The Impact of Individualism—Collectivism, Social Presence, and Group Diversity on Group Decision Making Under Majority Influence

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ABSTRACT: Majority influence is the attempt by a majority of group members to impose their common position on group dissenters during group decision making. Because of globalization, the use of cross-cultural teams in group tasks is becoming increasingly common. The objective of this study was to investigate how national culture, social presence, and group diversity may affect majority influence in a group decision-making context. A total of 183 groups participated in a large-scale empirical experiment at multiple sites. The results show that the national culture of group minorities has a significant impact on majority influence and that the use of computer-mediated communication can reduce majority influence. The findings have both theoretical and practical implications for improving the outcome and the effectiveness of group decision making in cross-cultural environments.

KEY WORDS AND PHRASES: CMC, computer-mediated communication, culture, group decision making, group decision systems, group diversity, majority influence, social presence, virtual teams.

AS GLOBALIZATION INCREASES, FIRMS REALIZE that part of their competitive advantage depends on the development of superior collaborative capability. The current business environment often involves collaboration in face-to-face (FtF) settings but increasingly involves distributed virtual teams to cope with uncertain, ambiguous, and rapidly changing information. Virtual teams are physically dispersed teams that heavily rely on electronic communication and collaboration technologies for performing much of their work. These changes have underlined the importance of virtual teams and offshoring in the massive shift toward a global digital economy [59].

Given the prevalence of diverse multicultural work groups that are composed of members from contrasting national cultures, it is vital for businesses and managers to understand the challenges of different national cultures. A lack of understanding of cross-cultural collaboration can lead to a variety of problems. For example, organizational studies on teams involving more than one national culture show that such teams may experience more problems, such as conflict, misunderstanding, poor performance [61], and decreased trust [31], as compared to homogeneous teams. To enable effective collaboration, group members must first be willing to share information and then have an opportunity to contribute. However, individuals' motivation to voice opinions can vary greatly within the context of any work situation or environment [60]. Majority influence, the phenomenon of interest in this research, is a particularly problematic phenomenon in cross-cultural groups and merits further investigation.

Majority influence is the attempt by a majority of group members to impose their common position on group dissenters during a decision-making process [36]. Majorities can shape not only the judgments and behavior of individual members but also the way they think [51], which may result in poor group decisions and unfavorable

outcomes. We believe that national culture is a key element affecting majority influence, because the related phenomenon of conformity is partially a product of culture [6]. Different cultural perspectives may increase or decrease social tensions and problems associated with majority influence in groups.

Collaborative software or related group support systems, which are designed to improve group processes, can be used to dampen social-oriented information exchange [84]. This dampening effect may in turn decrease majority influence and improve opportunities for individual group members to contribute. In this paper, we refer to collaborative software as a common and generic umbrella term for computer-mediated communication (CMC) tools. A glaring limitation of existing studies on CMC is that most of them focus on Western cultures [20]. Only fewer than 30 empirical studies have focused on cultural issues [77]. CMC can increase participation; reduce domination, production blocking, and cognitive interference; and create greater equality of influence [11, 33]. However, the findings from previous research using participants from Western cultures may not be directly applicable to other cultures. Group members from different cultures may perceive group dynamics differently from traditional Western concepts of group behavior. This is one of the major reasons many management and organization practices developed in Western countries have failed when introduced to other cultures [35]. Furthermore, whether the use of CMC can promote greater equality of influence in culturally homogeneous and heterogeneous groups still needs to be empirically validated [3].

Although there have been extensive studies on majority influence in social psychology since the 1950s, few have investigated this issue from both cultural and technological perspectives. Thus, in this research, we are interested in exploring how majority influence is affected by cultural differences and whether majority influence can be diminished through CMC. Specifically, we aim to address several important research questions: Do group members from different cultures experience different levels of majority influence during group decision making? Do differences exist in the way that majority influence affects group decision making in FtF and distributed communication settings with or without CMC support? Does the effect of majority influence on group minorities vary from culturally homogeneous groups to culturally heterogeneous groups? To address these questions, we first developed a theoretical model to explain and predict how group minorities from different national cultures may behave under majority influence in various communication settings. We then operationalized the theoretical model into hypotheses, which were empirically tested in rigorous laboratory settings. Finally, we discuss the contributions, limitations, and future research directions.

Conceptual Foundation

Majority Influence

SOCIAL INFLUENCE REFERS TO THE WAY in which opinions and attitudes of one or more persons affect others. *Conformity,* the most dominant form of social influence [40],

is a process of conflict resolution in which deviant group members comply with a group's majority viewpoint. Because this line of research investigates how a majority can influence a minority to conform to its view, it is also referred to as *majority influence* research. A majority can be defined in at least three different ways [40]: (1) according to the number of members in each group, with the majority group being numerically greater than the minority group; (2) a majority typically holds the normative position (i.e., opinions and beliefs that reflect accepted societal standards in a society), whereas a minority holds an anti-normative position; and (3) based on the power relationship between the source and recipient of influence, majorities are higher in power than minorities. In congruence with the bulk of majority influence literature, we adopt the first definition.

Convergent-divergent theory [49] argues that majorities foster convergence of attention, thoughts, and alternatives considered. Movement from a minority position to a majority position is usually attributable to two assumptions: one is the belief that majority judgments are likely to be correct—an assumption termed *informational influence.* When informational influence occurs, the minority senses the "strength in numbers" about the majority's position. The other assumption is that individuals want to be accepted and therefore wish to avoid the disapproval that emanates from maintaining a minority viewpoint—an assumption termed *normative influence.* When normative influence occurs, minorities are not so much concerned about truth as they are concerned about being socially accepted. Discrepancy with a majority is surprising and stressful; it increases either the belief that one is inadequate or deviant or the doubt in one's own opinion [4]. To reduce such internal conflicts, people tend to adopt the majority position and convince themselves of the validity of that position by considering issues only from the majority perspective [50]. People might also be motivated to identify with or see themselves as similar to the majority in order to perceive greater status or power [47].

Strong majority influence can result in poor organizational decisions, because people fear reprisal from the majority [74]. A study of U.S. juries showed that in more than 85 percent of all judicial cases, the majority position on the first ballot was the final verdict [34]. Another study showed that when a position source comprised 50 percent of a group's position, there was compliance to that position without detailed processing of the position's messages [41].

Culture

Fundamentally, culture is conceptualized as shared symbols, norms, and values in a social collectivity, such as a country [27]. Beyond national culture, culture also represents shared values and attitudes within a specific organization or in other forms of social grouping [82]. One way to clarify the concept of culture is to identify dimensions of cultural variation [76]. The most popular cultural theory that has been adopted in information systems (IS) research is Hofstede's model of national culture [27], which was developed based on a large body of survey data about the values held by employees in local subsidiaries of IBM in more than 50 countries. His model defines

five cultural dimensions that are based on value orientations that are shared across cultures: power distance, individualism–collectivism (I-C), masculinity–femininity, uncertainty avoidance, and Confucian dynamism.

Some researchers criticize Hofstede's model on the grounds that it is rather crude and simplistic, that a survey may not be a suitable way of measuring cultural differences, and that a study of the subsidiaries of one company may not provide information about entire national cultures. Yet Hofstede's model has been widely validated by more than 140 studies [78], making it generalizable to different settings [44, 64]. Moreover, it is the most commonly adopted model in cross-cultural CMC research. His general cultural constructs or dimensions can be useful in helping explain potential differences in culture regarding the use of technology [81]. Myers and Tan [48] examined 36 studies on culture in the management information systems literature; among them, 24 used one or more dimensions of Hofstede's model. Therefore, we adopted Hofstede's cultural model in this research.

National culture plays an important role in group interaction because it has a direct impact on individual behavior [14] and on how people use products and technologies [30]. Culture affects interpersonal communication, influencing, for example, situational factors of communication, self-conception, verbal and nonverbal communication, and interpersonal relationships [24]. It is one of the promising dimensions of technology-based group research that has a tremendous impact on organizations [68]. Organizations from different countries must strategically work together on major projects, such as joint ventures and localization programs; thus, managers and researchers need to deepen their understanding of the effect of national culture on management.

Computer-Mediated Communication

Improving group processes and outcomes via CMC has been one of the most highly investigated research issues in the past two decades [10, 53]. By breaking down communication barriers, CMC may help group members convey information or opinions that may not be otherwise conveyed in a traditional FtF, non–CMC-supported environment [32, 37, 38].

Because CMC is designed to improve teamwork, research on CMC also needs to be extended to cross-cultural teams to examine how it can improve their performance. Given the importance of national culture, CMC-based cross-cultural studies "are highly relevant to a post-industrial society in which managerial teams, often composed of individuals from different national cultures, will make extensive use of information technology (IT) to support group decision-making" [84, p. 54]. Because people who possess different values, preferences, and beliefs may view and use CMC differently, the ways that CMC can change group behavior are likely contingent upon national culture [73, 80]. Despite the increasing diversity of global virtual teams and the promise of CMC to help such teams, only a handful of studies have attempted to investigate the use of technology in culturally heterogeneous teams (e.g., [3, 9, 62, 71]), but none of them has examined majority influence.

Theoretical Model and Hypotheses Development

A problem in existing IS multicultural research is that it is either atheoretical or the theories are developed at an inappropriate conceptual level. Creating theoretical propositions about specific national cultures without addressing the underlying mechanisms that make these cultures different is problematic. An examination of underlying theoretical mechanisms of national culture needs to take place to help explain important behavioral differences of group members that can generalize to a variety of circumstances.

We predict, based on Hofstede's model, that a difference will exist between the behavior of Chinese group minorities and that of U.S. group minorities under majority influence. The primary reason for those differences is that Chinese group members are expected to lean strongly toward collectivism, and U.S. group members should lean strongly toward individualism. Specifically, we concentrate on explaining differences in the acceptability of majority views in homogeneous individualistic and collectivistic groups as well as in culturally heterogeneous groups—all in three types of communication settings with different levels of social presence. Our research model is shown in Figure 1.

The Impact of Culture on Majority Influence

By examining Hofstede's model, researchers can hypothesize which dimensions would most likely play a role in the treatment of the IT artifact [21]. Among five dimensions of Hofstede's model, we believe the cultural difference in the I-C dimension (ICD) is most appropriate to be used to explain the potential difference in majority influence because:

1. We desire to keep our theory succinct and relevant. Starting with a model that accounts for all five of Hofstede's dimensions as independent variables is an unwieldy place to start building a useful theory in our context. One reason for this is that those five dimensions do not follow the same direction, and they exist as separate theoretical constructs [18]; thus, researchers normally consider only one or two dimensions at once.

2. Triandis [75] suggests developing hypotheses concerning the relationship between culture and social behavior based on the ICD of Hofstede's model. *Individualism* describes cultures in which the ties among individuals are loose, while *collectivism* describes cultures in which people are integrated into strong, cohesive groups that protect individuals in exchange for unquestioning loyalty. The ICD is the most commonly used dimension in cross-cultural research while explaining why groups in some countries are more willing to adhere to group norms than those in other countries, and is a pertinent factor for CMC research in organizations and groups [74]. Thus, we argue that the ICD is directly related to the phenomenon of interest of this research, majority influence, because this dimension involves group cohesion, conflict resolution strategies, and the
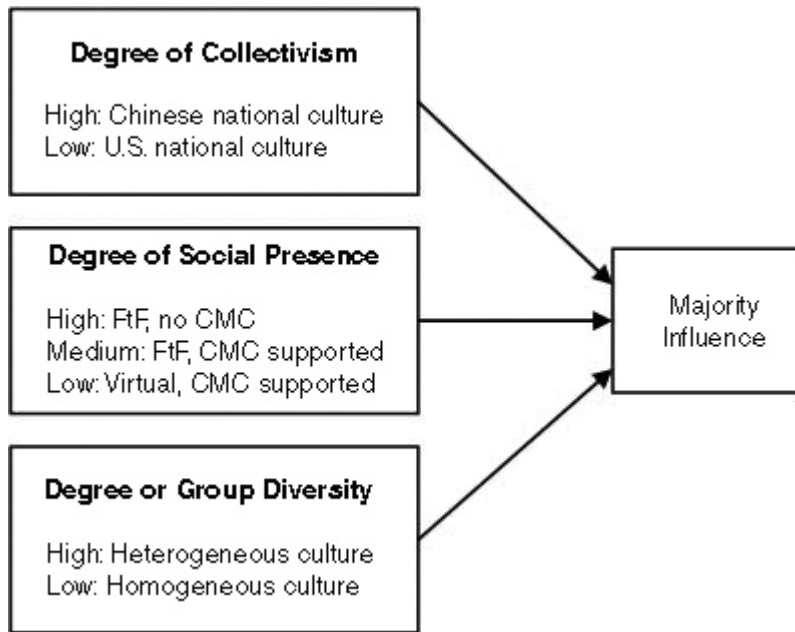
Figure 1. Research Model

willingness to challenge different opinions. The ICD best reflects cross-cultural variations in conformity behavior, such as majority influence [6].

3. The target participants in our experiment were undergraduate students with similar status in universities. They had no previous working relationships, and no hierarchical social structure existed among them. Thus, status differences did not exist and the effects of the power distance dimension can be ignored.

4. Given the nature of the task and the experimental design used in this study (e.g., one session), the differences between cultures in masculinity–femininity, uncertainty avoidance, and Confucian dynamism would have relatively little impact in this study.

5. In terms of relevance and practicality, the ICD neatly aligns with the national cultures of China and the United States; this alignment allows clean operationalization for testing the model. The practical significance of the ICD applied to China and the United States is extremely high considering that these are two major world powers that are increasingly involved in joint ventures using heterogeneous and distributed teams.

Based on the ICD, we first predict that minorities with individualistic cultures would be less susceptible to majority influence than those with collectivistic cultures. In an *individualistic* culture, ties between people are loose, and task concerns prevail over relationship concerns [27]. Such cultures highly value freedom and individual rights. People tend to think or act independently and are largely unconnected with others.

They view conformity to group norms as being associated with relinquishing one's autonomy, not being in control, and being pushed around. When a conflict arises between personal and group goals, it is considered acceptable for individual goals to be placed ahead of collective goals. As a result, individualists tend to follow their own conscience and make their own choices without being affected or controlled by any external cause [39]. When people in an individualistic culture disagree with a majority position, they are likely to resolve conflicts via open and direct communication.

In contrast, a *collectivistic* culture is one in which people are integrated into strongly cohesive groups and base their self-understanding on the reactions of others. This type of culture focuses on keeping balance and harmony within a group [19], and relationships among group members prevail over tasks when making group decisions [27]. Such group members tend to employ indirect means for conflict resolution because the maintenance of harmony within the group and the ability to forge consensus are highly regarded [16]. When a conflict between personal and collective goals occurs, subordination of personal goals to the collective goals is helpful in promoting values such as harmony, humility, courtesy, patience, and obedience [42]. Collectivists typically hesitate to speak up in a group, try to coordinate their actions with those of others to minimize social friction, and have an abiding fear of being separated or disconnected from the group. Collectivists are accustomed to conforming and restricting their ideas, even when using CMC [26]. They are more inclined to modify their own preferences and positions to conform to a group and behave more cooperatively than individualists are [5], which is expected to result in a higher level of majority influence. In summary, we propose that the degree of collectivism of group minorities is a positive function of majority influence:

> *Hypothesis 1: Majority influence will be manifested more strongly on collectivistic group minorities than on individualistic group minorities.*

Cultural diversity can refer to national, organizational, or professional differences [27]. In this study, group diversity refers to the cultural diversity of group members—either all group members are from the same national culture (homogeneity), or they are from contrasting national cultures (heterogeneity), as operationalized by the ICD. There are three streams of research on the impact of heterogeneity on team effectiveness [17]: (1) organizational demography literature, which examines the differences in observable characteristics, such as age or functional background; (2) cultural diversity literature, which highlights demographic variables presupposed to relate directly to cultural attributes, values, and perceptions; and (3) group research, which addresses team composition effects. Our study belongs to the third category.

Team similarity is considered to be positively associated with team effectiveness and interpersonal attraction [17]. Diversity in race and nationality appears to interfere with group process more than does homogeneity in organizational teams [66]. Because homogeneous team members share common views and are likely to interpret and evaluate situational events and management practices in similar ways, they generally report stronger affinity for their teams than those in culturally heterogeneous teams. In contrast, members from different cultures in a group are more likely to respond

differently to the same event or managerial approach [23]. They do not share the same mental models that enable shared understanding [7]; they experience more difficulty while agreeing on what is important and working together—resulting in diminished group harmony and cohesion, and causing psychological pressures such as discomfort and a weak sense of belonging to a group [62]. Cultural differences among group members may amplify ambiguity, complexity, and confusion in group decision making [8], and may cause variations in members' attitudes, values, and overall performance, potentially leading to conflicts when team members interact [85]. These problems can foster mistrust and miscommunication among team members and increase stereotyping, which result in the inability to validate ideas and arguments, gain consensus, and reach decisions [1].

Social identity theory (SIT) [72] can further reveal the nuances of cultural diversity in groups. *Social identity* is an individual's self-concept, derived from perceived membership of social groups [29]. Namely, it is an individual-based perception of what defines "us" as associated with any internalized group membership. Social identities assume some commonality with others; therefore, people's social identities are grounded in their perceptions of social group membership. SIT asserts that group membership creates an in-group—or self-categorization in ways that favor an in-group at the expense of an out-group. The evaluation of one's own group is determined with reference to other groups through social comparisons in terms of value-laden attributes. The mere act of individuals' categorizing themselves as group members can lead them to display in-group favoritism. After being categorized as members of a group, individuals seek to achieve positive self-esteem by positively differentiating their in-group from an out-group on some valued dimensions. SIT suggests that the more the conflict exists between group members, the more likely those individuals will judge one another on their group affiliation rather than on individual characteristics. However, newly formed culturally heterogeneous groups (as in this study) probably would not have sufficient time to adjust to substantial cultural differences [85].

Based on SIT, we argue that group minorities who identify their in-group should be more susceptible to majority influence. Conversely, minorities who see themselves as different from other group members are more likely to view the majority as an out-group and hence become more resistant to majority influence. Therefore, we predict that group diversity has a negative impact on majority influence—namely, the higher the cultural diversity, the weaker the majority influence:

> *Hypothesis 2: Majority influence will be manifested more strongly in culturally homogeneous groups as compared to culturally heterogeneous groups.*

For collectivists, avoiding conflicts and achieving group goals are highly valued. Prior studies have shown that collectivists in culturally heterogeneous groups normally attempt to increase their levels of cooperation when cooperative behavior is expected [3]. Under the condition of cultural diversity, collectivists are likely to make more effort to achieve group harmony and consensus than individualists. In contrast, as strong individualists, U.S. group members are simply much more independent and naturally lean away from creating deep collective ties [14]. Thus, U.S. participants are

less likely to be affected by majority influence, especially when they are the minority in culturally heterogeneous groups and have strong sense of out-group:

> *Hypothesis 3: Majority influence on collectivistic minorities in culturally heterogeneous groups will be manifested more strongly than that on individualistic minorities in culturally heterogeneous groups.*

The Impact of Social Presence on Majority Influence

The effect of social presence on majority influence can be explained using social presence theory. *Social presence* can be defined as "the degree to which a medium facilitates awareness of the other person and interpersonal relationships during the interaction" [22, p. 118]. FtF communication tends to have the most number of social cues, so it is typically viewed as being high in social presence [45], while CMC media have fewer social cues and are typically viewed as being low in social presence. In addition, distributed teams that rely on CMC generally have less social presence than FtF groups [60].

Social presence theory predicts that media low in social presence may not be suitable for intersubjective interpretation when interactivity and reciprocity are needed in communication [45]. Central to social presence theory is the assumption that "the presence of the information sender influences recipients' understanding of the message" [45, p. 89]. A communication medium that provides more social cues will generate a higher level of social presence, thus leading to increased direct confrontation and stronger social pressure and normative influence on individual group members [60, 74]. The fear of rejection by other group members can be reduced by alleviating or avoiding direct confrontation through media with fewer social cues or by having individual judgments or comments given anonymously [13]. For example, Rains [57] demonstrated through a meta-analysis that group support systems, a leaner medium with lower social presence, increased influence equality and reduced group member dominance. Thus, we propose that the level of social presence of communication media is a positive function of majority influence.

Following several related studies (e.g., [12, 60]), we operationalized social presence in this study by using three communication settings with different levels of social cues—namely, FtF non-CMC groups, FtF CMC groups, and distributed CMC (dCMC) groups. Group minorities in the FtF non–CMC-supported communication environment are expected to be less willing to challenge majority positions than they are in both CMC-supported environments, because FtF communication is the richest medium that offers the largest number of social cues by which group majorities can exert the most influence on group minorities. In an FtF setting, more verbal or nonverbal cues are available and can be processed to form interactivity, reciprocity, and interdependence among communication partners than in CMC-supported settings [59]. Extensive research has compared the outcomes of U.S. groups in traditional FtF non–CMC-supported environments versus those in CMC-supported environments and suggested that the use of CMC would increase equality in participation and reduce

social pressure to conform [54]. Members in FtF CMC-supported groups exchange opinions using textual and visual cues; however, because voice cues are removed, the majority will exercise less normative influence and conformity pressure on the minority than in FtF unsupported communication.

In a dCMC setting, group members are physically located at different sites. They exchange opinions through textual cues only. Because of the removal of both voice and visual cues, a dCMC setting has the fewest social cues among the three communication settings, resulting in the lowest levels of social presence and normative influence [67]. Another feature that dCMC allows, which we used in this study, is the provision of anonymity, which further reduces social presence among group members. Anonymity enables individual contributions to group discussions without identification [33, 56]. This feature helps overcome the conformance pressure [79] that occurs in groups when team members do not want to criticize any other team member's effort or elicit a dissenting viewpoint. By lowering social presence, anonymity may reduce evaluation and communication apprehension [65] and increase the tendency of group members to resist or disagree with the majority view.

> *Hypothesis 4: Majority influence will be manifested more strongly in FtF non-CMC groups, followed by FtF CMC groups, and finally in distributed CMC groups.*

As stated above, compared with the other two communication settings, dCMC generally lowers social presence in group communication. It is believed that the Chinese culture values a more high-context, subtle form of communication that relies more heavily on nonverbal cues than does individualistic culture [25]. Therefore, Chinese participants would be more negatively affected by the lost social cues when going from FtF to a distributed setting in comparison to U.S. participants. Accordingly, Chinese majorities in homogeneous distributed groups would be restricted or handicapped in exerting majority influence on Chinese minorities. In contrast, the U.S. majorities in homogeneous groups can easily adapt themselves to low-context communication in distributed settings and exercise strong majority influence on Chinese minorities. In addition, people tend to focus on arguments rather than on presenters in a distributed communication setting [54]. Chinese participants would likely lower their caution regarding their differentiation between in-group and out-group members in a distributed setting, and thus may lean toward the majority position more easily when the influence is stronger.

> *Hypothesis 5: In a distributed CMC setting, majority influence will be manifested more strongly on collectivistic minorities in heterogeneous groups than in homogeneous Chinese groups.*

Methodology

TO TEST THE ABOVE HYPOTHESES, WE CONDUCTED controlled laboratory experiments with a $3 \times 2 \times 2$ factorial design that manipulated social presence, national culture of group minorities, and group diversity. A total of 183 four-member groups participated in the study.

Operationalization of Independent Variables

As introduced earlier, we operationalized social presence as the communication medium with three different settings. In the FtF unsupported setting, four group members sat FtF in a lab. The group members' decisions were presented on a whiteboard so that every member could see them, and then group members explained their opinions to the rest of the group, one person at a time. Therefore, this medium provided multiple cues, including voice, visual (i.e., participants saw each other and decisions on the whiteboard), and other verbal cues. It offered the highest social presence among the three settings. The FtF CMC setting was similar to the FtF unsupported setting, except that each group member worked on the task only through a CMC system that we developed for this study rather than through oral communication. Hence, it had a moderate level of social presence. In dCMC groups, group members sat in different rooms and did not see each other at all before, during, or after the experiment. Like members in FtF CMC groups, members in dCMC groups also worked on the task only through the same CMC system. This communication medium included only textual cues and was the medium with the lowest level of social presence.

The national culture construct is the ICD of Hofstede's cultural model. It is suggested that U.S. culture leans strongly toward individualism, whereas Chinese culture leans strongly toward collectivism [5]. Although mainland China was not included in Hofstede's original study, Chinese residents of Hong Kong and Taiwan were shown to be collectivists [27]. In this study, we conducted a manipulation check of the ICD for all participants to further validate our assumption that a significant difference exists in this dimension between Chinese participants and U.S. participants. We operationalized group diversity with two levels—culturally homogeneous (low on group diversity) and heterogeneous (high on group diversity).

Choice of Group Size

Empirical evidence reveals that a majority of three members has the maximum influence on minorities [51] and that larger majorities do not exercise much more influence [46]. Therefore, we used four-member groups in all communication settings in this study, attempting to form a three-member majority during experiments.

Participants: Naive Participants and Confederates

Participants were undergraduate students recruited from four universities. They all contributed to the study on a voluntary basis and were compensated monetarily. Human-subject protocols were followed at all participating institutions. Participants of Chinese homogeneous groups were recruited from two universities in Beijing, China, whereas participants in culturally heterogeneous groups and U.S. homogeneous groups were recruited from two universities in the United States. Ideally, we would have liked to have each culturally heterogeneous group formed with U.S. participants in the U.S. and Chinese participants in China. However, this was infeasible due to the requirement

of an FtF communication environment and a 12-hour time zone difference between China and the United States. In culturally heterogeneous groups, Chinese members were students who had been in the U.S. for at most two years and spoke any dialect of Chinese as their native language. They could speak and write English effectively. In this way, Chinese participants in these groups would not have language barriers, and we could reasonably assume that they maintained their original collectivistic cultural values, which was further confirmed via the manipulation check. This approach has been used in other studies (e.g., [63]). All participants in CMC groups were familiar with computers and online communication. Among all participants, 57.9 percent were male, 66 percent were between ages 20 and 25, 14 percent were between ages 25 and 29, and others were older than 30.

Each group included one naive participant (i.e., the minority) and three confederates who were specially trained in advance and followed specific, predeveloped instructions in the experiment to form a majority of three. Confederates were master-level graduate students who did not know naive participants but were of similar ages. They were used in the same way across all groups and all settings so that we could guarantee that a unanimous majority of three would be formed in every group in a consistent and predictable manner. To maximize the consistency of confederates and minimize unnecessary mistakes, we trained four or five confederates at each participating institution and used them repeatedly in all group sessions. This strategy also provided the advantage of eliminating within-group variation. In addition, confederates could never yield to the naive participant, so minority influence did not exist.

None of the naive participants had prior knowledge about the experimental task. When we formed groups, each naive participant was informed that all other group members were students similar to him or her in order to avert status difference. Under such a setting, status effects [15] and group member proximity effects could be considered minimal. Because the focus of our study was not to examine the changes of majority influence in groups over time, we conducted the experiments in one session rather than in a longitudinal study, which increased experimental control and reduced difficulty in logistics and execution. Finally, we also tried to balance gender in groups so that half of the members of each group were male.

Group Task

In this study, we selected a preference task, in which groups aimed to select, by consensus, a preferred alternative based on contextual norms. In this type of task, the majority position is usually taken as the norm against which other (minority) positions are compared.

Because the task selected for this study had to be equally understandable by both Chinese and U.S. participants, we chose a well-known group decision-making task called desert survival. The hypothetical task scenario was as follows: participants were trapped in a desert but had saved eight items. Group members were required to work together to rank those items in terms of their importance to desert survival. The task went through a number of rounds. In each round, members were required to

rank or rerank those items based on their own judgment and teammates' rankings and opinions in the previous round(s), and to explain their rankings to the rest of the group. This was repeated until either the group reached a consensus on the ranking or the group had already gone through eight rounds (the termination condition), depending on which came first. An advantage of selecting such a task was that it minimized the side effect of personal knowledge and background on the task—through a preexperiment questionnaire, we collected demographic information about participants and confirmed that no participants in this study had any prior knowledge or experience with desert survival. No time pressure or restrictions were imposed on this task in any of the experimental settings. Group members were told to take as much time as necessary to generate the best ranking.

All participants in the U.S. were provided with an English version of the task scenario and instructional materials, which were translated into Chinese and back-translated by bilingual professionals in advance to ensure cross-language equivalence in meaning. The validated Chinese versions of those documents were provided to participants in China. Prior to the formal experiments, we conducted pilot studies at all participating sites. Participants in those studies did not report any problems or misinterpretations with the task or instructions.

TeamDiscussion: A Web-Based Collaboration Software

To support this research, we developed a Web-based CMC tool called TeamDiscussion, which was used by all CMC-supported groups through a Web browser at all sites. Figure 2 shows the main system interface, which consists of three parts: (1) the upper section shows the ranking results of the previous and current rounds from each member of a group, (2) the middle section displays the explanation from each group member (e.g., par_a is the naive participant) on his or her ranking in the previous/current round, and (3) the bottom portion allows individual participants to rank those eight items (left) simply by clicking "Move Up" and "Move Down" buttons and to provide explanation for their rankings (right) in the current round.

In CMC groups, every participant had his or her own computer to work with. In each round, each group member ranked items and provided explanations to his or her ranking in the bottom section. The submitted rankings and explanations would immediately appear in the ranking table at the top and in the middle "Comments" field, with submitters' experimental IDs attached. However, the system was carefully designed so that in any round, no naive participants would be able to see other group members' rankings and explanations before submitting his or her own. A round was finished after all members submitted their rankings and explanations. If a group had not reached a consensus decision on rankings, the system automatically started the next round and the same process was repeated. The entire session would end automatically when one of the two termination conditions introduced in the previous subsection occurred. The whiteboard used in FtF unsupported groups or the TeamDiscussion system in CMC groups always displayed rankings generated only in the previous and current rounds.
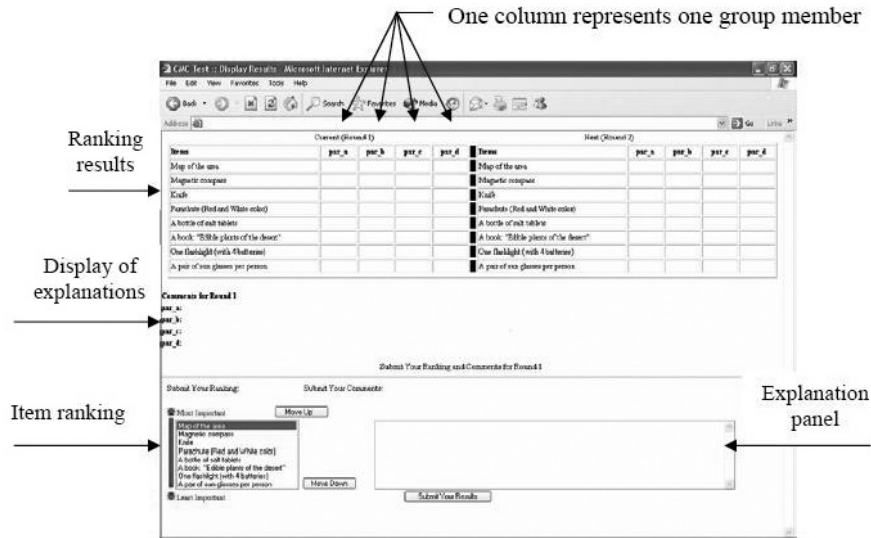
Figure 2. System Interface (at the beginning of the first round)

Experimental Procedures

The experimental procedures were as follows: each participant read an introductory article about desert survival before coming to the lab to participate in the experiment. The article provided some generic knowledge about desert survival but did not discuss any specific items used in the task. Upon their arrival, group members were ushered to prearranged seats according to experimental settings introduced earlier. To increase realism, in the distributed CMC setting, the naive participants were also told that their group members were located at remote sites at that moment and would work with them through the TeamDiscussion system in real time. Then a facilitator introduced the objective of the study and national culture and experimental IDs of all group members. The four members of each group were assigned experimental IDs as A (the naive participant), B, C, and D (confederates). The facilitator's role was to coordinate an experimental session without participating in any discussions or judging rankings. In addition, the facilitator also informed participants that the task would go through a number of rounds and that they would be notified to stop at a certain point. Such an approach has been adopted by other studies on majority influence because participants need some time to respond to such influence [52]. To ensure consistency, we used the same facilitator across sessions at each site, and a carefully scripted procedure.

The first round was slightly different from the subsequent rounds because confederates had to wait till the naive participant submitted his or her ranking, and then they generated their rankings by reshuffling the ranking of the naive participant according to predefined instructions. Those predefined reshuffling strategies were tested, refined, and finalized through pilot studies. By this method, confederates created initial

rankings that were significantly different from the naive participant's as well as from other group members' in order to minimize the potential suspicion from the naive participant. Starting from the second round, there would be no requirement for the order of ranking submission for confederates—they ranked items by completely following scripts, regardless of the naive participant's ranking. In particular, confederate B was instructed to keep his or her first-round ranking unchanged for the remaining rounds, while confederates C and D were instructed to change their rankings in the second and third rounds, so that their rankings would become the same as that of confederate B at the end of the third round, creating a unanimous majority ranking. Such a procedure was used to prevent suspicion from the naive participant. In our study, no naive participant ever suspected the roles of confederates, as shown in the postexperiment questionnaires. After the third round, all confederates would keep their unanimous ranking unchanged (i.e., maintaining majority) and provide explanations only for different rankings of the naive participant based on certain guidelines. The gap between the rankings of confederates and that of the naive participant, along with normative statements provided in the explanations, enabled confederates to exercise persistent normative influence on the naive participant.

Operationalization of Dependent Variable (Majority Influence)

We adopted a proven surrogate measure of majority influence based on the number of rounds each group took to reach a consensus decision, as used by Tan et al. [74]. The number of rounds to reach a group consensus represented how long it took a naive participant to yield to the majority influence formed by confederates. The larger the number of rounds taken by a naive participant to follow the majority's ranking in order to reach a group consensus, the lower the majority influence. If a naive participant did not yield to the majority after eight rounds, a value of nine was assigned to this dependent variable.

Data Analysis

Manipulation Check

GIVEN THE OBJECTIVE OF THIS STUDY, the assumed difference in I-C between U.S. and Chinese cultures was a pertinent factor. We adopted the Values Survey Module 94 developed by Hofstede for a preexperiment manipulation check on national culture, and we found that Chinese participants ($\mu = 68$) were significantly lower on the index of individualism than U.S. participants ($\mu = 88$). A t-test confirmed the significance of this difference ($t_{181} = 2.22$, $p < 0.05$) and demonstrated the evidence of successful manipulation on culture in terms of I-C. Particularly, the I-C scores of Chinese and U.S. participants in culturally heterogeneous groups were significantly different ($p < 0.05$), further confirming the manipulation of group diversity.

Results

Table 1 summarizes the descriptive statistics of the dependent variable. Table 2 shows the results of an analysis of variance (ANOVA) on the dependent variable, which met the homogeneity and the normality requirements of the ANOVA.

ANOVA results revealed a significant main effect of the national culture of group minorities on majority influence ($F(1, 171) = 19.3$, $p < 0.01$). Chinese participants took significantly fewer rounds ($\mu = 5.41$) to follow the group majority and reach a group consensus than their U.S. counterparts ($\mu = 6.28$), indicating that the majority influence in the collectivistic culture was significantly stronger than that in the individualistic culture. Thus, H1 was supported.

ANOVA results showed that the main effect of group diversity was not significant ($F(1, 171) = 1.23$, $p = 0.27$). Therefore, H2 was not supported.

A post hoc analysis of the main effect of national culture of group minorities showed that Chinese minorities in culturally heterogeneous groups took significantly fewer rounds to follow the majority ($\mu = 5.5$) than U.S. minorities in heterogeneous groups ($\mu = 6.5$, $p < 0.01$). The pattern can be observed from the comparison shown in Figure 3. Thus, H3 was supported.

A significant main effect of communication medium ($F(2, 171) = 29.5$, $p < 0.01$) on the majority influence was found. A significant interaction existed between national culture of group minorities and communication medium ($p < 0.05$), which implies that the effect of culture on majority influence may vary in different communication media featuring different levels of social presence. A further Fisher's least significant difference (LSD) analysis showed that group minorities in the FtF unsupported setting took significantly fewer rounds to reach consensus ($\mu = 4.8$) than those in the FtF CMC setting ($\mu = 6.5$, $p < 0.01$) and dCMC setting ($\mu = 6.3$, $p < 0.01$). The results showed that much stronger majority influence existed in the FtF unsupported setting than in both CMC-supported settings. Yet no significant difference in majority influence was found between FtF CMC and distributed CMC settings ($p > 0.05$). Thus, H4 was partially supported.

The results of contrast analysis of the effect of group diversity showed that in the distributed CMC setting, majority influence on Chinese minorities was higher in heterogeneous groups than in Chinese homogeneous groups ($F(1, 30) = 4.966$; $p < 0.05$). Thus, H5 was supported. There was no significant interaction between group diversity and the national culture of group minorities, and between group diversity and communication medium.

Discussion

CROSS-CULTURAL GROUP RESEARCH PRESENTS several challenges that are applicable to our study. It took our research team a year and a half to gather the data at different research sites. The tasks of recruiting appropriate participants, designing instructional scripts, finding an appropriate group task that was suitable to participants in both cultures, and coordinating experiments at several sites were particularly challenging. These

Table 1. Descriptive Statistics of the Dependent Variable

Communication medium	National culture of group minority	Group diversity	Majority influence		Sample size (number of groups)
			Mean	Standard deviation	
FtF unsupported	United States	Homogeneous	4.7	1.4	18
		Heterogeneous	5.1	1.2	12
	China	Homogeneous	4.9	1.3	23
		Heterogeneous	4.6	0.9	12
FtF CMC	United States	Homogeneous	6.8	1.3	15
		Heterogeneous	7.2	0.8	11
	China	Homogeneous	6.1	1.3	20
		Heterogeneous	5.9	1.1	12
Distributed CMC	United States	Homogeneous	7.1	1.2	16
		Heterogeneous	7.3	1.1	12
	China	Homogeneous	5.2	1.3	20
		Heterogeneous	6.1	0.9	12

Table 2. Results of ANOVA Test on the Dependent Variable

	Degrees of freedom	F	p
National culture (NC)	1	19.3	0.00**
Group diversity (GD)	1	1.23	0.27
Communication medium (CM)	2	29.5	0.00**
NC × GD	1	0.14	0.71
NC × CM	2	4.16	0.02*
GD × CM	2	0.55	0.58
NC × GD × CM	2	1.39	0.25

* $p < 0.05$; ** $p < 0.01$.
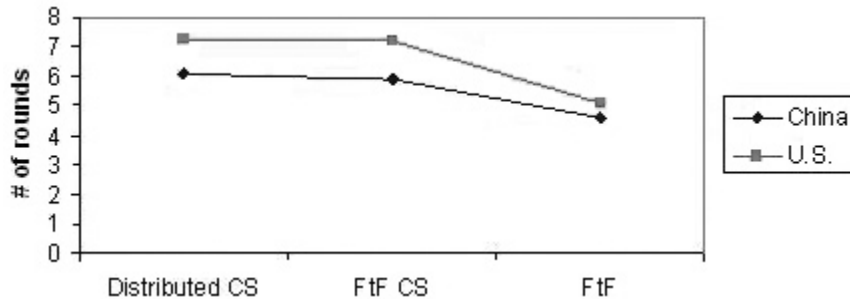
Figure 3. Number of Rounds Taken in Culturally Heterogeneous Groups

issues probably help explain why there have been very limited empirical studies that examine culture's effect on different group processes and outcomes in the context of technology use.

This study provides insights into how majority influence may be affected by the degree of collectivism of group minorities, social presence, and group diversity in group decision making. We make several theoretical and empirical contributions to the study of national culture in the context of technology-supported FtF and virtual teams, which has been called for by several researchers (e.g., [21, 69]). This section first summarizes our results, then discusses the implications for theory and practice, along with its limitations and future research possibilities.

Summary of Findings

First, the results show that national culture significantly affects majority influence, which we attribute to the disparity in social norms and cultural beliefs of group members who are from disparate national cultures. Specifically, results supported our prediction that majority influence on collectivistic group minorities is manifested more strongly than that on individualistic group minorities (H1). Thus, the level of

majority influence on group minorities appears to depend on their national cultural propensity toward collectivism (or individualism).

Second, we did not find significant evidence to support our prediction that majority influence on group minorities would be stronger in culturally homogeneous groups as compared with that in culturally heterogeneous groups (H2). This unexpected result indicates that group minorities in our experiment behaved consistently in the way that conformed to their national cultural norms and beliefs regardless of the degree of group diversity and the national culture of the majorities.

Third, we found significant support for our prediction that in culturally heterogeneous groups, majority influence on collectivistic minorities would be stronger than that on individualistic minorities (H3). This indicates that there indeed exists a different value system between individualistic and collectivistic cultures in how their participants deal with being a minority in a culturally diverse group.

Fourth, we found that majority influence in a group is a function of social presence, as operationalized by the communication medium. Specifically, we found that minorities in FtF unsupported groups experienced a higher level of majority influence than FtF CMC groups and dCMC groups (H4). However, there was no significant difference between FtF CMC groups and dCMC groups. This finding implies that, in general, removal of some nonverbal cues (e.g., voice and facial expression) can result in significantly less social presence and conformance pressure, and in turn less majority influence. Such nonverbal cues, which are typically available in the FtF unsupported setting, may enable group majorities to exercise the strongest influence on group minorities. Compared with FtF CMC, removing visual cues in a distributed CMC setting seems not sufficient to reduce social presence significantly to impact majority influence.

Fifth, we found that majority influence was manifested more strongly on Chinese minorities in heterogeneous groups than in homogeneous Chinese groups in a distributed CMC setting (H5). In other words, despite collectivists' cultural inclination toward supporting or agreeing with in-group members, if collectivistic majorities are restricted by the low social presence imposed by a communication medium or if a communication medium does not match communication needs, the group decision-making outcome would be more likely to be determined by the amount of normative influence exercised rather than cultural similarity.

Aside from testing our hypotheses, we found an interesting relationship between the CMC use and decision time. Previous research has reported mixed findings about the impact of CMC use on group decision time [55]. In this study, we observed the shortest performance time in the FtF unsupported groups (mean = 50 minutes), in comparison with FtF CMC groups (mean = 74 minutes) and dCMC groups (mean = 95 minutes). In other words, the decision time increased while using CMC. Such a phenomenon can be explained as follows. First, as a richer medium, the FtF unsupported setting affords more rapid feedback than CMC settings. In CMC environments, group members tend to spend more time on processing normative information and composing their arguments. Second, CMC enables participants more time to think, edit, and refine their arguments in comparison with FtF unsupported communica-

tion. These differences not only likely contribute to the different levels of majority influence but also could lead to different levels of quality and satisfaction of group decision making.

Implications for Theory

Our primary theoretic contribution is that culture matters in group decision making involving majority influence. We carefully explained and examined why and how collectivistic and individualistic group minorities under majority influence reacted differently in three distinct communication settings. We also extended the cultural dimensions by accounting for social presence and group diversity. To our best knowledge, this is the first study to examine the effect of group diversity on majority influence. In addition, this is one of the few cross-cultural empirical studies using technology-supported teams.

As a further theoretical contribution of this work, it is critical to emphasize that Hofstede first published his theory on the ICD in 1980. Since then, we have seen dramatic changes in the global economy (with China and the United States at the forefront of these changes), the advent of the Internet, political and economic reform in China, increases in global travel, changes in how corporations compete, increased ethnic diversity in the United States, and the use of virtual multicultural teams. Yet, despite all these profound changes, the overall construct of the ICD appears to still hold. This is not to say that a shift in these national cultures has not occurred at all over time. Such shifts likely occur [21, 43], but are not necessarily rapid.

These results suggest that although culture may slowly change over time, some of its psychological components are deeply ingrained through a socialization process that does not change as rapidly as technology does. Hence, culture is a worthy theoretical phenomenon of interest because one's cultural inclinations are generally stable and can be used to reasonably predict his or her behavior. These conclusions support what Hofstede found in his updated work [28]—that his cultural model is still valid in the information age. It is important to note that Hofstede's claim and our results partially conflict with the criticism by McCoy et al. [43] that suggests a possibility that Hofstede's dimensions may not hold strongly today in some cultures or that individual-level measures of culture may be more appropriate. We argue that it is possible that cultural changes occur faster in some national cultures than others. And, clearly, individual differences between people will always exist within a given culture. Given our theoretical model and empirical evidence, we assert that some generalizations can be made at a national culture level.

Implications for Practice

The findings of this study have significant managerial implications. The emphasis on teamwork in organizations is growing. Therefore, it is important to understand the effect of culture on teamwork and identify ways to minimize group process loss and

productivity loss. Although it is true that globalization is erasing the boundaries of countries and that current differences between national cultures may not be as significant as they once were, culture still largely influences individual and organizational behavior. We found striking differences in how group minorities behaved under the majority influence in Chinese and U.S. groups. Although it may be intuitive to think that people with different national cultures may behave similarly under majority influence, in reality they do not, because they operate with disparate value systems that have a direct and significant impact on the group process. The results of this study imply that it is a mistake for managers to assume that all members of their organizations are going to behave with the same set of motivations and cultural values.

These differences have tremendous implications for creating work teams that transcend national culture. The findings of this study suggest that there is a need for practitioners and organizational groups to be aware of and understand cultural difference when working in a cross-cultural decision-making context. Such underlying cultural difference requires deep understanding and, ideally, empathy from managers and team members for the attitudes, norms, and values of others.

As a specific example from our research, managers and organizations should consider the needs of collectivistic team members by providing advanced technologies and procedures to offset the effects of negative majority influence. Aside from technological interventions, team-building exercises could be highly valuable in these scenarios. As we suggested earlier, managers and organizations need to take special care when dealing with multicultural groups that have collectivistic minority group members because individualists are much more likely to exert majority influence in these situations, which can create suboptimal outcomes and strained relationships.

Meanwhile, our finding that FtF groups without the support of CMC have higher majority influence than CMC-supported groups has important implications for practice: the use of CMC can help reduce unwanted majority influence in the process of group decision making.

Limitations and Future Research

Several limitations of this study provide opportunities for future research. First, CMC to date is largely designed from a North American perspective, which encourages independent thinking and participation from all group members. Raman and Wei [58] suggest that differences in cultural attributes and decision environments have important implications to the design of CMC systems for people with different cultural backgrounds. As a result, the egalitarian spirit of CMC may conflict with norms of acceptable behavior in nonegalitarian societies. Researchers have suggested that CMC designed to reduce certain process losses may not be effective when conformity and harmony are the cultural norm. For example, Ho et al. [26] found the use of group decision support systems less effective in Singapore when compared to their use in the United States. Although our findings showed that majority influence on Chinese group minorities was reduced in both homogeneous and heterogeneous groups using CMC, this reduction may not be in harmony with their cultural values. It is argued

that when technologies have features that reflect users' cultural origins, they have interpretive flexibility and can be adapted and used in different ways. Thus, further reductions may be possible if the CMC systems are designed with collectivists in mind. Further research needs to be conducted to see how different cultural groups make these adaptations and whether the outcomes are satisfactory and in conformance with users' cultural values.

Another limitation is that in order to minimize the potential effect of familiarity among group members, our study used ad hoc groups in which the naive participants did not know any other group members (i.e., confederates). Virtual teams with a shared history [2] and with time to develop relationships in the virtual environment [83] are likely to be more cohesive and to have higher performance. Thus, future research can explore the majority influence in established virtual teams with a higher level of group cohesion, as opposed to ad hoc teams.

Moreover, task and medium choices have a significant impact on team outcomes [70]. For example, we used a decision-making task, which can be among the most challenging tasks for teams. Future research thus needs to examine other types of tasks—such as brainstorming and idea generation—and other communication media.

Finally, we used student participants of similar demographic backgrounds because of the challenge in the nature and execution of the study. Field research in actual organizations with working groups in which group members have diverse backgrounds would potentially provide more insights. Further, it would be useful to examine the effects of different levels of cultural heterogeneity in groups and different group size in the future.

Conclusion

CULTURAL DIVERSITY IS NOT A NEW PHENOMENON, yet it is increasingly relevant in our progressively mobile and global world. Today, cross-cultural groups are common in organizations because of the changing global market and business challenges. Understanding cultural differences is beneficial for overcoming the potential barriers that culturally heterogeneous teams face, because individuals from different cultural backgrounds communicate and act differently [24].

This research makes several contributions to the fields of majority influence and group collaboration. First, we examined the majority influence in culturally heterogeneous groups in both FtF unsupported and CMC-supported environments and compared it with the majority influence in culturally homogeneous groups. This is an important phenomenon to be examined because many virtual teams in the real world are culturally heterogeneous. To our best knowledge, no studies have investigated majority influence in culturally heterogeneous groups supported by CMC. Second, most of the prior studies on group collaboration were conducted in FtF settings. In this study, in addition to FtF groups, we also investigated majority influence in physically distributed groups. Third, to address the common challenge of small sample size in most previous cultural CMC studies, we had a large number of groups that participated in this empirical study in China and the United States. This study provides some new

insights into how to design and carry out an empirical cross-cultural study, as well as a number of theoretical and practical implications.

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