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A cross-cultural comparative analysis of small group collaboration using mobile twitter



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ABSTRACT

This study was undertaken to determine the distinctive user behaviors and patterns of participants communicating using Twitter on a mobile device in a small-group collaborative setting. Participants were from Western and Eastern cultures (the United States and Korea). Tweets were coded and classified and the results analyzed. Several cultural dimensions were utilized to detect subtle differences between participants from these two different cultures in their dynamic mobile exchanges. Systematic differences in microblogging behaviors were found mostly in the direction predicted by the findings of previous studies on differences in national culture; however, we also report new and interesting findings that contribute to the knowledge base. We discuss the theoretical and practical implications of our findings and how this mobile communication information technology can be leveraged to the advantage of individuals and organizations.

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1. Introduction

Use of mobile social networking services (SNS) using a PC, tablet, or smartphone is becoming more common in the business world as well as in the personal lives of individuals. In recent years, the number of users who access SNS by smartphone or mobile devices has grown exponentially. Texting on smartphones has become popular in business decision-making (Cohen, 2011; Koch, Leidner, & Gonzales, 2013) and personal communication (Smith, 2015).

Mobility provides significant leverage in communication. Communication is enhanced by spatial and temporal flexibility, spontaneity, immediacy, ad-hoc demand readiness, and pocket-size portability. These potent attributes strengthen the communication capability of mobile devices and enable closer social ties among users (Treem & Leonardi, 2012; Turban, Liang, & Wu, 2011; Turkle, 2008). Among many popular options, microblogging is one versatile SNS that incorporates all of the features mentioned above. Twitter is a good example. Twitter and other SNS vendors readily accommodate the development of individual “social circles” in which quick group decision-making or other, similar small-group discussion can proceed.

Although mobile SNS is expected to make business practices more efficient in general, numerous questions remain unanswered. The role of culture in mobile SNS is one of the most salient issues. Cultural influences are interwoven, to varying degrees, throughout the social fabric of a society. Impacts of culture are clearly evident in the context of communication because communication is both a window into culture and an external reflection of cultural values (Donabedian, McKinnon, & Bruns, 1998). From the early times of computer-mediated communication (CMC), cultural impact has been extensively studied in various contexts; the findings of many of these studies confirmed the significance of cultural variables (D. Straub, 1994; D. Straub, Keil, & Brenner, 1997). Thus, culture may affect the way people communicate using mobile SNS, and presumably also the outcome of that communication. The mobility and instantaneity of mobile SNS add more complexity to the interaction between culture and communication. The existing literature on culture and CMC does not clearly explain how culture interacts with mobility in communication involving mobile SNS.

Past studies mostly focused on non-mobile platforms such as personal computers (PCs). The overall objective of this study is to explore the idiosyncrasies of users from Western and Eastern cultures who utilize mobile devices and SNS for small-group communication. To date, very few comparative cultural studies have focused on microblogging on a mobile device in the

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collaborative small-group setting. This gap is particularly significant in light of the fact that the use of Twitter on smartphones is increasing in many corners of the world. As of June 2015, Twitter supported more than 35 different languages and had more than 316 million active monthly users, 80% of whom routinely access the SNS using a mobile device (Twitter, 2015).

The contribution of this study compared to that of many earlier culture–IT studies is the inclusion in the analysis of mobility as a variable related to usage of mobile devices and SNS in cross-cultural contexts. Although comparative cultural studies focusing on CMC have enabled us to accumulate considerable knowledge of different CMC categories, the question is whether the results of these studies are relevant in the context of mobile devices. The findings of this study provide both theoretical and practical insight into this question.

For our comparative cultural analysis, two countries were selected: the U.S. and Korea. In cultural terms, these countries differ most in their focus on how individuals relate to each other within society (i.e., individualism versus collectivism) and on short-term versus long-term goal orientation. The experimental study includes small groups of participants using Twitter on mobile devices (TMD).

2. Literature review

2.1. Relevant microblogging studies

Despite the growth of SNS use on mobile devices around the world, related research is lacking. Studies of Twitter in small-group settings are nonexistent. In this study, Twitter was used as a collaborative tool in small groups that were given a task. In learning environments where collective problem-solving is important to task completion, the connectedness afforded by Twitter enables seamless team play, rapid group communication, and pooling of energies to come up with new and unexpected ideas (Carpenter, 2014). In industry, Twitter is perceived as an effective communication tool for project teams to communicate quickly, easily, and meaningfully (Klynstra, 2012; Samuel, 2011). Using Twitter on a mobile device is easy to do, and there is no cost involved, unlike other highly priced commercial communication platforms. The practicality and economic advantage of Twitter and other mobile SNS invites more industry applications.

Many culture-related Twitter studies have identified cultural influences that have been corroborated in many CMC studies emphasizing culture. We describe a few of these Twitter/culture studies below. One important fact about these studies is that none have accounted for mobility.

Garcia-Gavilanes, Quercia, and Jaimes (2013) testified that Twitter usage behaviors not only differ among countries, but they are also predictable. These behaviors strongly correlate with cultural dimensions. For example, Tweeters from individualistic countries preferred to socialize with strangers, but Tweeters from collectivist countries preferred to strengthen their existing social ties. Acar (2013) compared the content of tweets between Japanese and American users. The Japanese tweeted more self-related messages and messages about TV programs, whereas the Americans tweeted more about their peers, sports, and news.

Krasnova, Veltri, and Günther (2012) conducted a study in which the ties between SNS self-disclosure behavior and two cultural dimensions – individualism and uncertainty avoidance – were evaluated. They reported that culture played a significant role in the cognitive patterns of SNS users. Two constructs, “trust in the SNS provider” and “trust in SNS members”, influenced the self-disclosure levels of highly individualistic American participants, but had no influence on German participants. For uncertainty

avoidance, the risk-averse German participants were significantly affected by “privacy concerns,” but the risk-tolerant American participants were not.

Emotions are included in many cross-cultural studies. Kayan, Fussell, and Setlock (2006) evaluated how people from different cultures use IT in different ways. They conducted a large-scale instant messaging experiment in America and Asia. The results reinforced many known findings of earlier cultural studies. In their examinations of the emotional aspect of the messages, they found that multi-party chat, audio-video chat, and emoticons were significantly more often preferred by Asian participants than by American participants. Adding to this study, Park, Baek, and Cha (2014) examined emoticons and non-verbal cues in 78 countries. Their study revealed that tweeters from individualistic countries preferred horizontal and mouth-oriented emoticons like 😊, whereas tweeters from collectivistic countries preferred vertical and eye-oriented emoticons like 👁️.

In addition to Twitter, other microblogging applications have been examined in microblogging studies. Gao, Abel, Houben, and Yu (2012) studied differences in behaviors of users of Twitter and Sina Weibo, which is a popular microblogging app in China. In their study, they reported that Chinese users use mobile apps more extensively and post to microblogs more often than other users. Saeed, Sinnappan, and Markham (2012) evaluated the technology acceptance model (TAM) in terms of Twitter usage in Australia and America. Their TAM Twitter study revealed a significant difference between the two countries in accepting Twitter.

Other factors that are intertwined with culture have also played a part in the outcomes of various studies. Garcia-Gavilanes et al. (2013) reported that Twitter usage depends on a country's social, economic, and cultural attributes. In a Twitter marketing study, Jobs and Gilfoil (2012) reported that microblogging was more prevalent in emerging countries than in developed nations.

A study that evaluated Twitter use from a government perspective reported similar cultural differences. Khan, Yoon, Kim, and Park (2014) reported on the use of Twitter by government workers in Korea and the U.S. Korean government workers exhibited collective-mindedness and cooperation and mostly retweeted to reinforce their collective agendas regardless of their main administrative functions. The correspondence of American government workers was more specific to individuals, and they only retweeted messages related to the purpose of a given department. Korean government workers relied on government information sources, whereas American government workers preferred private information sources.

2.2. Small-group collaboration

This study involved small groups of Twitter users in a collaborative setting; data about their communicative actions was collected and analyzed by the researchers. A useful tool to conceptualize these communicative actions is Bales' interaction process analysis (Bales & Strodtbeck, 1951). Over half a century old and still widely used, Bales' system distinguishes four types of actions during group collaboration: (1) positive reactions, (2) attempted answers, (3) questions, and (4) negative answers. Positive reactions and negative answers are, in Bales' words, “expressive–integrative,” that is, they primarily concern the social process, not the assignment's content. They might be about who is boss, or about just being friendly. Attempted answers and questions are related to the assignment's content, though they may have social side effects.

It may be expected that the cultural “unwritten rules of the social game” (G. Hofstede, Hofstede, & Minkov, 2010, p. 3) that are implicit in the different national cultures of Koreans and Americans

affect the relative salience of these communicative actions in the two cultural groups. The cultural dimensions drive the group's reciprocal communicative acts; combinations thereof yield the effective cultural manifestations or group outcomes depicted in Fig. 1.

3. Theoretical framework

3.1. Featured technologies

This study features a microblogging software application on a smartphone or similar personal mobile internet-ready communication device. The device and software are treated as one integrated unit, not as separate stand-alone entities. This microblogging software application can be accessed and used from different computing devices, including smartphones. Along with other social media, it has become a preferred communication channel for many. Similarly, smartphones are becoming essential devices in our personal lives. Smartphones can also have many different mobile software applications, including those for microblogging.

These two technologies can certainly function independently. Since their debut, many studies have analyzed these technologies. The significance of this study is that we focus on the combination of the two. When a microblogging app is used on a smartphone, the benefits of both are synergized and the level of performance improves. For example, microblogging on a smartphone allows checking of and access to a microblogging account while in transit. Furthermore, checking a microblogging account using a smartphone is much easier than doing so on a non-mobile computing device. The “thumb drive” navigation of a smartphone lowers the logistic barrier characteristic of a non-mobile PC, with its keyboard and mouse. This ease and frequency of use fosters a deeper affinity between the user and both elements of the integrated unit – the microblogging app and the smartphone.

Studies have found that people are using these two elements as one integrated unit more often (Carpenter, 2014; Samuel, 2011). The Twitter Company reports that 78% of active Twitter users access the service on a mobile platform (Twitter, 2015). Another industry report reveals that around 60% of social media time is spent not on desktop computers, but on smartphones and tablets (Adler, 2014). Based on these reports, we feel that it is timely to conduct a study of Twitter on a mobile device. The complementary nature of these two elements adds value to both.

3.2. Review of cultural models in IS

Culture is considered a core topic in IS research, which makes sense since information systems are often deployed across cultural boundaries. The links between culture and IT have been explored in a wide variety of studies. Researchers have focused on theory (Gefen & Straub, 2001; Karahanna, Evaristo, & Srite, 2006; Mark Srite & Karahanna, 2006), methodology (Karahanna, Evaristo, & Srite, 2002), technology acceptance (Chong, Chan, & Ooi, 2012; G. J.; Hofstede, 2001; Hong, Thong, & Tam, 2013; M.; Srite, 2006), web design (Chau, Cole, Massey, Montoya-Weiss, & O'Keefe, 2002), user

Table 1

Cultural dimensions in the U.S. and Korea in decreasing order of difference.

Cultural dimensions	U.S.	Korea	Difference [U.S. – Korea]
Individualism vs. collectivism (IDV)*	91	18	73
Long-term orientation (LTO)*	26	100	74
Uncertainty avoidance index (UAI)*	46	85	39
Indulgence vs. restraint (IVR)	68	29	39
Masculinity vs. femininity (MAS)*	62	39	23
Power distance (PDI)*	40	60	20

* Usual range: 0–100 (Source: <http://www.geerthofstede.com/Research> and VSM).

experience (Mark Srite & Karahanna, 2006; D. Straub, 1994), group settings (Zhang, Lowry, Zhou, & Fu, 2007), the negotiation process (Kersten & Noronha, 1999), and more. One common thread in these divergent studies is the significance of culture. In the evolution of almost every major technology, from fax and email (Pornsakulvanich, Haridakis, & Rubin, 2008) to instant messaging (Rice, D'Ambra, & More, 1998), technological idiosyncrasies never dominated culture.

The results of many studies can be explained using a theoretical model. In some cases, however, the results fail to support the model. Many theoretical models have various shortcomings (Leidner & Kayworth, 2006; D.; Straub, Loch, Evaristo, & Karahanna, 2002). Without a robust, well-tested theoretical model, a scientific study and its results are at a risk.

The best-known cultural model, and the one with the best track record in explaining national-level phenomena, is Hofstede's model of national culture (G. Hofstede et al., 2010) which has been mentioned in almost every culture–IT study. Because this model is well-known in the scientific community, a full description is omitted here. Briefly, Hofstede's model is about the “unwritten rules of the social game” (G. Hofstede et al., 2010, p. 3) that are shared by a group. It outlines shared national-level values for each country for the following dimensions: the power distance index (PDI), individualism versus collectivism (IDV), masculinity versus femininity (MAS), the uncertainty avoidance index (UAI), long-term orientation versus short-term normative orientation (LTO), and indulgence versus restraint (IVR) (see Table 1). These cultural dimensions can be used to compare cultural idiosyncrasies of the populations of particular countries. Consequently, it has been utilized in many culture–IT studies.

Hofstede makes a few important points that are relevant to this study (G. Hofstede et al., 2010). First, there are many levels of culture, ranging from the national, ethnic, or regional to professional and organizational. The earlier in life a culture is learned, the more deeply it penetrates – much like language, which is best learned in youth. Second, culture consists of both shared values (the “unwritten rules of the social game”; (G. Hofstede et al., 2010, p. 3), of which we are usually unaware, and shared practices, such as religious practices, stated convictions, symbols, rituals, and heroes. Hofstede uses the following metaphor of the rings of an onion: more superficial practices tend to be shared when culture is learned later in life – including organizational culture, of which Hofstede also presents an empirically derived model – while values tend to

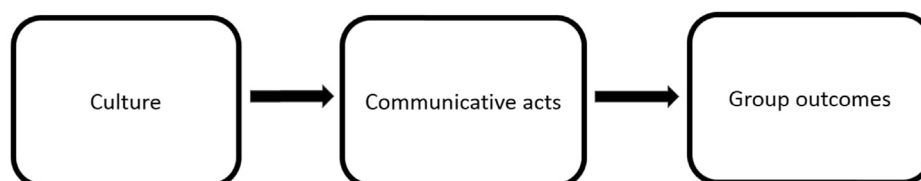


Fig. 1. Basic model.

derive from the culture acquired from birth. This deeper level of shared cultural values is not the same thing as social identity. The former is about the unwritten, unconscious rules of social interaction, while the latter is about conscious group affiliation and the rituals and symbols that attend such affiliation. Conversely, cultural practices of religious or organizational groups, while not necessarily pointing to shared “unwritten rules of the social game”, are the very elements that are important to people's social identity. According to Hofstede, this combination of unconscious values and conscious practices needs to be unpacked, lest “culture” become a confusing, analytically meaningless concept.

Another emerging model of culture is the “virtual onion model” (Gallivan & Srite, 2005; Gefen & Straub, 2001; D.; Straub et al., 2002). In line with Hofstede, and utilizing social identity theory, the core idea of this model is that an individual's cultural identity has many more levels than just national identity; it may be made up of religious, ethnic, professional/occupational, organizational, work, or individual elements. In contrast to Hofstede's national culture, this model relies on individuals' conscious affiliation to social identities rather than shared unwritten rules. Through an interpretive lens, studies based on this model meticulously explore and tease out an individual's intertwined cultural ties to a variety of groups and subgroups. This model opposes any cultural analysis that relies on only one or two cultural levels (e.g., national or national and organizational).

The model also examines the order of significance of each cultural level to the individual's social identity; the closer a level is to the individual, the more important it is to that individual, and vice versa. For example, if religion is most important, then religious values are regarded as more important than values of other cultural levels. Furthermore, the order of cultural levels may differ among individuals even within the same nation.

This order of cultural levels is also dynamic in that it can be reshuffled depending on an individual's education, life experience, life turning points, or other major life events. An individual's life priorities reflect his or her regard for cultural levels. However, this model has not been validated, and not enough follow-up empirical studies have been performed. For our culture–IT study, which focuses primarily on the national level, the virtual onion model would not be a good fit. Therefore, Hofstede's model of national culture dimensions is used instead.

In this study, the numeric values from Hofstede's cultural model are used to indicate the positions of the U.S. and Korea on each dimension (see Table 1). A summary of characteristics of the two countries is as follows: Americans are expected to share equally, to provide open access to information to everyone, and to communicate openly, directly, and actively. There is a highly individualistic culture. In the workplace, employees are expected to be self-reliant and strive for quick results. Americans tend to express and talk freely about their goals and objectives and are explicit in their intentions to achieve them. They are also more direct in resolving conflicts and are willing to take risks and accept innovative new ideas. In groups, they rely more on verbal communication than on body language. Weak group bonding and commitment in the form of an explicit contract are characteristic of Americans. They believe in reaping the benefits of their own effort and determining their own fate.

By contrast, Koreans utilize more nonverbal and indirect communication techniques, including metaphor and implicit messages. Korea's is a hierarchical, autocratic society in which power is centralized, inequalities are inherent, and top-to-bottom command lines are typical. Koreans value collectivism and place great emphasis on group and long-term extended relationships. Group loyalty is highly prized and takes precedence over rules and regulations. Every group member takes responsibility for ensuring

the well-being of other members. Uncertainty avoidance is characteristic of Koreans; thus, unorthodox behavior, new ideas, and innovation are not always well received.

In many studies, Korea has been used as an example to represent collectivistic culture (Gudykunst, 1997; Minkov & Hofstede, 2012; Rice et al., 1998; Ting-Toomey et al., 1991). However, this is a simplification. Table 1 shows that in a pairwise comparison between the U.S. and Korea, there are significant differences of at least 20% of the total score on each of the six dimensions on the scale. For two dimensions, individualism–collectivism and long-term orientation, the differences are over 70%. In addition, while considerable cultural differences exist among Western and Eastern countries, a similar gap between these two dimensions is often found along the West–East divide.

3.3. Research model and hypothesis development

In this empirical study, we examine the use of Twitter by users from two distinctly different (Western and Eastern) cultures: the U.S. and Korea. This arrangement was intended to facilitate contrast between the cultural differences and salencies in these two cultures. We investigate how the communicative actions described earlier play out in these groups based on our adopted theory of culture. Note that we are not talking about conscious processes here, but about patterns that occur largely unconsciously.

We expect Korean groups to be, on average, more concerned with relationship maintenance than American groups, both because of the huge difference in the role of individualism in the two countries, and because of the equally huge difference between them in long-term versus short-term orientation. To oversimplify the combined effect, we present the following example: making a friend is the work of under a minute in the U.S. and that of a lifetime in Korea; this explains the tendency toward positive reactions in the Korean context. On the other hand, in the individualistic, short-term-oriented U.S. context, seeking individual prominence and exhibiting character are prime utilizations of relational currency. Therefore, we expect that U.S. participants will value actions that allow them to “speak their minds”. They will also provide content-related answers and show disagreement more frequently than Korean participants. They will avoid relational messages, since these connote dependency. In stark contrast, Koreans will avoid disagreement since every relational act may harm the group as a whole, and because retaliation may occur one day. In addition, while Koreans may also provide many possible answers to show a constructive attitude, they may be expected to stay away from “negative answers”; if they disagree they may simply fall silent.

Due to these differences, we expect Koreans to exchange significantly more tweets than Americans. Other authors have also suggested this. Erez and Earley (1993) have suggested that people from Eastern cultures put greater emphasis on two-way communication, more personal communication, and more frequent communication than people from Western cultures, especially to coordinate activities and clarify collaboration processes (Erez & Earley, 1993). They are also more concerned with other members' experience and relationships (Te'eni, 2001). The Vallaster study reported that people from Eastern cultures prefer to avoid possible open confrontation, instead seeking clarification one-on-one after a meeting is adjourned (Vallaster, 2005). Thus, we expect people of Eastern cultures to choose less open communication forms more often.

A score of 39 in the gender-related cultural dimension (MAS) indicates that Korea has more feminine than masculine tendencies. The dominant values in Korea are caring for others and valuing society's good over that of individuals. Instead of admiring differences and individuality, they emphasize similarities and

collectivity. With a score of 62, Americans are inclined toward masculinity, which fosters competition and success over others and a “winner takes it all” attitude. Twitter being a text-driven social medium, it may be perceived to be less open than face-to-face confrontation and therefore better aligned with the tendencies of Koreans. Thus, we conjecture that they will feel more at ease with Twitter and tweet each other significantly more often than Americans.

In Eastern culture, as a result of a collective act, group outcomes are the responsibility of each member regardless of how he or she performed (Triandis, 1988). Applying this principle, we posit that fewer messages or lack of participation may signal failure to group members who are sensitized to seek and respond to group approval. On the other hand, social sanctions such as shaming are common cultural and motivational mechanisms in Korean culture. Thus, inaction or individual silence in Korea directly impacts the functioning of the group. Positive group confirmation, on the other hand, is not perceived as a threat to personal self-worth or self-expression; it can and should be engaged in freely.

In a Twitter group collaboration context, group members must come to a consensus. Every member therefore must tweet in order to contribute to the collaboration process. Based on the known traits of both countries, we postulate that Americans may focus on tweeting to get their points across, whereas Koreans may focus on using Twitter to maintain group harmony during the collaboration process. By exchanging more tweets, Korean group members may seek to improve collaboration and achieve group goals more harmoniously than American group members. Thus, we hypothesize that:

Hypothesis 1. Korean group members will tweet each other significantly more often than American group members.

Studies have shown that people of Eastern culture tend to conform to in-group norms, be more cooperative, and respond more favorably to group goals than people of Western culture (Elleson, 1983; Mann, 1980). They tend to view group membership positively as long-term and permanent, in contrast to people of Western culture (Earley & Gibson, 1998). Korea shows a notable score of 100 in the long-term orientation (LTO) cultural dimension. Koreans highly regard their past traditions and perpetuate their traditional values. Long-term commitment and permanence are virtues in Korean society. By contrast, America shows a score of 26, which is the largest difference among all the cultural dimensions between the two countries. Americans tend to seek more immediate solutions to current problems.

Collectivist individuals often refrain from raising questions or addressing problems that may threaten group harmony or alter the friendly atmosphere; they prefer to deal with such questions after the meeting, on a one-to-one basis, if required (Vallaster, 2005). Erez and Earley (1993) also emphasize that collectivist individuals favor more personal communication that facilitates decision-making processes.

Given these facts, we expect that the Korean participants in this study will place higher priority on group harmony than on their own personal goals compared to the participants from the U.S. This may be manifested by fewer tweets from the Korean participants about new issues or new challenges, unlike the American participants. Therefore, we hypothesize that:

Hypothesis 2. Korean group members will send significantly fewer new (initiatory) tweets than American group members.

Rice et al. (1998) reported that people of Eastern culture prefer a synchronous medium, which allows observation of others' reactions. This preference on the part of the Korean participants may result in generation of many tweets in order to establish a friendly group environment. Additionally, people from collectivistic

societies prefer indirect and informal methods of conflict resolution, emphasizing context more than content, and implicit more than explicit communication (Gudykunst, 1997). By sending more friendly tweets, Koreans secure their positions within the group and influence the in-group atmosphere positively. Conversely, Americans, with their high score of 91 on the individualism–collectivism (IDV) dimension (Table 1), may be relatively less concerned about the relationships in the group beyond getting the job done. We speculate that this focus will result in fewer friendly tweets from members of the American groups compared to members of the Korean groups. We thus expect more “positive reactions” and friendly tweets from the Korean groups.

Hypothesis 3. Korean group members will send significantly more friendly tweets than American group members.

The general belief is that the people of Eastern cultures are more concerned with group processes and harmony than with individual agendas. In case of a possible group conflict or strong disagreement, people of Eastern cultures are inclined to withdraw from direct confrontation and to deal with disagreements outside of the group, seeking to resolve the issue later (Ting-Toomey et al., 1991). When facing an uncertain future or change, Americans prefer to tackle directly any differences or conflicts in order to clarify the situation. By contrast, Koreans prefer to reduce friction where possible. The one decisive fact that divides the two societal ideologies is that Koreans believe their future fate is largely influenced by others, while Americans do not.

A score of 60 on the PDI cultural dimension indicates that Korea has a more hierarchical society than the U.S. They believe that everyone is “socially ranked” in various social groupings and contexts. A Korean must show proper respect to other Koreans according to these social ranks (e.g., age, seniority in a company, school, or organization). They believe that their position or status can be altered by other Koreans of higher rank. With a score of 40, Americans seem to believe in the adage “everyone is equal” while acknowledging individuality and each person's values. We therefore expect members of the American groups to send more requests for clarification and more tweets expressing “negative reactions” than members of the Korean groups.

Hypothesis 4. American group members will send significantly more tweets expressing disagreement than Korean group members.

Past studies (Argyle, Hengerson, Bond, Iizka, & Contarello, 1986; Gudykunst & Ting-Toomey, 1988; Wallbott & Scherer, 1986) showed that people from collectivist cultures are more context-oriented and implicit, while people from individualistic cultures are more content-oriented and explicit. Being content-oriented, then, we posit that Americans should be more focused on the task, while Koreans will be more concerned with other members' experience and relationships (Te'eni, 2001). In a decision-making situation that involves conflict, participants with individualistic cultural attributes will infuse the group communication process (Donabedian, et al., 1998) with problem definitions, solution articulations (Singelis & Brown, 1995), and some explicit anger and distress (Gudykunst & Nishida, 1994). We suspect that the synchronicity and spontaneity of TMD may be exploited by Americans to their advantage. TMD provides immediate, direct, and content-oriented communication, which may be very gratifying for the Americans. Thus, we hypothesize that:

Hypothesis 5. American group members will experience significantly higher levels of satisfaction than Korean group members.

The attributes of collectivist cultures suggest that group cohesiveness is higher here than in individualistic cultures. The greater good of society as a whole and collective goals are highly valued in

the former. For example, in 1998, Korea went through a period of economic crisis, receiving support from the international monetary fund (IMF). During that time, almost every Korean citizen donated valuable goods and gold possessions to their government to pay off their nation's debt to the IMF (saying things like, "I'm using my own money to pay off my nation's debt").

This national collective act and cohesive behavior was compelling to the rest of the world. It became one of the world's top news stories of the year (BBC, 1998). In contrast, there were some similar cases of aid from the IMF in Western countries in recent years (e.g., Greece), but no similar group cohesive behaviors. From this example, we see that in a collectivist culture, the consensus is that the group's well-being and group conformity generally take precedence over personal agendas. Furthermore, the relative scores of Korea on all cultural dimensions indicate a high level of group cohesiveness. We expect, therefore, that in this study, the Korean participants will exhibit more group cohesiveness than the American participants (see Fig. 2).

Hypothesis 6. Korean group members will exhibit significantly higher levels of group cohesiveness than American group members.

4. Empirical analysis

In testing of the hypotheses, the main objective of this empirical analysis is to capture the cultural aspects and salencies of micro-blogging conversations. The experimental processes and treatments were precisely constructed in accordance with the hypotheses and the testing method was internally validated through a pilot experiment. In this section, the experimental design, content analysis, and results are presented.

4.1. Experimental design

One pilot experiment and two rounds of the main experiment were conducted. Business school students from the U.S. and Korea were recruited. Information about participants is provided in Table 2. The participants were given a course credit or equivalent for their participation. Before the experiment, the participants were briefed about the overall concept of the study. Because American colleges are known for their cultural diversity, a preliminary questionnaire was administered to obtain information about the participants' cultural background. A Western cultural background was recorded for all U.S. participants. All participants were in peer relationships; no social or academic hierarchy was present.

The experiment facilitator arranged participants in groups of four. In the grouping process, compounding variables such as

familiarity and gender were controlled. A few three-person groups were formed due to unavoidable circumstances such as odd numbers and dropouts. Participants were instructed to create new Twitter IDs for this experiment. The experiment facilitator then forwarded the Twitter IDs of all four participants in each group to each participant, instructing them to exchange tweets of basic greeting. When two people were left in a group because the other two had dropped out before the start of the experiment, the group was merged with another, similar two-person group. After the experiment started, two-person groups were dropped from the experiment. The dropout rates were less than 10% in all rounds of the experiment.

The pilot experiment was conducted to validate the experimental procedures, fine-tune the instruments, and finalize the coding scheme. In the pilot experiment, six tasks in total were evaluated. For the main experiment, two of these six tasks were used because they were more diverse in terms of their characteristics and because they generated a similar number of tweets. The six tasks were: 1) University ethics committee (Strauss & McGrath, 1994), 2) McDonald's (Harvard case study #9-303-098), 3) Noble Industries (Choi, 2004), 4) Zappos, 5) Radio Frequency Identification, and 6) Starbucks problems (Rainer & Turban, 2010). From these, the two final tasks for the main experiment were the Noble Industries and Starbucks problems. These two were selected based on their opposing characteristics to each other to balance the task-biased influences. For the final dataset, additional 30 teams were included. The final coding scheme was validated after several iterative coding cycles. A chronology of the action items that were validated during the pilot experiment and finalized before the main experiment is provided below:

1. In the experiment, only Twitter on mobile device (TMD) was used, no other medium allowed.
2. Participants were asked to set up new Twitter accounts.
3. Participants were asked to validate in-group members' accounts by exchanging a few "Hello" messages.
4. In order to address security concerns, each Twitter group was established in privacy mode, which means outsiders had no access to in-group processes and message contents.
5. A 10-day period was allowed for task discussion and submission of a final solution. During this period, the experiment facilitator reminded and warned the participants only to use TMD for communication about the assigned tasks.

These steps may not accurately simulate normal daily use of Twitter (which is open to the public and involves hashtags and followers, etc.), but this private mode in-group setting is an

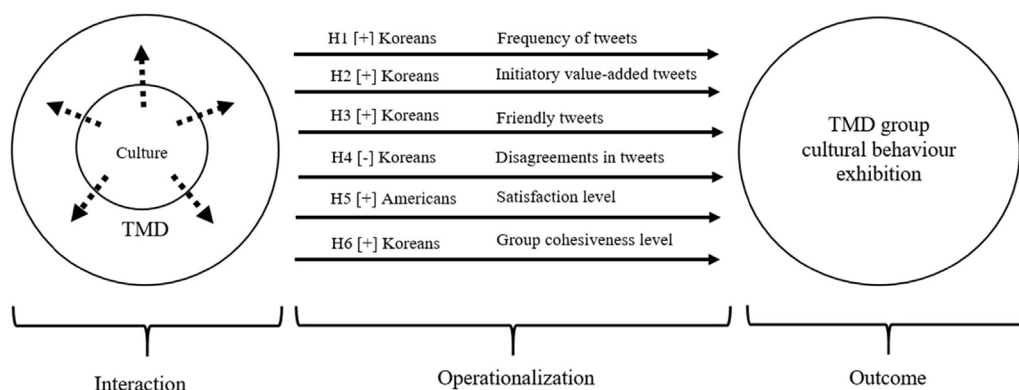


Fig. 2. Culture and TMD interactions hypothesized.

Table 2
Numbers of Participants and groups.

	Pilot 1		Pilot total	Main experiment 1		Main experiment 2		Main total
	Korea	U.S.		Korea	U.S.			
# of Participating subjects	15	46	61	22	67	60	149	
# of Participating groups	4	12	16	6	17	16	39	

available option that is favorable for small in-group collaboration in private social circles. In addition, although Twitter recently unlocked the 140-character limit on its direct message function, this experiment was conducted before this change.

All exchanged tweets were collected for analysis. Collection of tweets according to subjects' IDs was performed using a Twitter application programming interface (API). Tweets from each group were put together and arranged chronologically to reconstruct the conversations of each team.

4.2. Content analysis

In the computer-mediated communication (CMC) domain, there is a well-established CMC coding manual (Baker-Brown, Ballard, Bluck, Suedfeld, & Tetlock, 1992). It is mainly used to analyze conversational messages microscopically in order to reveal underlying meanings. However, microblogging lacks a similar instituted post-analysis coding manual. This is a research deficiency, but also an opportunity. As a novel aspect of this study, a microblogging coding protocol was devised. Our reasoning was as follows.

This study involved groups of participants with no prior attachments to one another who had to come up with practical suggestions to complete assigned tasks. During completion of this assignment, participants were expected not only to think about the task at hand, but also about social, instrumental, and organizational issues, and about how to "behave" appropriately.

Bales' system was developed for face-to-face groups (Bales & Strodtbeck, 1951). Considering Twitter's inherently unique attributes, we altered the categories in Bales' system, while retaining the main distinction between affect and content. In our coding system, the focus is on the number and content of tweets, that is, how many tweets – the strength of the message or relationship – and what information each tweet conveys. These are the major measurable categories of Twitter conversation. Consequently, the dependent variables are the number and content of tweets. During the multiple sessions of the pilot study, the dependent variables were refined. Sample tweets were coded by the researchers separately. Any incongruence in the results was resolved through subsequent discussions. The coding scheme was refined as needed until a final scheme was established based on two rounds of coding of data from the pilot experiment by the researchers.

The coding for the main experiment, which used the final coding scheme, was carried out by four judges who were IS graduate students with years of TMD experience. Multiple preliminary coding sessions were held to ensure inter-judge reliability. During these pilot sessions, the judges reconciled their coding differences. In five preliminary sessions, inter-judge reliability ranged from 0.94 to 0.99. The final coding scheme thus consisted of three dimensions: task specifics, friendliness, and agreement. Task specifics corresponds to the following categories in Bales' content matter: "attempted answers" and "questions." Friendliness captures his "expressive-integrative" categories: "positive reactions" and "negative answers." Agreement has elements of both content and affect. All collected tweets were coded according to these dimensions. For instance, a message could be classified as "process-related", "friendliness-neutral", and "agreeing". More detail of

these three dimensions is as follows:

- Task specifics: A message category that pertains to the task or its administration. Its subcategories are described below.
- An initiatory message is a new task-specific message initiated by a team member to start a conversation or a discussion (e.g., "The first person I would fire would probably be Fred only because he is a pushover and old").
- A referred message is a task-specific message that refers to an earlier message and is sent for the purposes of clarification (e.g., "McDonald's does have free Wi-Fi just like Starbucks does. <http://t.co/oV510y9S>").
- A process-related message is a task-specific message that checks for or requests clarification about the team process (e.g., "So what's the next step for this project?").
- A miscellaneous message is a message that is task-irrelevant or personal (e.g., "The guy sitting next to me on the train has a tattoo of a tear drop falling from his eye. How lil wayne of him").
- Friendliness: A message category that describes the tone of a message (e.g., a smiley-face emoticon, or "how do we do that. lol sorry I'm awful at twitter").
- Each message was classified as friendly, neutral, or unfriendly.
- Agreement: A message category that describes the level of support or agreement with other message(s) (e.g., "Harry should be next, I agree, and then Tom and Phil").
- Each message was classified as agreeing, neutral, or disagreeing.

Since the number of messages is an important measure in this study, an objective comparison of this parameter was critical. Some concern arose about possible bias due to differences in message-composing habits across subjects. Simply put, different people have different conventions when composing messages; some tend to divide a message into multiple shorter messages, while others say everything in one longer message. To address this concern, if multiple tweets resembled a single message on a topic, then the messages were collectively labeled as one. Similar to the message coding, the decision to merge multiple tweets into a single message was carefully considered and discussed during the preliminary coding sessions by the four judges. Judges then made independent decisions on mergers during coding. As a result, the average number of original tweets per team was 47.9, but this number was reduced to 32.1 after the merging process. The merged messages were used in the final data analysis.

4.3. Results

No significant difference in the average total number of messages was observed between the American and Korean teams based on the results of a simple t-test ($p = 0.187$). In Table 3, under the message type subcategories of messages, the average number of the messages and the ratio measures (explained below) are provided. The following paragraph explains why the 'ratio measure' was needed.

There was a question regards to the variances of the total number of tweets. From the groups, the total number of tweets were noticeably high and low. If these raw numbers of total tweets

Table 3
Message evaluations.

Message type		U.S. (ratio)	Korea (ratio)	All (ratio)
Average number of messages per group		22.6	41.0	29.4
Friendliness	Unfriendly	1.6 (0.03)	0.0 (0.0)	1.0 (0.02)
	Neutral	18.6 (0.89)	21.7 (0.63)	19.7 (0.79)
	Friendly	2.5 (0.08)	19.3 (0.37)	8.6 (0.19)
Task specifics	Initiatory	8.1 (0.45)	13.8 (0.35)	10.2 (0.45)
	Referred	0.2 (0.01)	0.7 (0.03)	0.4 (0.02)
	Process	6.3 (0.34)	15.8 (0.38)	9.8 (0.35)
	Miscellaneous	8.1 (0.21)	10.6 (0.24)	9.0 (0.22)
Agreeableness	Agreeing	1.7 (0.10)	3.5 (0.07)	2.4 (0.09)
	Neutral	19.9 (0.86)	37.1 (0.92)	26.2 (0.88)
	Disagreeing	1.0 (0.04)	0.5 (0.01)	0.8 (0.03)

Table 4
GLM analysis of messages.

Dependent variable	F values of the 'Country effect'	Means	
		U.S.	Korea
Total number of messages	4.9*	22.6	41.0
Ratio of friendly messages	17.2**	0.08	0.37
Ratio of initiatory messages	6.2*	0.45	0.35

* Significant at $\alpha = 0.05$ level** significant at $\alpha = 0.01$ level

are used as a dependent variable, then it would bias the results. To this dilemma, a *ratio* measure is used for a reasonable and unbiased analysis and comparison. A ratio value is calculated by dividing the number of tweets in a corresponding category (e.g. initiatory tweet) by the total number of tweets. For example, if a group had three initiatory tweets from a total of 30 tweets, a ratio value of 0.1 ($= 3/30$) is entered for the initiatory tweet category. For an extremely low number of total tweets, a small denominator (the number of total tweets) value could distort the analysis. To prevent this from happening, five groups that had ten or fewer tweets were excluded from the analysis. In corollary, there were 11 Starbucks (6 from the U.S. and 5 from Korea) task groups and 14 Noble Industries task groups (9 from the U.S. and 5 from Korea).

In the GLM model, the country was set as the main variable; the task type and group size were set as the control variables. The group size variable was used to address the difference in the group size (three or five instead of four members).

Table 4 shows the GLM results for the dependent variables. Significant effects by country are evident. For example, members of the Korean groups sent significantly more messages than members of the American groups. This difference was not statistically significant according to the t-test (Table 3). Since GLM is a more comprehensive analysis method, with random effects eliminated, than a simple t-test, we employed the GLM results in the final analysis. This finding supports H1 (Korean group members will tweet each other significantly more often than American group members). Table 4 shows that members of the American groups sent significantly more initiatory messages than members of the Korean groups. This supports H2 (Korean group members will send significantly fewer new (initiatory) tweets than American group members).

The Korean groups also sent significantly more friendly messages. Thus, H3 was supported (Korean group members will send significantly more friendly tweets than American group members). Overall, no significant difference was observed in the ratio of disagreeing messages between members of the American and Korean groups. Therefore, H4 (American group members will send significantly more tweets expressing disagreement than Korean group members) was not supported.

A post-experiment questionnaire was intended to measure satisfaction with communication and group cohesiveness. The measurement constructs and their items are adopted from earlier published studies (Chidambaram, Bostram, & Wynne, 1990/1991; Choi, 2004; Majchrzak, Beath, Lim, & Chin, 2005; Pornsakulvanich, et al., 2008). The number of respondents, after eliminating those who provided invalid and incomplete answers, is 46–23 from Korea and 23 from the U.S. A factor analysis was performed using principal component analysis. The items with factor loading values below 0.5 were removed (Fields, 2009). The Cronbach's alpha values of the finalized constructs are all over 0.7 and, thus, are considered acceptable (D. W. Straub, 1989) (0.71 for satisfaction with communication and 0.78 for group cohesiveness). The factor scores of the two constructs were used as dependent variables in subsequent analyses. The Pearson correlation coefficient of the factor scores for the two constructs was 0.78. Another GLM analysis was performed to examine the effect of country using task type as the control variable. The results are summarized in Table 5.

The country variable has main interaction effects with two constructs: satisfaction with communication and group cohesiveness. The Korean groups exhibited higher levels of both communication satisfaction and group cohesiveness. Therefore, H5 (American group members will experience significantly higher levels of satisfaction than Korean group members) was not supported and H6 (Korean group members will exhibit significantly greater group cohesiveness than American group members) was supported.

5. Discussion

In this section, we discuss the results of hypothesis testing, the importance of using Twitter on a mobile device, and the cultural differences evident in communication via this medium that were revealed in this study. For each hypothesis, we provide a plausible explanation of TMD usage behaviors in terms of cultural tendencies and inhibitions.

H1 (Korean group members will tweet each other significantly more often than American group members) was supported. The number and frequency of tweets instantiate the desire of the participants in these groups to establish progressive working relationships and achieve group goals. Evaluation of the tweets from the Korean groups showed that many expressed group harmony and friendly support, such as: "I am not terribly good at this kind of assignment. Please understand if I post messages making no sense, hahaha", "Wow! Your answer is good!", and "I know that all of you are busy preparing for a final exam. Let's do our best and have fun!".

As the scores for the gender (MAS) and individualism–collectivism (IDV) cultural dimensions for the Korean groups indicate, the feminine traits of caring for others and valuing the good of society

Table 5
GLM analysis of questionnaire responses.

Dependent variable	F values of the 'country effect'	Means (Factor scores)	
		U.S.	Korea
Satisfaction with communication	6.3*	-0.63	0.44
Group cohesiveness	5.7*	-0.42	0.40

*Significant at $\alpha = 0.05$.

**Significant at $\alpha = 0.01$.

over that of individuals were more prevalent, and their low IDV values indicated that they tried to conform to in-group norms, foster cooperation, and respond more favorably to group goals than the American groups, who focused more on the individual. Koreans are earnestly concerned about how others perceive them, and they care about other group members' experiences and in-group relationships, as suggested in previous research (Te'eni, 2001). In a demanding situation such as that provided in the experiments in this study, this tendency may become even more apparent. Their frequent tweeting and the higher number of personal tweets could therefore be ascribed to this attribute.

Among the American groups' tweets, there were none that noticeably expressed friendly sentiments like in the Korean groups' tweets. They were more concentrated on completing the given task. These results explain the Americans' high scores for IDV and MAS.

H2 (Korean group members will send significantly fewer new (initiator) tweets than American group members) was supported. The words "new" and "initiator" project an impression of doing something different than the status quo. In most cases, more time is needed to discuss a new, initiator idea. Suggesting a new idea can be viewed as creating value, disrupting, or causing controversy, depending on how the new initiator idea is received. This a priori view stems from culture. The results of testing of H2 corroborated the scores on the cultural dimensions for these two countries. The Koreans may have interpreted new, initiator ideas as a disruption of group harmony or provocation to group conflict, whereas the Americans readily listened to new initiator ideas and considered offering of such to be progressive behavior.

Low Korean scores for IDV and MAS compared to the Americans led us to believe that the Koreans would show a strong propensity toward prioritizing group goals over personal goals (Han, 2004; Singelis, Triandis, Bhawuk, & Gelfand, 1995; Tan, Wei, Watson, Clapper, & McLean, 1998; Triandis, 1998), which may explain why participants refrained from sending new initiator tweets. For Korean participants, the wish to avoid disrupting the group apparently prevailed over their desire to accomplish group goals. Thus, members of the Korean groups opted for stability and security over uncertainty and risk in this context. Conversely, members of the American groups were willing to accept new and different ideas. They were more tolerant of differences and accepting of risks.

The high values for uncertainty avoidance (UAI) also provide a plausible explanation for this result. Since raising a new issue usually creates uncertainty, people in a culture with high scores on the UAI would naturally try to avoid sending initiator tweets. These different behaviors of members of the American and Korean groups are also reflected in their indulgence vs. restraint (IVR) scores. The low IVR score of 29 for the Korean participants infers that, generally speaking, restraint is preferred over indulgence, whereas in America, indulgence is more common behavior, as individuals act in their own interests.

H3 (Korean group members will send significantly more friendly tweets than American group members) was supported. Scores on the IDV and MAS cultural dimensions demonstrate a significant difference in behavior between groups from the two countries. The

fact that members of the Korean groups sent significantly more friendly tweets than members of the American groups suggests that Korean group members warmly welcomed each individual within the group and valued each other's contributions. Korean group members were significantly more cognizant of group acceptance and conflict, placing less value on advancing individual agendas (Rice, et al., 1998; Ting-Toomey, et al., 1991). In terms of Bales' interaction protocol analysis, their tweets contained more "positive reactions," as expected.

A high number of friendlier tweets may also be interpreted in negative terms as a low frequency of critical tweets. It may be that people in collectivist cultures may be inclined to accept conditions that might be less beneficial to each individual, but which require a high degree of group approval. This conservative aspect of collectivist culture is sometimes balanced by "off-line" communications, in which individualist expressions are restricted to informal or unofficial settings where people feel more comfortable to release their inner feelings without fear of reprisal, thus preserving group harmony.

H4 (American group members will send significantly more tweets expressing disagreement than Korean group members) was not supported. The Korean participants sent a grand total of zero "negative answers", while the American participants sent very few. Since the amount of data for testing of this hypothesis was low, the difference was not significant. As the values for the MAS and LTO cultural dimensions indicate, people of Eastern culture generally avoid open confrontation in group contexts, preferring to deal with the conflict later (Vallaster, 2005). However, they are also highly motivated to accomplish group goals. In the group collaboration context utilized in this study, the Koreans were more focused on working collectively in an effort to complete the assigned tasks.

H5 (American group members will experience significantly higher levels of satisfaction than Korean group members) was not supported. In fact, the Korean participants actually reported a higher level of satisfaction with communication in this experiment. This result corroborates the findings of prior studies that people with collectivist mindsets are more concerned with group harmony and will exert substantial amounts of effort in ensuring that harmony (Tan, et al., 1998). In the comparison of values, the Korean participants had highly significant values for the total number of messages (F value 4.9, Korea 41.0 > U.S. 22.6) and the ratio of friendly messages (F value 17.2, Korea 0.37 > U.S. 0.08). Not only were they trying to complete the group task, but the Korean participants also sent many tweets to secure the relationships between group members. The effortlessness of executing a thumb drive smartphone maneuver and the device's easy tweeting capability were useful for the Korean participants to accomplish their goal while ensuring group harmony. This may explain why they sent more tweets than the American participants.

H6 (Korean group members will exhibit significantly higher levels of group cohesiveness than American group members) was supported. The relative scores for the IDV, long-term orientation (LTO), uncertainty avoidance (UAI), indulgence vs. restraint (IVR), gender (MAS), and power distance (PDI) dimensions all point to a high level of group cohesiveness for the Korean participants. This

result corroborates those of prior culture studies in which collectivists valued group relations over the needs of each individual; this has been echoed many times in this study. The collectivistic mindset prevailed over individualism in our experiment on the use of TMD as a group communication medium. In testing of H6, the cultural factors outweighed the impact of communication technology in the context of small-group collaboration via TMD.

6. Implications

The results of this study provide some theoretical and practical implications. First, we identified theoretical and conceptual pathways through which cultural traits impact the way people interact using communication IT on mobile devices. The results of this empirical study validated these relationships. The theoretical model provided herein may be the basis for future studies in this area. Second, we identified significant cultural differences in the way people interact when microblogging on mobile devices. Specifically, the frequency of messages exchanged, relative portion of friendly messages, and frequency of initiatory messages differed between the groups in this study. These results suggest that when people from different cultures engage in microblogging, cross-cultural misunderstandings may occur, as is known from existing literature focusing on face-to-face interactions. As a result, participants on both sides of a cultural divide could be left with poor impressions of the others' intentions and manners. The practical implication of this finding is that when engaging in mobile microblogging across cultural boundaries, one should consider the effects of culture in order to ensure success.

In this study, we also developed a framework to categorize and code tweets, which can be used in future studies. We encourage such studies, since we included only two cultures in the present study.

This study also provides practical guidelines to improve mobile microblogging services. In collectivistic cultures such as that in Korea, mobile microblogging should exploit those features that strengthen existing relationships with close friends or interested parties. For example, an ample supply of emoticons should be provided for users with collectivist mindsets to enable them to avoid conflicts or hostile atmospheres and to secure group harmony. Another possible way to support such customers is to add a function that makes sending a simple status message easy. For example, providing a set of frequently used phrases such as, "Good idea!", "I like it!", or "hahaha" to support others' messages would be useful.

This empirical study provides information on why emoticons or cartoon characters are so popular and important among users from collectivist cultures. There is actually a growing virtual market for emoticons in many countries with collectivist cultures. On the other hand, in countries with individualistic cultures, designing an interface that facilitates exchanging friendly and supporting messages may be less important than in collectivistic cultures. It may be more effective to ensure the technological soundness of the mobile microblogging platform for users from individualistic cultures. Ease of use and the technical capabilities of the device may be more enticing for them. Based on these findings, practitioners may design and implement their goods and services progressively for distinct cultural markets.

7. Conclusion

Culture is a variable that is always a subject to study because it is as much as deeply entrenched in a society, it is also bound to change and evolve. This substantially impacts how a technology is accepted and disseminated. This empirical study includes a two-

country comparison in which the cultural tendencies were examined of participants using Twitter on smart mobile communication devices. In order to gather the data, a microblogging coding protocol was developed that can be utilized in similar studies.

The conclusion that we draw from this study is that although Twitter on a mobile device certainly provides a set of compelling communication options and new expectations, tendencies of those using it generally conform to the findings of earlier CMC cultural studies (Elleson, 1983; Erez & Earley, 1993; Mann, 1980; Singelis & Brown, 1995; Triandis, 1988). Cultural propensities thus still play a role alongside technical factors in a cross-cultural setting. Therefore, team leaders and designers of group collaboration settings should take culture seriously. In addition, user-centered technology adoption and consumption may not be eclipsed by technology potency.

Given the results of this study and many results of earlier studies, culture outweighs the influences of new technologies. It is interesting to see if this behavior will continue, hence the future research studies. TMD is still in the early stages of commercialization; therefore, its use and impact will require further monitoring. A follow-up study is to evaluate "mature" TMD with its effects against evolving culture.

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