Verbal Cues of Involvement in Dyadic Same-culture and Cross-culture Instant Messaging Conversations

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ABSTRACT
This paper explores how people in same-culture and cross-culture pairs use verbal cues to express involvement in dyadic text-based Instant Messaging (IM) conversations. We report an experimental study with same-culture and cross-culture pairs of American and Chinese participants, in which we manipulated the participants' level of involvement in IM conversations using a distraction task (an online game). We found that American and Chinese participants used verbal involvement cues, such as cognitive words and definite articles, differently to express involvement. Our results provide suggestions for improving international, multicultural team collaboration using computer-mediated communication (CMC) tools.

Author Keywords
Involvement; CMC; conversation; communication processes; verbal cues; intercultural collaboration

ACM Classification Keywords
H5.3 Group and Organization Interfaces: Computer-supported cooperative work

General Terms
Experimentation; Human Factors

INTRODUCTION

Conversational involvement is defined as the extent to which participants are immersed and engaged with their partners and with the ongoing dialog [7], and can be perceived from both the non-verbal and verbal cues an interactant exhibits. An uninvolved interactant may be viewed negatively by his or her conversational partners. Many people find conversations with uninvolved partners less satisfying than those with highly involved partners [3], as suggested in the phrase "it's like I'm talking to myself". For two people working together on a team, involvement in conversations is thus especially important, as the level of involvement of a team member in work-related discussion influences the teammate's impressions of him or her, their interpersonal relationships, and their willingness to collaborate [3, 16].

With the rising popularity and various benefits of global collaboration today, multinational work teams, consisting of members from different cultures and speaking different languages collaborate via computer-mediated communication (CMC) channels more and more, due to the low cost and high efficiency in coordinating meetings [11]. While in face-to-face interaction non-verbal behaviors, such as direct eye contact, animated facial expressions, or forward lean, are important for the expression and interpretation of involvement [17, 22], in most text-based CMC, such audio and video cues are not supported. Without these non-verbal cues, however, several studies found that participants can still express emotions, status, and even involvement [26, 19]. Nguyen & Fussell [19] found that in text-based IM conversations, subtle verbal cues such as the high frequency of assent words and low frequency of singular first-person pronouns (e.g., "I", "me") are significant indications of involvement. For example, in an experimental study, conversationalists who used many assent words and few "I" pronouns reported being more involved in the IM conversation [19]. They were also rated as being more involved than those who used few assent words and many "I" pronouns by third-person observers, who watched a screen recording of the conversation.

However, most studies of conversational involvement have not considered cultural differences in communication styles that may influence the use of involvement cues [21, 5]. For example, the use of "I" vs. "we" pronouns has been shown to differ across cultures [31]. In addition, verbal cues such as the word "yeah" can be interpreted differently by members of different cultures [33]. Given such culture differences in communication styles, the results about the verbal indicators of involvement from previous studies with mostly North American participants may not apply to participants from other cultures such as China or Japan. Moreover, very few studies examined how verbal involvement cues are used in intercultural pairs in which a North American participant converses with an East Asian participant. This study aims to bridge this important literature gap.

We begin with an overview of the concept of interaction involvement, verbal cues of involvement, and cultural

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differences in the usage of these verbal cues. We then outline our research questions and hypotheses and present an empirical study examining the expression of involvement in IM conversations between two same-culture or cross-culture American and Chinese partners collaborating on a decision making task. As we will show, American and Chinese participants used certain verbal cues of involvement differently when talking to a partner from the same versus a different culture. The results of our study contribute to the development of CMC theories and carry implications for the design of communication tools to support remote intercultural collaboration.

BACKGROUND

Scholars have taken various perspectives on involvement in social interactions, defining involvement as a cognitive dimension of an inherent trait [7], or as a communication process measured by behavioral indicators (e.g. nonverbal behaviors, facial expressions, tone of voice) [23]. Despite differences between these approaches, most scholars conclude that interaction involvement consists of both an individual component (e.g., one's own ability to focus) and a changing, adaptive component under the influence of the partners, the media, the conversational task, and the social context surrounding the conversation [5, 6]. Moreover, the dedication of cognitive attention is an important component of interaction involvement [7]. In today's workplace where many people use IM to discuss serious work-related issues, multitasking during an IM conversation is common [11]. Such multitasking may steer the interactant's cognitive attention away from the partner and the ongoing IM conversation, reducing the interactant's involvement. Based on this, we manipulated the participants' level of involvement in our experiment using a distraction task, mimicking actual multitasking situations common in today's workplace.

Expression and interpretation of involvement cues in IM

Besides non-verbal cues of involvement, studies of face-to-face interaction have looked at the relationship between certain verbal cues such as the use of pronouns and interaction involvement [17]. Camden & Verba [4] found that the level of involvement of a speaker in an ongoing face-to-face conversation could be inferred from three linguistic features of the speaker's speech: (a) the number of intensifiers (related to certainty words) vs. qualifiers (related to hedge words); (b) the number of personal ("I", "we") vs. impersonal ("you", "they") pronouns; and (c) the number of definite vs. indefinite articles. Another study suggested that highly involved dyads used fewer personal pronouns ("I", "me"), and more relational pronouns ("we", "us", etc.), than less involved dyads [4]. Moreover, the use of definite articles (e.g., "the", "this", or "that") increases as a speaker becomes more cognitively involved with the topic of the (face-to-face) conversation [4]. In text-based IM conversations, Nguyen & Fussell [19] found that participants said fewer "I" pronouns, more assent words, more cognitive words, and more definite articles when they were highly involved than when they were less involved due to multitasking.

The above studies explained their results based on previous research about the use of "I" pronouns, assent words, cognitive words, and definite articles. First, reference to oneself through the use of many "I" pronouns indicates an inward orientation to one's own thoughts and feeling, rather than an outward attention to, and connection with, the partner [24]. Therefore, high number of personal pronouns indicates a lack of focus towards the conversation. On the other hand, agreements in decision-making discussion express participants' acceptance of each others' utterances as correct or true. Agreements thus can reflect a speaker's attention to, and active processing of, a partner's messages [12, 29]. Words expressing agreements (e.g., "yes", "true", "right") were thus suggested to be an indicator of attention, and in turn, involvement in a conversation [29]. In the decision-making discussions in Nguyen & Fussell's study [19], thoughtful contributions to the dialog indicate active cognitive focus on the content of the conversation, and therefore, high involvement. Such thoughtful contributions often contain words expressing thinking, assumption, or speculation such as "think", "suppose", "guess", "presume" that are used to form arguments in the decision-making process [27]. Lastly, definite articles are used to refer to thoughts, objects, images, or people that the conversation partners can identify [1], based on common ground or mutual knowledge [8]. Therefore the use of definite articles also indicates attention to the partner, and thus involvement in the dialog.

In summary, previous studies found that the number of "I" pronouns, assent words, cognitive words and definite articles a participant said are good verbal indicators of that participant's involvement in conversations. However, these previous studies did not consider cultural differences in the way people use various verbal cues such as pronouns, which other studies have found both in face to face and in IM conversations [e.g. 31, 32]. The expression of involvement also depends on cultural norms and styles [5]. We turn to the literature about cultural differences in the use of the above verbal cues of involvement next.

Cultural differences in the use of verbal involvement cues

Culture differences in communication styles have been widely studied. People from Western cultures are often said to be more individualistic, and thus emphasize the independence of individuals, whereas people from Eastern cultures such as China or Japan are often described as collectivistic, emphasizing the interconnectedness of individuals in the context of social behavior and interactions [13]. Moreover, people from Western cultures such as North America tend to adopt a direct, low-context style of communication, stating their opinions and thoughts explicitly and verbally, with little reliance on non-verbal

cues such as facial expression [10, 9]. On the other hand, people from Eastern cultures such as China or Japan tend to adopt an indirect, high-context style, deriving meanings not only from the explicit, verbal content, but also from the communication context such as the relationship between speakers, and relying on the non-verbal cues such as facial expression or body language for the expression and interpretation of meaning [10, 9].

In CMC environments, studies have found evidence of cultural differences in the verbal communication styles and strategies of participants from Western cultures and those from Eastern cultures. Setlock, Fussell, & Newirth [30] examined various features of language use in audio and video conferencing of American-American (AA) pairs, American-Chinese (AC) pairs, and Chinese-Chinese (CC) pairs doing a decision making task together. They found that CC pairs used more "we" pronouns than other pairs. Stewart, Setlock, & Fussell [30] examined the argumentation styles of AA, AC, and CC pairs in text-based IM conversations and found that Chinese participants tended to use more reasoning activities (providing reasons for their claims) in their conversations than American participants.

These studies however did not consider different levels, or states of involvement that participants had during their conversations. The use of verbal cues to convey involvement in interactions might be different for speakers from different cultures [5, 21]. Regarding the use of pronouns, previous studies suggested that "I" pronouns are used more frequently by members of individualistic, Western cultures such as those from North America as these cultures promote individual identity, while the inclusive "we" pronouns are used more by members of collectivistic, Eastern culture such as those from China who tend to view themselves as members of a collective [30, 31]. Consequently, we expect that American participants will rely on "I" pronouns to express involvement in conversation more than Chinese participants.

H1: American participants will use "I" pronouns to express different levels of involvement in text-based IM conversations more than Chinese participants.

In terms of assent words, Stewart et al. [32] found that in IM conversations, American participants tended to use more convergent markers (to express agreement) than Chinese participants. We hypothesize that:

H2: American participants will use assent words to express different levels of involvement in text-based IM conversations more than Chinese participants.

Setlock, Fussell, & Quinones [31] found that same-culture American pairs used more words related to thinking and reasoning such as "expect" and "assume" than same-culture Chinese pairs or cross-culture pairs in IM conversations. We hypothesize that:

H3: American participants will use cognitive words to express different levels of involvement in text-based IM conversations more than Chinese participants.

Lastly, few studies have compared the use of definite articles between American participants and Chinese participants in conversations, much less in text-based IM conversations. Therefore, we ask:

RQ1: How do American participants and Chinese participants differ in the way they use definite articles to express involvement in a text-based IM conversation?

METHOD

To test our hypotheses and research question, we conducted an experiment in which same-culture and cross-culture pairs of American and Chinese participants discussed a business idea using only text chat. During their 20-minute discussion, we manipulated each participant's level of involvement using a distraction task such that there were five minutes during which both participants were highly involved, five minutes during which one participant was highly involved and the other was distracted, five minutes during which the other participant was highly involved and the first distracted, and five minutes during which both were distracted. After each five-minute period, participants answered questionnaires measuring their level of involvement, other communication process outcomes such as emotions or understanding, and other variables.

Participants

Participants consisted of 60 students (41 undergraduate students, 47 females) studying at a large American university. There were 30 North American participants born in the United States (29) or Canada (one) and speak English as their native language. Of the North American participants, 28 were Caucasian and two were Asian. There are 30 Chinese participants born in China (25), Taiwan (three), or Hong Kong (two), and speak Mandarin as their native language. Participants were recruited for course credit or $10 compensation. Each participant was paired randomly with a partner from the same culture or from a different culture, resulting in three combinations: 10 Chinese-Chinese (CC) pairs, 10 American-American (AA) pairs, and 10 American-Chinese (AC) pairs. Participants in a pair did not know each other prior to the experiment.

Materials

Task. Pairs of participants discussed a business proposal for 20 minutes. The proposal is for a new on-campus outlet of a popular ice-cream brand. All of the participants in this study knew the ice-cream brand and the typical set-up of an outlet of this brand. In our scenario, the owner of the ice-cream brand, in response to higher demand from the student population, wanted to open a new shop on the university campus. Eight on-campus locations were under consideration. The participants needed to discuss with their partners to choose one of these eight locations for the new

outlet. Each pair needed to consider the locations carefully, listing at least five pros and five cons for every location, keeping in mind aspects such as: the personas of the customers who most frequent that location, costs of opening an outlet at that location, benefits and drawbacks to the student community, etc. To keep the participants engaged in the discussion for the whole 20 minutes, the experimenter recommended that they discuss the pros and cons of two locations every 5 minutes in the order these locations were listed, and then choose the best location to recommend to the owner of the ice-cream brand. To keep them engaged in the discussion, pairs were told they would have to write a final report together after their 20-minute discussion listing the pros and cons of each location and indicating their choice. However, we did not make them write the report.

Distraction task. To manipulate the level of involvement of participants during their conversation, we used a distraction task in the form of an online computer game. At some points during the 20-minute discussion, each participant in a pair had to play this game while he or she was chatting, paying equal attention to the game and to the conversation. The game was thus introduced to distract the participants from the conversation, resulting in lower level of involvement than that in the full involvement condition, where participants only focused on chatting.

The game was a memory puzzle, in which players had to uncover 18 matching pairs of common food items. A maximum of two food items can be uncovered at a time. If the two items do not match, they will be covered again. The player had to uncover two identical items at the same time, and had to successfully uncover all 18 pairs of food item within the time limit. The game is available online at http://www.agame.com/game/tasty-food-memory.html.
When participants were in the distracted condition, they had to play the game continuously for five minutes. If a game ended before 5 minutes were up, the experimenter asked the participant to restart and play the game again.

Communication processes survey. Every five minutes during the discussion, each participant was asked to pause everything he or she was doing and fill out a short online survey. Since the discussion task was 20 minutes in total, each participant completed four such surveys in each experiment.

The survey contains six 7-point Likert scale questions about the participants' self-reported level of involvement in the conversation. We asked two questions about how involved participants were, and how involved they think their partners were, in the last 5 minutes (1=not involved at all, 7=very involved). The next four questions were adapted from Cegala's [7] Interaction Involvement Scale to measure the participants' level of involvement during the last 5-minute portion of the conversation. These four questions were chosen based on the result of a pilot test (see Table 1).

Post task survey. After the 20-minute discussion was over, participant completed an online post-task survey that collected demographic information.

Equipment

Both participants used identical Mac Book Pro laptops, running Mac OS X Lion, with pre-installed "Messages" software, an IM client that can be configured for Google Talk chat servers. Participants chatted with their partners using the "Messages" program without any audio or video, and played the computer game on Safari web browser. A computer program written in Apple Script was used to control the flow of the experiment. It would pop-up messages asking the participants to pause the discussion and the game, bring the communication process survey to the front, and prompt the participants to fill out this survey every 5 minutes during the 20-minute discussion. At the end of the discussion, the computer program would prompt participants to fill out the post-task questionnaire.

Procedure

Two participants were invited to the lab, and asked to sit down at two workstations, separated by a large divider. The experimenter then introduced the study, and briefed participants on how to use the chat program, how to play the game, and explained the discussion task. The participants were then asked to read more detailed instructions on the computer. Both participants practiced the game until they understood it before starting discussion.

At the beginning of the discussion, and every five minute during the 20 minutes discussion, the experimenter would randomly ask each of the participant in the pair to either play (low involvement, or L condition), or not to play (high involvement, or H condition) the computer game while they were chatting, with equal attention to the game and the discussion. To give the participants an incentive to pay attention to both the game and the discussion equally, the experimenter told the participants that apart from the $8 basic compensation they would get for the experiment, they had a chance to earn a maximum of $2 bonus based on their game scores and the quality of their discussion. The experimenter randomized the order of the L and the H conditions; so that for four segments (each segment lasting 5 minutes) of the 20-minute discussion, there would be one segment in which both participants in a pair were in the L condition (playing the game while chatting), one segment in which both of them were in the H condition (not playing the game), and two segments in which one of them were in the L condition, and the other in the H condition.

After every 5-minute segment during the 20-minute discussion, both participants stopped all their activities to answer the communication process survey and to receive instructions from the experimenter (about whether to play the game) for the next 5-minute segment. In all these four segments, the participants discussed the pros and cons of eight locations to open a new outlet of an ice cream brand,

and chose the best location. The experimenter suggested that they discussed two locations during each segment, but the participants could opt to lead their discussion their own way, as long as they finished the task given. All pairs conversed until they were out of time. After four segments, participants were asked to fill out the post-task survey. We then carefully debriefed the participants. We asked them about the workload during the whole experiment. While participants commented that playing the game while talking was hard and distracting, they did not think that such experimental tasks were too difficult. Finally, all participants were thanked, and given $10 for their participation, regardless of their performance on the final report or on the game.

Measures

We collected two types of measurements from the experiments. First, from the communication process survey participants filled out every 5 minutes, we collected measurements about their self-reported involvement in the conversation. Second, from the logs of IM chat sessions, we counted the number of different linguistic cues such as "I" pronouns that each participant used during their conversations, using TAWC, an adaptation of Pennebaker & Francis's LIWC [25], developed by Kramer et al. [14]. These two sets of measurements will be used as dependent variables in later statistical analyses.

Involvement during the conversation

We used 4 items from Cegala's Interaction Involvement Scale (IIS) [7] with some adaptation to suit the context of the study (see Table 1). These four items formed a reliable scale (Cronbach's α = .78) so scores were averaged to compute the level of involvement.

Items	1=Very rarely, almost never 7=Very frequently, almost always
1	During the previous 5 minutes of the conversation, I carefully observed how my partner responded to me.
2	During the previous 5 minutes of the conversation, I was sensitive to my partner's hidden or subtle meanings.
3	During the previous 5 minutes of the conversation, I pretended to be listening to my partner while in fact I was thinking about something else.
4	During the previous 5 minutes of the conversation, I was preoccupied and did not pay complete attention to my partner.

Table 1. Four items adapted from Cegala's involvement scale.

We also asked participants to answer a single question about how involved or committed they were (self's involvement), and their partners were (partners' involvement) in the conversation (1=not at all involved, 7=very much involved). The ratings were negatively skewed. For these measures, log and other conventional transformations did not improve the normality of the data. Instead we used a histogram of the level of involvement to recode the data into three categories (1 to 4 =1, 4 to 6=2, and 7=3), roughly corresponding to low involvement, average involvement, and high involvement.

Verbal cues to involvement

Based on the results of Nguyen & Fussell [19] regarding the verbal cues of involvement in text-based IM conversations, we are only interested in the use of personal pronouns, assent words, definite articles, and cognitive words in this study. We counted the number of these verbal cues to involvement in the transcript of the participants' IM chat session. The word counts were computed using TAWC [14]. The raw word counts were negatively skewed, and thus the logs of the raw count were used in statistical analyses.

Personal pronouns. Personal pronouns are those that refer to the individual self, such as "I", "me", or "mine". We generated a list of personal pronouns based on the dictionary created by Pennebaker & Francis [25], and also taking into account the corpus from our data, to include possible misspelled words or abbreviations with the same meaning that participants typed in their conversation.

Assent words. We counted the number of words expressing consent to an idea stated before it based on the dictionary by Pennebaker & Francis [25].

Definite articles. The list of definite articles such as "the", "this", "that" was generated based on the dictionary created by Pennebaker & Francis [25].

Cognitive mechanism words. We also counted the number of words expressing thinking, reasoning, contemplating, speculation, or reflection based on the dictionary by Pennebaker & Francis [25].

RESULTS

We report the results in two parts: 1) a manipulation check to make sure the distraction task lower participants' level of involvement in the conversation 2) the use of verbal involvement cues in IM conversations between pairs of cross-culture, and same-culture American and Chinese partners in two involvement conditions. The first part includes analyses of participants' level of involvement on a 7-point Likert scale, measured every 5 minutes of their conversation in two conditions: high involvement (without distraction task) and low involvement (with distraction task). The second part includes analyses on the word counts of different categories for each participant in pairs of different culture combinations, in the two involvement conditions.

Manipulation Check

To make sure that the distraction task successfully lowered the participants' level of involvement, we conducted a

mixed model ANOVA on self-reported involvement as measured by 4 items adapted from Cegala's IIS [7] (R^2=.79). The fixed factors are the speaker condition and partner condition (both either low involvement with distraction task or high involvement without distraction). The random factors are the pairs, participants, and time order. Since we collected ratings at 4 different points of time, this time variable has value 1 to 4, 1 being the first 5-minute of the 20 minute discussion, and 4 being the last 5-minute segment.

We controlled for the involvement of the partner in these analyses since involvement is an interactive process, in which the two speakers mutually influence the involvement of each other [23]. The results indicated that the manipulation worked. Participants reported being significantly less involved (F[1, 145.30]=456.51, p<.0001) in the low-involvement condition (M=5.61, SE=.11, 95% CI [5.46, 5.76]) than in the high-involvement condition (M=3.46, SE=.11, 95% CI [3.28, 3.67]) (Cohen's D=2.22).

Participants' ratings of partners' involvement. We asked participants to rate their partners' level of involvement and understanding every 5 minutes (1=lowest to 3 = highest, after recoding to adjust for normality). We then conducted a mixed model ANOVA of the same form on the speaker's ratings of their partner's involvement (R^2=.63) and understanding (R^2=.62). We found that speakers rated their partners significantly higher in involvement (F[1, 114.6]=35.60, p<.0001) when the partners were in the high involvement condition (M=2.16, SE=.06, 95% CI [2.04, 2.28]) than in the low involvement condition (M=1.98, SE=.06, 95% CI [1.86, 2.10]) (Cohen's D=.27).

Word count per minute. We analyzed the total number of words said by participants every minute, for each 5-minute segment of their conversation, in the two involvement conditions. We expected that people in the high involvement condition would be more responsive than in the low involvement condition, as indicated in the number of words they said per minute. We conducted a mixed model ANOVA, with speakers' (participants') involvement condition, and partners' involvement condition as the fixed effects, and pair, participants, and time as the random effect on the total number of words said every 1 minute (R^2=.62). We found that participants spoke significantly more words per minute (F[1,142.50]=80.77, p<.0001) when they were highly involved (M=23.42, SE=.89, 95% CI [21.85, 25.01]) than when they were less involved (M=16.18, SE=.89, 95% CI [14.88, 17.49]) (Cohen's D=.90).

Cultural differences in the use of verbal involvement cues

H1 to H3, and RQ1 refer to the difference in the way American and Chinese participants in same-culture and cross-culture American and Chinese pairs used verbal involvement cues such as "I" pronouns and assent words differently in their IM conversations. To test these hypotheses and answer this question, we conducted mixed model ANOVAs. Participants' culture, the partners' culture, the two involvement conditions, and the interactions between these three variables were the fixed effects. Pair, participant, and time were the random effects. The dependent variables are the log of the counts of "I" pronouns, assent words, definite articles, and cognitive words every 5 minutes. We also control for the total number of word said during the 5 minutes. We included the correlation among these word counts in Table 2, and the means and SE of these word counts in Table 3. Differences in the ways American participants and Chinese participants used verbal cues to express different level of involvement can be observed through significant interaction effects of participants' culture and involvement conditions on the number of verbal cues uttered.

	"I"	Assent	Def. Art.	Cog. words	Word rate
"I" Pronouns	1				
Assent words	.035	1			
Definite Articles	.082	.215	1		
Cognitive words	.364**	.261**	.437**	1	
Words per 5 mins	.206**	.232**	.566**	.367**	1

**. Correlation is significant at the 0.01 level (2-tailed)

Table 2. Correlations of different categories of word counts.

Word category	Involvement condition	
	High	Low
"I" pronouns	M=2.58 (SE=.27)	M=3.52 (SE=.27)
Definite articles	M=6.02 (SE=.32)	M=4.70 (SE=.32)
Assent words	M=3.72 (SE=.23)	M=2.43 (SE=.23)
Cognitive words	M=10.74 (SE=.42)	M=7.91 (SE=.42)

Table 3. The means and standard errors of the number of words in different categories each participant uttered every 5 minutes in the two involvement conditions.

"I" pronouns. A mixed-model ANOVA of the form outlined above on the log of the number of "I" pronouns every 5 minutes (R^2=.51) showed no main effects of participants' culture (F[1, 56.63]=1.56, p=.21), and partners' culture (F[1, 54.22]<1, n.s) on the number of "I" pronouns a participant said every 5 minutes. We found a main effect of involvement condition (F[1, 181.2]=18.10, p<.01), showing that participants said fewer "I" pronouns in the high involvement condition than the low involvement condition (Cohen's D=.29, see Table 3). But we found no significant interaction effects. H1 was not supported.

Assent words. We conducted a mixed model ANOVA of the form outlined above on the log number of assent words said every 5 minutes (R^2=.39). We found a significant main effect of participants' culture (F[1, 52.05]=4.61, p=.03). Chinese participants said significantly more assent words (M=3.2, SE=21, 95% CI [2.76, 3.63]) than American participants (M=2.54, SE=.22, 95% CI [2.14, 3.01]) (Cohen's D=.28). There is also a significant main effect of involvement condition (F[1, 182.8]=16.31, p<.001). Participants said significantly more assent words in the high involvement condition than in the low involvement condition (Cohen's D=.55, see Table 3). We found no significant interaction effect. Thus, H2 was not supported

Cognitive words. A mixed model ANOVA of the form outlined above on the log number of cognitive words every 5 minutes (R^2=.23) showed a significant main effect of involvement condition (F[1, 184.7]=4.38, p=.03). Participants said significantly more assent words in the high involvement condition than the low involvement condition (Cohen's D=.54, see Table 3). We also found a near significant interaction effect of participants' and partners' culture (F[1, 26.94]=3.15, p=.08). We conducted one planned post-hoc test between the log number of cognitive words said by participants in same-culture pairs and by those in cross-culture pairs. We found that participants said marginally (F[1, 26.94]=3.16, p=.08) more cognitive words in same-culture pairs (M=9.01, SE=.63, 95% CI [7.75, 10.27]) than in cross-culture pairs (M=9.58, SE=.41 95% CI [8.67, 10.29]) (Cohen's D=.10) (see Figure 1).

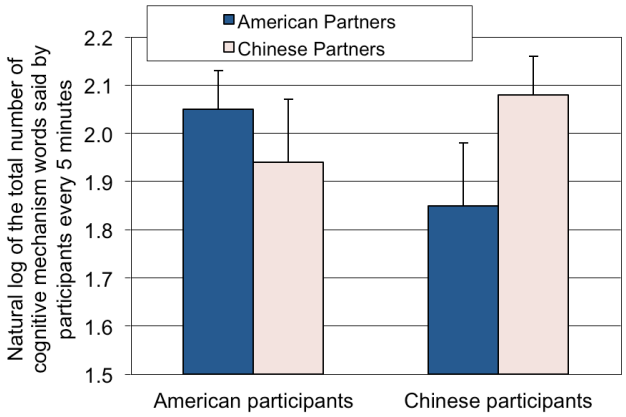

Figure 1. Log number of cognitive words said every 5 minutes for pairs of different cultural combinations: AA, AC, and CC.

We also found a significant interaction effect of participants' culture and involvement condition (F[1, 177]=5.23, p=.02). A post-hoc Tukey HSD contrast revealed that only the difference between the high involvement and the low involvement condition for the Chinese participants was significant at α=.05. Chinese participants said significantly more cognitive words in the high involvement condition (M=10.41, SE=.60, 95% CI [9.22, 11.62]) than in the low involvement condition (M=6.50, SE=.56, 95% CI [5.37, 7.63]) (Cohen's D=.87). Contrary to H3, For the American participants, the difference between the high involvement condition (M=11.06, SE=.67, 95% CI [9.75, 12.38]) and the low involvement condition (M=9.33, SE=.78, 95% CI [7.77, 10.89]) was not significant according to the Tukey HSD contrast (see Figure 2).

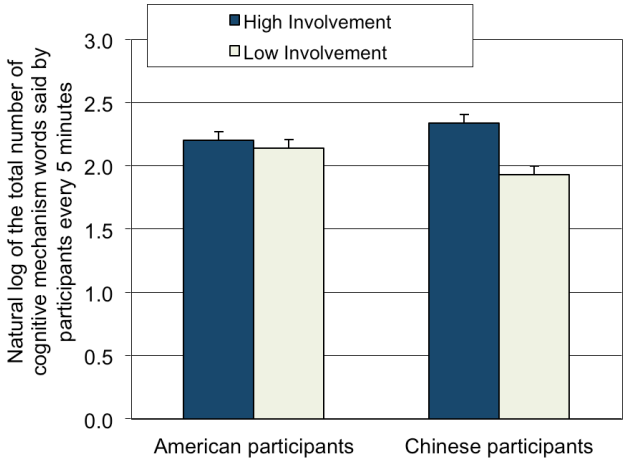

Figure 2. Log number of cognitive words said every 5 minutes by American and Chinese participants in two conditions.

Definite articles. To answer RQ1, we conducted another mixed model ANOVA of the form outlined above on the log number of definite articles said every 5 minutes (R^2=63). We found a significant main effect of involvement condition (F[1, 180.40]=5.40, p=.02). Participants said significant more definite articles in the high involvement condition than in the low involvement condition (Cohen's D=.54, see Table 3). We found a significant interaction effect of partners' culture and involvement condition (F[1, 175.5]=5.84, p=.02). A Tukey HSD contrast revealed that only the difference between the high and low involvement condition for the Chinese partners was significant at α=.05. Participants said significantly more definite articles in the high involvement condition (M=6.80, SE=.58, 95% CI [5.63, 7.96]) than in the low involvement condition (M=4.30, SE=.45, 95% CI [3.36, 5.17]) when they worked with a Chinese partner (Cohen's D=.60). When participants worked with an American partner, the difference between the high involvement condition (M=7.25, SE=.67, 95% CI [5.89, 8.60]) and the low involvement condition (M=5.13, SE=.46, 95% CI [4.20, 6.05]) was not significant (see Figure 3).

We also found a significant three way interaction effect of participants' culture, partners' culture, and involvement condition (F[1, 175.3]=5.32, p=.02). A Tukey HSD contrast showed that only for American participants working with Chinese partners, the difference in total number of definite articles said in 5 minutes between the high involvement condition (M=9.85, SE=1.21, 95% CI [7.30, 12.39]) and the low involvement condition (M=4.55, SE=1.05, 95% CI [2.33, 6.76]) was significant (Cohen's D=1.03). All other comparisons were not (see Figure 4).

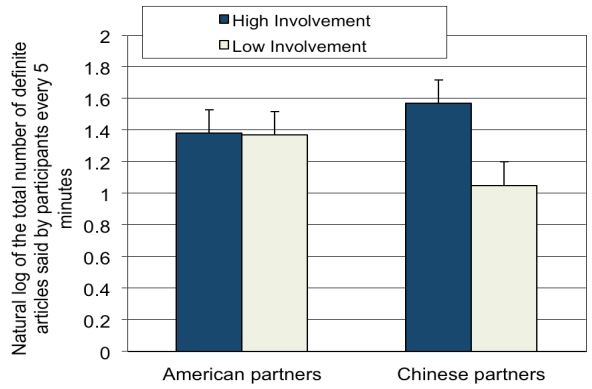

Figure 3. Log number of cognitive words participants said every 5 minutes when they work with American and Chinese partners in two conditions.

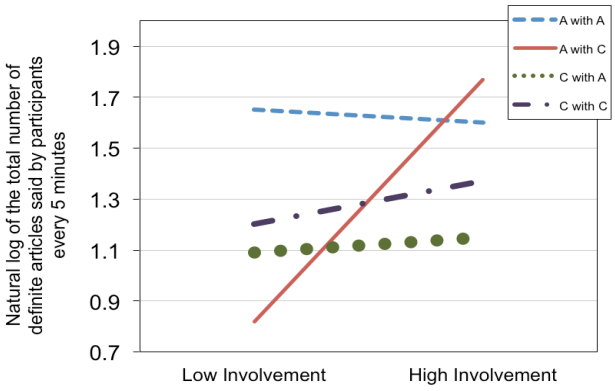

Figure 4. Log number of cognitive words participants said every 5 minutes for different cultural combinations in two conditions.

DISCUSSION

In general, our results show that participants used "I" pronouns, assent words, cognitive words, and definite articles differently when highly involved and when less involved, consistent with previous studies [20]. More importantly, we found several cultural differences not only in the way American and Chinese participants used verbal cues in general, but also when they are highly involved or less involved. First, we found that Chinese participants used significantly more assent words than American. One explanation is that Chinese participants are relationship-oriented and tend to avoid conflicts and preserve harmony [34] through words of agreement. Some studies found that Chinese participants sometimes responded with assent words even when they disagreed [30, 18]. Another explanation is that Chinese participants tend to use assent words not to signal agreement, but as a form of back-channel responses to signal acknowledgement to the partners more than American participants [33].

Second, we found that participants said marginally more cognitive words in same-culture pairs than in cross-culture pairs. This result is consistent with Nguyen & Fussell's [19] finding that in cross-culture pairs participants tended to say fewer opinions in a problem-solving task. It is possible that participants feel more comfortable expressing their ideas when talking to a partner from the same culture. This result call attention to a challenge in intercultural collaboration when multi-cultural team members tend to hold back their thoughts despite the need for a variety of perspectives or approaches in a team discussion.

Third, we found several evidences that Chinese and American participants used verbal cues to express involvement differently. Contrary to our expectation, Chinese participants significantly changed their frequency of cognitive words between the high and low involvement conditions, but not American participants. It is possible that while American participants used more cognitive words in general than Chinese participants [31], the difference in the frequency of cognitive words said by American participants between the high and low involvement conditions is less perceptible. Therefore, cognitive words might play a smaller role in the expression and interpretation of involvement for American participants than for Chinese participants.

We also found for Chinese participants the use of definite articles did not change significantly between the two involvement conditions. This result may be due to the fact that Chinese participants who speak English as their second language tend to omit articles in their English sentences because of the lack of articles in Mandarin [28].

On the other hand, American participants changed their use of articles when they are highly involved and when they are less involved, consistent with previous studies [4]. More interestingly, the increased use of definite articles by American participants in the high involvement condition compared to the low involvement condition was more significant in cross-culture pairs than in same-culture pairs. While further studies are required to explain this result, its implication is interesting. Perhaps the bigger difference in the use of definite articles in conversations of cross-culture pairs than of same-culture pairs makes it easier to detect the level of involvement of American participants based only on textual cues in text-only conversations. Nguyen & Fussell's [20] findings call for reconsideration of the presumed primary importance of non-verbal cues to involvement in face-to-face conversations [3], as simple verbal cues may be enough for participants to express and detect level of involvement in text-based IM conversations. Our result adds to this finding by implying that the role of simple verbal cues in the expression of involvement becomes even more significant when IM conversations happen in cross-culture pairs or teams.

Our results also help explain the findings from previous studies, which found that participants reported higher negative emotions in intercultural IM conversations [19, 18]. Nguyen & Fussell [18] found that such negative emotions emerged when one member mistakenly perceived

the other member as less dedicated to the team task, based solely on what was said in the IM conversation. Our results further suggested that because American participants and Chinese participants express and interpret involvement cues differently, there is higher risk of misunderstanding about the state of involvement of team members in intercultural teams. This may explain why frustration arose in cross-culture IM conversations, where there is a lack of audio and visual cues to provide more awareness about each team members' activities.

Lastly, our results also call into attention an important confounding factor in many lab studies about cross-culture conversations. Most such studies did not consider the level of involvement of their multicultural participants and how involvement may influence participants' communicative behaviors. There are cultural differences in the way participants in different countries perform and pay attention during lab experiments (e.g., East Asian participants tend to be more serious and focused than North American ones). Our results further show that American and Chinese participants exhibited different communicative behaviors when their level of involvement varied. Therefore, future experimental studies of intercultural conversations should be aware of the potential impacts of involvement on the communication process under investigation.

DESIGN IMPLICATIONS

In intercultural teamwork, IM is a popular, quick, and easy communication solution [11]. We found that participants from different cultures had different verbal styles of conveying conversational involvement. Members of intercultural team may face difficulties in understanding teammates' involvement, which may lead to frustration and negative experience. In the context of increasing multitasking at work, our result suggests the need to increase team members' awareness of the activities of others during a team discussion via IM. Several tools have been designed to support attention and awareness in conversations using non-verbal and verbal cues, such as the GroupMeter system [15], or Conversation Clock [1]. Tools similar to these can be developed to display an aggregate visualization of the team members' involvement in a conversation based on verbal cues.

Moreover, while it is possible to detect people's involvement in a text-based IM conversation based on several verbal cues as studies suggested [20], our results also call attention to the varying significance of these cues when applied to people from different cultures. We found that for Chinese participants article use may not be a good indicator of involvement, but cognitive word use is. The opposite applies to American participants. Designers of future tools that rely on verbal cues to detect involvement in team conversation may need to consider these differences when designing for work teams from different cultures, or for multicultural teams.

LIMITATIONS & FUTURE DIRECTIONS

Our paper is not without limitations. We only study dyads, while group interaction is more common for remote intercultural collaboration. We only studied American and Chinese participants while real intercultural collaboration involve people from many more countries. Lastly, our small sample size might have limited the power of some results.

In future studies, we intend to code agreements, disagreements and relational messages. This coding scheme takes into account the conversational context to classify idea units based on their meanings, instead of mere word counts. Future studies may also record the IM chat window of participants' conversations to capture the speed of response for analysis. Lastly, future research can investigate conversations in more realistic team settings such as at actual workplaces, or can even allow all participants to use their native language to communicate with one another.

CONCLUSION

Our study examined the cultural differences in the use of verbal involvement cues in text-based IM conversations between American and Chinese participants. We conducted an experiment using same-culture and cross-culture pairs of American and Chinese participants discussing a decision making task via IM. Our results showed that American and Chinese participants used several involvement cues, such as cognitive words and definite articles, differently. Our study sheds light on an important communication process in intercultural CMC, and carries implications for the design of CMC tools to enhance collaboration among dispersed multicultural team members.

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