoring of wikipedia," *Journal of Computer-Mediated Communication*, vol. 12, no. 1, pp. 88–113, 2006.

[12] L. D. Setlock and S. R. Fussell, "What's it worth to you?: The costs and affordances of cmc tools to asian and american users," in *Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work*, CSCW '10, (New York, NY, USA), pp. 341–350, ACM, 2010.

[13] K. Siau, J. Erickson, and F. Nah, "Effects of national culture on types of knowledge sharing in virtual communities," *Professional Communication, IEEE Transactions on*, vol. 53, pp. 278–292, Sept 2010.

[14] E. Hall and M. Hall, *Understanding Cultural Differences*. Consortium Book Sales & Dist, 1990.

[15] I. Leki, "Twenty-five years of contrastive rhetoric: Text analysis and writing pedagogies," *TESOL Quarterly*, vol. 25, no. 1, pp. pp. 123–143, 1991.

[16] J. THOMAS, "Cross-cultural pragmatic failure," *Applied Linguistics*, vol. 4, no. 2, pp. 91–112, 1983.

[17] D. T. Nguyen and S. R. Fussell, "Retrospective analysis of cross-culture communication," in *Proceedings of the 3rd International Conference on Intercultural Collaboration*, ICIC '10, (New York, NY, USA), pp. 211–214, ACM, 2010.

[18] D. T. Nguyen and S. R. Fussell, "Effect of message content on communication processes in intercultural and same-culture instant messaging conversations," in *Proceedings of the 2013 Conference on Computer Supported Cooperative Work*, CSCW '13, (New York, NY, USA), pp. 19–32, ACM, 2013.

[19] H.-C. Wang, S. F. Fussell, and L. D. Setlock, "Cultural difference and adaptation of communication styles in computer-mediated group brainstorming," in *Proceedings*

of the SIGCHI Conference on Human Factors in Computing Systems, CHI '09, (New York, NY, USA), pp. 669–678, ACM, 2009.

[20] C. Kluckhohn, "The study of culture," in *The policy sciences* (D. L. . H. Lasswell, ed.), pp. 86–101, Stanford University Press, 1951.

[21] A. L. Kroeber and T. Parsons, *The concept of culture and of social system.* American Sociological Review, 1958.

[22] G. Hofstede and G. Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations.* SAGE Publications, 2001.

[23] D. Williamson, "Forward from a critique of hofstedes model of national culture," *Human Relations*, vol. 55, no. 11, pp. 1373–1395, 2002.

[24] A. Marcus and E. W. Gould, "Crosscurrents: Cultural dimensions and global web user-interface design," *interactions*, vol. 7, pp. 32–46, July 2000.

[25] D. Kim, Y. Pan, and H. S. Park, "High-versus low-context culture: A comparison of chinese, korean, and american cultures," *Psychology and Marketing*, vol. 15, no. 6, pp. 507–521, 1998.

[26] E. Wrtz, "Intercultural communication on web sites: A cross-cultural analysis of web sites from high-context cultures and low-context cultures," *Journal of Computer-Mediated Communication*, vol. 11, no. 1, pp. 274–299, 2005.

[27] S. Nishimura, A. Nevgi, and S. Tell, "Communication Style and Cultural Features in High/Low Context Communication Cultures: A Case Study of Finland, Japan and India," in *Proceedings of a subject-didactic symposium in Helsinki on Feb. 2, 2008.*

[28] W. Gudykunst, S. Ting-Toomey, and E. Chua, *Culture and interpersonal communication.* Sage series in interpersonal communication, Sage Publications, 1988.

[29] L. D. Setlock, S. R. Fussell, and C. Neuwirth, "Taking it out of context: Collaborating within and across cultures in face-to-face settings and via instant messaging," in *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work*, CSCW '04, (New York, NY, USA), pp. 604–613, ACM, 2004.

[30] M. Phongpaibul and B. Boehm, "Improving quality through software process improvement in thailand: Initial analysis," *SIGSOFT Softw. Eng. Notes*, vol. 30, pp. 1–6, May 2005.

[31] S. Rotchanakitumnuai and M. Speece, "Barriers to internet banking adoption: a qualitative study among corporate customers in thailand," *International Journal of Bank Marketing*, vol. 21, no. 6/7, pp. 312–323, 2003.

[32] T. J. Knutson, R. Komolsevin, P. Chatiketu, and V. R. Smith, "A cross-cultural comparison of thai and us american rhetorical sensitivity: Implications for intercultural communication effectiveness," *International Journal of Intercultural Relations*, vol. 27, no. 1, pp. 63–78, 2003.

[33] E. G. Chua and W. B. Gudykunst, "Conflict resolution styles in low-and high-context cultures.," *Communication Research Reports*, vol. 4, no. 1, 1987.

[34] T. Winograd, "A language/action perspective on the design of cooperative work," in *Proceedings of the 1986 ACM Conference on Computer-supported Cooperative Work*, CSCW '86, (New York, NY, USA), pp. 203–220, ACM, 1986.

[35] F. Flores, M. Graves, B. Hartfield, and T. Winograd, "Computer systems and the design of organizational interaction," *ACM Trans. Inf. Syst.*, vol. 6, pp. 153–172, Apr. 1988.

[36] M. Schoop, "An introduction to the language-action perspective," *SIGGROUP Bull.*, vol. 22, pp. 3–8, Aug. 2001.

[37] J. Bowers and J. Churcher, "Local and global structuring of computer mediated communication: Developing linguistic perspectives on cscw in cosmos," in *Proceedings of the 1988 ACM Conference on Computer-supported Cooperative Work*, CSCW '88, (New York, NY, USA), pp. 125–139, ACM, 1988.

[38] F. Kensing and T. Winograd, *The language/action approach to the design of computer-support for cooperative work: A preliminary study in work mapping*, vol. 1364. Stanford University. Center for the Study of Language and Information, 1991.

[39] F. De Cindio, G. De Michelis, C. Simone, R. Vassallo, and A. M. Zanaboni, "Chaos as coordination technology," in *Proceedings of the 1986 ACM Conference on Computer-supported Cooperative Work*, CSCW '86, (New York, NY, USA), pp. 325–342, ACM, 1986.

[40] S. M. Kaplan, W. J. Tolone, D. P. Bogia, and C. Bignoli, "Flexible, active support for collaborative work with conversationbuilder," in *Proceedings of the 1992 ACM Conference on Computer-supported Cooperative Work*, CSCW '92, (New York, NY, USA), pp. 378–385, ACM, 1992.

[41] J. Whiteside and D. Wixon, "Contextualism as a world view for the reformation of meetings," in *Proceedings of the 1988 ACM Conference on Computer-supported Cooperative Work*, CSCW '88, (New York, NY, USA), pp. 369–376, ACM, 1988.

[42] J. Searle, *Speech Acts: An Essay in the Philosophy of Language*. Cam: [Verschiedene Aufl.], Cambridge University Press, 1969.

[43] J. Searle, *Expression and Meaning: Studies in the Theory of Speech Acts*. Cambridge University Press, 1979.

[44] T. Ballmer and W. Brennenstuhl, *Speech act classification: a study of the lexical analysis of English speech activity verbs*. Speech Act Classification, Springer-Verlag, 1981.

[45] J. Searle and D. Vanderveken, *Foundations of Illocutionary Logic*. Cambridge University Press, 1985.

[46] J. Searle, *Mind, Language And Society: Philosophy In The Real World*. Master-Minds Series, Basic Books, 1999.

[47] S. Gass and J. Neu, *Speech Acts Across Cultures: Challenges to Communication in a Second Language*. Studies on Language Acquisition [SOLA], De Gruyter, 2006.

[48] H. P. Grice, "Meaning," *The Philosophical Review*, vol. 66, no. 3, pp. 377–388.

[49] J. Habermas, *Communication and the evolution of society*. Beacon Paperback, Beacon Press, 1979.

[50] J. Searle, *Intentionality: An Essay in the Philosophy of Mind*. Cambridge paperback library, Cambridge University Press, 1983.

[51] J. R. Searle, "Meaning, communication, and representation," in *Philosophical Grounds of Rationality: Intentions, Categories, Ends* (R. E. Grandy and R. Warner, eds.), pp. 209–26, Oxford University Press, 1986.

[52] R. H. Finnegan *Language in Society*, vol. 5, no. 2, pp. pp. 234–240, 1976.

[53] D. Hymes, "Ways of speaking," in *Explorations in the ethnography of speaking* (R. B. . J. Sherzer, ed.), pp. 433–452, Cambridge University Press, 1974.

[54] E. Ochs and B. Schieffelin, *Developmental pragmatics*. Academic Press, 1979.

[55] W. W. Cohen, V. R. Carvalho, and T. M. Mitchell, "Learning to classify email into speech acts," in *In Proceedings of Empirical Methods in Natural Language Processing*, 2004.

[56] H. Kim, "The semantic and pragmatic analysis of south korean and australian english apologetic speech acts," *Journal of Pragmatics*, vol. 40, no. 2, pp. 257 – 278, 2008.

[57] S. Liu, "An experimental study of the classification and recognition of chinese speech acts," *Journal of Pragmatics*, vol. 43, no. 6, pp. 1801 – 1817, 2011. Postcolonial pragmatics.

[58] A. Qadir and E. Riloff, "Classifying sentences as speech acts in message board posts," in *Proceedings of the Conference on Empirical Methods in Natural Language Processing*, EMNLP '11, (Stroudsburg, PA, USA), pp. 748–758, Association for Computational Linguistics, 2011.

[59] V. R. Carvalho and W. W. Cohen, "On the collective classification of email speech acts," in *Proceedings of the 28th annual international ACM SIGIR conference on Research and development in information retrieval*, pp. 345–352, ACM, 2005.

[60] V. R. Carvalho and W. W. Cohen, "Improving email speech acts analysis via n-gram selection," in *Proceedings of the HLT-NAACL 2006 Workshop on Analyzing*

Conversations in Text and Speech, pp. 35–41, Association for Computational Linguistics, 2006.

[61] A. Leuski, "Context features in email archives," in *Proceedings of the 28th International SIGIR Conference on Research and Development in Information Retrieval, Workshop on Information Retrieval in Context (ACM SIGIR IRiX)*, pp. 54–56, Citeseer, 2005.

[62] J. Goldstein and R. E. Sabin, "Using speech acts to categorize email and identify email genres," in *System Sciences, 2006. HICSS'06. Proceedings of the 39th Annual Hawaii International Conference on*, vol. 3, pp. 50b–50b, IEEE, 2006.

[63] A. Lampert, R. Dale, C. Paris, *et al.*, "The nature of requests and commitments in email messages," in *Proceedings of the AAAI Workshop on Enhanced Messaging*, pp. 42–47, 2008.

[64] A. Lampert, R. Dale, and C. Paris, "Detecting emails containing requests for action," in *Human Language Technologies: The 2010 Annual Conference of the North American Chapter of the Association for Computational Linguistics*, pp. 984–992, Association for Computational Linguistics, 2010.

[65] R. G. D'Andrade and M. Wish, "Speech act theory in quantitative research on interpersonal behavior," *Discourse Processes*, vol. 8, no. 2, pp. 229–259, 1985.

[66] V. Rus, C. Moldovan, N. Niraula, and A. C. Graesser, "Automated discovery of speech act categories in educational games.," *International Educational Data Mining Society*, 2012.

[67] A. Olney, M. Louwerse, E. Matthews, J. Marineau, H. Hite-Mitchell, and A. Graesser, "Utterance classification in autotutor," in *Proceedings of the HLT-NAACL 03 Workshop on Building Educational Applications Using Natural Language Processing - Volume 2*, HLT-NAACL-EDUC '03, (Stroudsburg, PA, USA), pp. 1–8, Association for Computational Linguistics, 2003.

[68] J. Alexanderssony, B. Buschbeck-Wolfz, T. Fujinamiz, E. Maiery, N. Reithingery, B. Schmitzx, and M. Siegelyy, "Dialogue acts in verbmobil-2," 1997.

[69] T. Winograd and F. Flores, *Understanding Computers and Cognition: A New Foundation for Design*. Language and being, Ablex Publishing Corporation, 1986.

[70] J. Taylor, *Rethinking the theory of organizational communication: how to read an organization*. The Communication and information science series, Ablex Pub. Corp., 1993.

[71] V. v. Reijswoud, "The structure of business communication: theory, model and application," Delft, 21996.

[72] J. Dietz and G. Widdershoven, "Speech acts or communicative action ?," in *Proceedings of the Second European Conference on Computer-Supported Cooperative Work ECSCW 91*, pp. 235–248, Springer Netherlands, 1991.

[73] E. Auramäki, E. Lehtinen, and K. Lyytinen, "A speech-act-based office modeling approach," *ACM Trans. Inf. Syst.*, vol. 6, pp. 126–152, Apr. 1988.

[74] C. T. Carr, D. B. Schrok, and P. Dauterman, "Speech acts within facebook status messages," *Journal of Language and Social Psychology*, 2012.

[75] M. Alavi and D. E. Leidner, "Knowledge management systems: Issues, challenges, and benefits," *Commun. AIS*, vol. 1, Feb. 1999.

[76] P. C. Thomas J. Knutson, Rosechongpom Komolsevin and V. R. Smith, "A comparison of thai and us american willingness to communicate," *Journal of Intercultural Communication Research*, vol. 31, pp. 3 – 12, 2002.

[77] "wordpress.org." `http://wordpress.org/`.

[78] S. Ishikawa, "The ICNALE and sophisticated contrastive interlanguage analysis of Asian learners of English," in *S. Ishikawa (Ed.), Learner corpus studies in Asia and the world*, vol. 1, pp. 91–118, 2013.

[79] G. Rossum, "Python reference manual," tech. rep., Amsterdam, The Netherlands, The Netherlands, 1995.

[80] C.-C. Chang and C.-J. Lin, "Libsvm: A library for support vector machines," *ACM Trans. Intell. Syst. Technol.*, vol. 2, pp. 27:1–27:27, May 2011.

[81] E. Fry, J. Kress, and D. Fountoukidis, *The reading teacher's book of lists*. J-B Ed Series, Prentice Hall, 2000.

[82] M. Guirdham, *Communicating Across Cultures at Work*. Palgrave Macmillan, 2005.

[83] G. Yule, *Pragmatics*. Oxford Introduction to Language Study ELT, OUP Oxford, 1996.

[84] A. Crismore, R. Markkanen, and M. S. Steffensen, "Metadiscourse in persuasive writing: A study of texts written by american and finnish university students," *Written Communication*, vol. 10, pp. 39–71, 1993.

[85] R. B. Kaplan, "Cultural thought patterns in inter-cultural education," *Language Learning*, vol. 16, no. 1-2, pp. 1–20, 1966.

[86] M. A. K. Halliday, *An introduction to functional grammar*. London E. Arnold, 2nd ed ed., 1994.

[87] J. Yuxin and C. Cheng, "Indirectness in chinese english writing," *Asian Englishes*, vol. 5, no. 1, pp. 64–74, 2002.

[88] J. Hinds, "Japanese expository prose," *Papers in Linguistics: International Journal of Human Communication*, vol. 13, no. 1, pp. 117–158, 1980.

[89] R. Donahue, *Japanese Culture and Communication: Critical Cultural Analysis*. G - Reference, Information and Interdisciplinary Subjects Series, University Press of America, 1998.

[90] J. O'Rourke and E. Tuleja, *Module 4: Intercultural Communication for Business*. Managerial communication series, Cengage Learning, 2008.

[91] L. Damen, *Culture Learning: The Fifth Dimension in the Language Classroom*. L2 Professional Library, Addison-Wesley Publishing Company, 1987.

[92] T. Winograd, "Designing a new foundation for design," *Commun. ACM*, vol. 49, pp. 71–74, May 2006.

[93] P. Cozby, *Methods in Behavioral Research*. McGraw-Hill, 2008.

[94] S. Komin, *Psychology of the Thai people: values and behavioral patterns*. Research Center, National Institute of Development Administration, 1990.

[95] J. Turner, *A Theory of Social Interaction*. Stanford University Press, 1988.

[96] P. M. Duronto, T. Nishida, and S. ichi Nakayama, "Uncertainty, anxiety, and avoidance in communication with strangers," *International Journal of Intercultural Relations*, vol. 29, no. 5, pp. 549 – 560, 2005.

[97] H. Deresky and E. Christopher, *International Management: Managing Cultural Diversity*. Pearson Australia, 2011.

[98] E. N. Forsythand and C. H. Martell, "Lexical and discourse analysis of online chat dialog," in *Proceedings of the International Conference on Semantic Computing*, ICSC '07, (Washington, DC, USA), pp. 19–26, IEEE Computer Society, 2007.

[99] T. A. F. L. A. S. T. Wu, F. M. Khan and W. M. Pottenger, "Posting act tagging using transformation-based learning," in *Proceedings of the Workshop on Foundations of Data Mining and Discovery*, IEEE International Conference on Data Mining, December 2002.

[100] A. Stolcke, N. Coccaro, R. Bates, P. Taylor, C. Van Ess-Dykema, K. Ries, E. Shriberg, D. Jurafsky, R. Martin, and M. Meteer, "Dialogue act modeling for automatic tagging and recognition of conversational speech," *Comput. Linguist.*, vol. 26, pp. 339–373, Sept. 2000.

[101] A. M. Serban and J. Luan, "Overview of knowledge management," *New Directions for Institutional Research*, vol. 2002, no. 113, pp. 5–16, 2002.

[102] W. C. Mann and S. A. Thompson, "Rhetorical structure theory: Toward a functional theory of text organization," *Text*, vol. 8, no. 3, pp. 243–281, 1988.

[103] D. ATKINSON and V. RAMANATHAN, "Cultures of writing: An ethnographic comparison of l1 and l2 university writing/language programs," *TESOL Quarterly*, vol. 29, no. 3, pp. 539–568, 1995.

[104] J. Wood, *Gendered lives*. Nelson Education, 2012.

[105] R. S. Merkin, "Cross-cultural communication patterns - korean and american communication," *Journal of Intercultural Communication*, May 2009.

[106] K. Pilhofer, *Cultural Knowledge: An Ethical Deconstruction of the Concept as a Foundation for Respect for Cultural Differences from a Post-Colonial and Levinasian Perspective*. diplom. de, 2010.

[107] A. Chapanis, "Computer-supported cooperative work: A book of readings," ch. Interactive Human Communication (Reprint), pp. 127–140, San Francisco, CA, USA: Morgan Kaufmann Publishers Inc., 1988.

[108] R. Slavin, *Cooperative learning: theory, research, and practice*. Prentice Hall, 1990.

[109] E. Aronson and S. Patnoe, *The Jigsaw Classroom: Building Cooperation in the Classroom*. Longman, 1997.

[110] D. Johnson, R. Johnson, and E. Holubec, *Circles of Learning: Cooperation in the Classroom*. Interaction Book Company, 1993.

[111] T. Yuizono, W. Li, and J. Munemori, "Promoting cultural learning: effects of cultural knowledge on text chats between japanese and chinese participants," in *Knowledge-Based and Intelligent Information and Engineering Systems*, pp. 167–176, Springer, 2011.

[112] L. Katz, *Negotiating International Business: The Negotiator's Reference Guide to 50 Countries Around the World*. Booksurge, 2006.

[113] S. G. Hart and L. E. Staveland, "Development of nasa-tlx (task load index): Results of empirical and theoretical research," in *Human Mental Workload* (P. A. Hancock and N. Meshkati, eds.), vol. 52 of *Advances in Psychology*, pp. 139 – 183, North-Holland, 1988.

[114] J. Lu, K. L. Chin, J. Yao, J. Xu, and J. Xiao, "Cross-cultural education: Learning methodology and behaviour analysis for asian students in it field of australian universities," in *Proceedings of the Twelfth Australasian Conference on Computing Education - Volume 103*, ACE '10, (Darlinghurst, Australia, Australia), pp. 117–126, Australian Computer Society, Inc., 2010.

[115] J. R. Kelly and S. G. Barsade, "Mood and emotions in small groups and work teams," *Organizational Behavior and Human Decision Processes*, vol. 86, no. 1, pp. 99 – 130, 2001.

Publications

International journal

[1] Pimnapa Atsawintarangkun, and Takaya Yuizono,"Investigating Communication Styles in Text-based CMC Using a Classification of Intention: A Comparison of Same-Culture and Different-Cultures Context",Journal of Intercultural Communication, to be published in issue 42 (November 2016).

International conferences

[2] Pimnapa Atsawintarangkun and Takaya Yuizono, "How Different Cultures Affect Online Communication on Knowledge Sharing Between the Thais and Chinese", in Proceedings of 16th International Conference on Human-Computer Interaction (HCI International 2014), Crete, Greece, 22 - 27 June 2014, pp.523-533.

[3] Pimnapa Atsawintarangkun and Takaya Yuizono, "Learners' attitudes toward knowledge sharing in the inter-cultural and high-contextual cooperative learning", in Proceedings of the eighth International Conference on Knowledge, Information and Creativity Support Systems (KICSS 2013), Krakow, Poland, 7-9 November 2013, pp.38-45.