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THE EXPRESSION OF CONFLICT IN COMPUTER-MEDIATED AND FACE-TO-FACE GROUPS

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This study integrated the research streams of computer-mediated communication (CMC) and group conflict by comparing the expression of different types of conflict in CMC groups and face-to-face (FTF) groups over time. The main aim of the study was to compare the cues-filtered-out approach against the social information processing theory. A laboratory study was conducted with 39 groups (19 CMC and 20 FTF) in which members were required to work together over three sessions. The frequencies of task, process, and relationship conflict were analyzed. Findings supported the social information processing theory. There was more process and relationship conflict in CMC groups compared to FTF groups on Day 1. However, this difference disappeared on Days 2 and 3. There was no difference between CMC and FTF groups in the amount of task conflict expressed on any day.

With the burgeoning use of computers to link dispersed work group members, it is surprising to find that conflict has had limited exploration in this context. Early research examined the expression of uninhibited behavior, a rather loosely defined construct that included a variety of behaviors (e.g., use of superlatives, swearing, flirting, interpersonal conflict; see Hiltz, Johnson, & Turoff, 1986;
Kiesler, Zubrow, Moses, & Geller, 1985). Taking a more fine-grained approach to the examination of uninhibited behavior, more recent work has focused on the amount of different types of conflict (task-related, interpersonal, and process) expressed in computer-mediated communication (CMC) and face-to-face (FTF) groups (Bhappu, Meader, Erwin, & Crews, 2000; Miranda & Bostrom, 1994; Straus, 1997). These early and more recent studies of uninhibited behavior and conflict in CMC and FTF groups have yielded inconsistent results. Some studies have found that there is more uninhibited behavior or conflict in CMC groups compared to FTF groups (Bhappu et al., 2000; Kiesler et al., 1985), whereas others have found that there are similar levels of uninhibited behavior or conflict between the conditions (Hiltz, Turoff, & Johnson, 1989; Straus, 1997).

The cues-filtered-out perspective (Culnan & Markus, 1987) was provided as an explanation of the greater amount of negative and deregulated behavior in CMC groups. This approach stated that a CMC environment is limited in its information richness, which leads to a reduction in social norms and ultimately more profane behavior. However, in light of inconsistent findings, a competing theory of social information processing (SIP) was developed (Walther, 1993; Walther & Burgoon, 1992), which stated that CMC groups could develop to the same level as FTF groups given enough time for equivalent message exchange. Therefore, given enough time to exchange the same amount of interpersonal or social information, CMC and FTF groups may exhibit similar levels of conflict and uninhibited behavior.

The main aims of this study were to compare the cues-filtered-out approach with the SIP theory and to extend previous work by examining the difference between CMC and FTF groups in the frequency of three different types of conflict: task, relationship, and process. Findings derived from this research will inform managerial understanding of how to best introduce and effectively support CMC-based technology in teams. In addition, this research may benefit CMC team members by increasing their awareness of how the media impact their group’s communication processes.
MEDIA DIFFERENCES IN CONFLICT

Intragroup conflict arises from “the interaction of interdependent people who perceive opposition of goals, aims and values, and who see the other party as potentially interfering with the realisation of these goals” (Putnam & Poole, 1987, p. 552). There are three broad types of intragroup conflict discussed in the literature: task, process, and relationship. The distinction is based on the foci of disagreement, and each type of conflict has different outcomes for the group. Task conflict consists of disagreements about group members’ perceptions of task issues such as goals, key decision areas, and appropriate choice for action. This type of conflict can improve decision-making outcomes and group productivity by increasing decision quality through incorporating devil’s advocacy roles and constructive criticism (Amason, 1996). Relationship conflict refers to disagreements and incompatibilities between group members about personal issues that are not task related, such as social events and gossip, including personality differences, animosity and annoyance between individuals (Jehn, Chadwick, & Thatcher, 1997; Pelled, 1996). Empirical research shows a negative association between relationship conflict, productivity, and satisfaction in groups (Jehn, 1995, 1997; Jehn et al., 1997; Pelled, 1996). The third type of conflict—process conflict—has had limited investigation (Jehn, 1997; Jehn, Northcraft, & Neale, 1999). It occurs when people disagree over who should do what and how things should be delegated (i.e., responsibility issues) (Jehn, 1997). Jehn and colleagues’ (1997, 1999) results suggested that high levels of process conflict are detrimental to productive work processes, as process conflict can distract group members from working on the task at hand.

It is surprising to note that little research has examined the development of different types of conflict within CMC groups. Early research tended to examine the global behavior of uninhibited communication or “flaming” rather than different types of conflict. The following section reviews the research into uninhibited behavior with a focus on theoretical grounding and more recent research into conflict and conflict management.
UNINHIBITED BEHAVIOR

Early research reported that CMC groups were more impersonal and hostile. CMC interactions have also been described as negative and inflammatory, with significantly higher incidences of profane speech compared with FTF interactions (Hiltz et al., 1986; Kiesler et al., 1985; Sproull & Kiesler, 1986). Other studies reported similar levels of uninhibited communication between FTF and CMC groups (Hiltz et al., 1989) and that the amount of uninhibited speech is quite low. A number of theories have been proposed to account for these findings.

The cues-filtered-out approach (Culnan & Markus, 1987) encompasses three types of theories—social presence (Short, Williams, & Christie, 1976), social context cues (Sproull & Kiesler, 1986), and media richness theories (Daft & Lengel, 1986). These theories have been proposed to explain the early findings of the disinhibited nature of CMC. They explain that differences between CMC and FTF are due to the limitations of bandwidth, the number of cues available, and the absence of social context and nonverbal cues in CMC. Researchers proposed that technological features of CMC trigger psychological states and processes that result in a situation of weak norms and social constraints and more deregulated behavior in the form of uninhibited communication (Spears & Lea, 1992).

Contradictory empirical findings raised concerns about the robustness of the cues-filtered-out explanation (Walther, Anderson, & Park, 1994). For instance, field studies have reported greater positive socio-emotional content in CMC groups than that found in laboratory studies (Chidambaram, 1996; Lea & Spears, 1992). One explanation for this difference is that early research gave CMC and FTF groups equal time periods to complete tasks. The use of equal time periods may introduce time pressure in CMC and interfere with the manipulation of media conditions (Bordia, 1997; Lea, O’Shea, Fung, & Spears, 1992; Walther, 1992). Because the limited bandwidth and typing requirements of CMC offers less information per exchange than FTF in equal periods of interaction, CMC requires more time to exchange the same number of messages (Walther, 1992). Therefore, experiments giving equal time to
CMC and FTF groups were capturing the effects of time constraints rather than the effects of the medium (Walther, 1992). Thus, the heightened amount of uninhibited behavior in CMC groups may have been due to increased time pressure in this condition compared to FTF groups, rather than simply the media manipulation.

Walther (1992) proposed that CMC groups develop via the mechanism of SIP. The basic premise of SIP theory is that although CMC inherently offers a slower communication rate than FTF, it is still able to convey nonverbal information (Walther, 1993; Walther & Burgoon, 1992). Given enough time for message exchange, CMC groups will reach the same level of development as FTF groups (Walther, 1996). Several studies have observed this (Chang, Irmer, Bordia, & Hobman, 2001; Chidambaram, 1996; Walther, 1993; Walther & Burgoon, 1992; Walther et al., 1994). For example, Walther (1993) examined the development of interpersonal impression. He found that initial differences between media diminished as CMC groups showed increasing and converging levels of interpersonal impression making.

The effect of timing restriction on uninhibited behavior was investigated by Walther (1994) in a meta-analysis. Comparing time-restricted studies with time-unrestricted studies, no differences were found in the degree of uninhibited communication in CMC interactions. Nor was it found that the difference between CMC and FTF interaction on uninhibited communication is greater in time-restricted than in time-unrestricted interactions. However, few time-unrestricted (compared with time-restricted) studies were included in the meta-analysis.

CONFLICT

Noting that previous research had investigated uninhibited behavior in CMC groups, Straus (1997) argued that uninhibited behavior was too loosely defined. It referred to a variety of behaviors such as swearing, use of superlatives, and flirting. Straus suggested that two types of disagreement be investigated—task-oriented conflict and personality disagreements—and examined their expression in both CMC and FTF groups. She found that
CMC groups exhibited more task-oriented conflict than FTF groups, consistent with the cues-filtered-out theory. Personality clashes were low across both conditions. These results are interesting, as CMC groups suffered from time constraints as they were given the same amount of time to complete the tasks as FTF groups. Under time pressure, it would be predicted from the cues-filtered-out theory and SIP theory that CMC groups should also exhibit more negative behavior (i.e., personality clashes) compared to FTF groups.

In a similar fashion, Miranda and Bostrom (1994) investigated the differences between FTF and Group Support Systems (GSS) groups in the expression of issue-based conflict and interpersonal conflict over time. They found that overall GSS–supported groups perceived lower amounts of issue-based and interpersonal conflict than FTF groups. These results suggest that computer-supported groups are less likely to exhibit conflict than FTF groups. This pattern of results contradicts both the cues-filtered-out approach and SIP theory and suggests that computer-supported groups can better manage conflict. However, the applicability of these findings to CMC research is limited due to the added technological support offered in a GSS environment compared with the more routine CMC group environment.

Bhappu et al. (2000) examined differences between media in the amount of conflict. Their measure of conflict combined the assessment of relationship and process conflict. Correlation results indicated that CMC groups exhibited significantly more conflict than FTF groups, supporting the cues-filtered-out perspective. These results supported Straus’s (1997) finding of more task-oriented conflict. However, like Straus’s, their study was cross-sectional, so it is not known whether this initial difference would persist as the cues-filtered-out theory would predict.

Other studies that have examined differences between computer-supported groups with unsupported groups in conflict management also provide some insights into the difference in conflict expression. Poole, Holmes, and DeSanctis (1991) examined conflict management in group decision support system (GDSS)–supported groups and unsupported groups. They found that overall GDSS
groups had more productive conflict-management processes than unsupported groups. In addition, they found that some GDSS groups had more effective conflict-management processes than other GDSS groups, and appropriation of the technology was offered as an explanation of this. This “appropriation of technology” is the core assumption of the Adaptive Structuration theory (AST) (Poole & DeSanctis, 1989a, 1989b), which proposes that group outcomes are reliant on how well the technology is appropriated or used by the group. Sambamurthy (1989) also found that comfort with GDSS was critical to a group’s successful adaptation. Thus, it appears that groups that appropriate the technology will better manage conflict. Chidambaram, Bostrom, and Wynne (1991) argued that given enough time, groups would be able to appropriate the technology, and this would promote better conflict management. This idea is consistent with the SIP theory’s general premise. Chidambaram et al. found that initially, unsupported groups were better able to manage conflicts, but this pattern was reversed in the last two (of four) sessions. These results indicate that computer groups may undergo an initial period of heightened or unmanaged conflict, but given enough time for message exchange and the appropriation of technology, they can supersede unsupported groups’ ability to manage conflict.

SUMMARY

The research examining either uninhibited behavior or conflict in CMC compared to FTF groups has yielded inconsistent results. For example, some studies have found that CMC groups experience higher levels of conflict compared to FTF groups (e.g., Bhappu et al., 2000; Straus, 1997), whereas others have found that CMC groups perceive lower amounts of conflict (Miranda & Bostrom, 1994). Recent theorizing has argued that when given equal time to interact, CMC groups experience greater time pressure as they take more real time to exchange the same number of messages as FTF groups (Walther, 1992). In addition, CMC groups require time to adapt to the technology to effectively manage conflict (Chidambaram et al., 1991; Poole & DeSanctis, 1989, 1990). Thus, this
study addresses the communication rate difference between CMC
and FTF groups and associated time restriction in CMC groups by
systematically providing more real time to CMC groups for equiva-
 lent message exchange.

There is not enough research on types of conflict in CMC to
allow us to make separate predictions for each type of conflict.
However, we predict that CMC groups may initially experience
higher levels of conflict, but with the appropriation of technology
(AST) and the time to exchange equivalent messages (SIP), CMC
groups should display the same levels of conflict as FTF groups.
We aimed to extend previous research by focusing on conflict’s
multidimensionality within two interactive environments (FTF and
CMC) and testing the validity of the SIP theory against the cues-
filtered-out approach. The following set of hypotheses predicts dif-
ferences in medium based on the cues-filtered-out and SIP perspec-
tives (Culnan & Markus, 1987; Walther, 1992).

Hypothesis 1a: There will be more task conflict in CMC groups com-
pared to FTF groups at all times (as predicted by the cues-filtered-
out theory).

Hypothesis 1b: There will be more task conflict in CMC groups com-
pared to FTF groups during early interactions, but there will be
equivalent levels of task conflict between CMC groups and FTF
groups during later interactions (as predicted by the SIP theory).

Hypothesis 2a: There will be more relationship conflict in CMC
groups compared to FTF groups at all times (as predicted by the
cues-filtered-out theory).

Hypothesis 2b: There will be more relationship conflict in CMC
groups compared to FTF groups during early interactions, but there
will be equivalent levels of relationship conflict between CMC
groups and FTF groups during later interactions (as predicted by the
SIP theory).

Hypothesis 3a: There will be more process conflict in CMC groups
compared to FTF groups at all times (as predicted by the cues-
filtered-out theory).

Hypothesis 3b: There will be more process conflict in CMC groups
compared to FTF groups during early interactions, but there will be
equivalent levels of process conflict between CMC groups and FTF
groups during later interactions (as predicted by the SIP theory).
METHOD

PARTICIPANTS

One hundred forty-six (106 females, 40 males) 1st-year psychology students participated in the study for course credit. Only proficient typists were invited to participate (typing speed above 40 words per minute). The average typing speed was 57.20 words per minute in CMC and 59.40 words per minute in FTF with a standard deviation of 11.53 and 10.01, respectively. There were 19 CMC (48 female, 21 male) groups and 20 FTF (58 female, 19 male) groups. The sizes of the groups ranged from 3 to 5; 18 groups had 3 participants, 13 had 4, and 8 had 5. In one CMC group, technological difficulties occurred during the first session. Therefore, the transcript of this interaction was not available for analysis. Participants were not randomly assigned to the two conditions due to resource constraints set by the availability of the computer facilities used in the CMC condition. However, post hoc tests revealed no significant differences between conditions in individual characteristics such as typing speed, gender, age, experience with computers, and usage of computers.

DESIGN

This study was a 2 (communication media) × 3 (time of measurement) mixed factorial design. Communication medium was a between-subjects variable with two levels, FTF and CMC. Time of measurement was a within-subjects variable with three levels: Time 1, Time 2, and Time 3. The dependent variables were the number of instances or frequency of task, process, and relationship conflict. Because gender diversity and team size influence interactions in teams, these variables were used as controls in the analyses (Jehn et al., 1997, 1999).
MATERIALS

Materials included a pretest questionnaire, task instruction sheet, typing test, and synchronous computer conferencing system. The pretest questionnaire contained items measuring participant demographics such as age, gender, degree enrolled, computer experience, attitude toward computers, and sensory preference. The task was a creative, interactive task of developing a radio advertisement for the university aimed at high school students. The task was pilot tested for comprehension and was identical in the two conditions, except for the amount of time specified.

The typing speed test used was WinType: typing speed test system version 1.3. The CMC system used was Internet Relay Chat (IRC), a text-based and synchronous system requiring users to be online simultaneously. In IRC, all messages are posted on the screen for everyone in the group to see. In front of the message, the sender’s member number is displayed in brackets when the message is posted.

CODING

A modification of the Time-by-Event-by-Member Pattern Observation (TEMPO) process-coding system (Futoran, Kelly, & McGrath, 1989) previously used by Straus (1997) was used to analyze the content of the group’s interactions from transcripts of the group’s discussions (see the appendix for coding definitions and examples). A conflict instance was defined as a statement that expresses disagreement. Each statement of disagreement was counted as a conflict instance, so that a frequency count of each type of conflict was made. Task conflict was coded when there was a disagreement or direct rejection of previously proposed task solutions or ideas. Process conflict was coded when there was a disagreement with previously proposed strategies for approaching the task or previous contributions to keep the task moving to the next step. The difference between task and process conflicts was that task conflicts related to the “what” of the task, whereas process conflicts related to the “how” of the task. The TEMPO coding sys-
tem also included disagreements about previously proposed intentions regarding the quantity or quality of the commercial as process conflict, but we decided to classify these disagreements as task conflict to be congruent with Jehn and colleagues’ (1997, 1999) definitions of task and process conflict. Relationship conflict was coded when a negative interpersonal comment was made. The first author did the coding. An independent judge, blind to the purpose of the experiment, was trained in the coding procedure. This independent judge was asked to code 20% of the scripts. The two coders achieved a Cohen’s kappa of .93 for relationship conflict, .78 for task conflict, and .79 for process conflict.

PROCEDURE

Participants signed up for either the CMC or FTF conditions. Participants met for 3 consecutive days. McGrath (1984) guidelines for using zero-history groups were followed. Participants were informed that they would meet over three sessions, and a reward was tied to task accomplishment. The incentive was a $25 bookshop voucher to each member of the best-performing group.

Experimenters followed a set script and agenda in both conditions. Participants were informed not to communicate with one another outside experimental sessions. No indication of participants’ meeting outside experimental sessions was detected when checking through the transcripts.

CMC condition. CMC sessions occurred in a large computer laboratory with 18 computers. Participants were randomly assigned to groups. Several groups ran during each session, and participants were instructed not to try to figure out who was in their group. On completion of the consent form, a pretest questionnaire and typing test were administered. Participants received training on how to use the IRC conferencing system. Participants were informed that several groups would be doing the same task as them and that a $25 bookshop voucher would be awarded to each member of the best-performing group. Task instructions were provided, and participants reviewed them for 5 minutes. The advertising script was
due at the end of the last session, and participants were told that groups that did not complete the script would not be eligible for the prize. CMC participants were informed that their interactions would be logged for further analysis and were given 60 minutes on each of the 3 days to work on the task.

**FTF condition.** Participants signed up for FTF sessions, with one group running per session. FTF participants completed the typing speed test and pretest questionnaire in the computer lab and were then instructed to move to the video room, where they were seated around a table. Task instructions were identical to CMC except for the time specified. FTF groups received 25 minutes each day to work on the task. A video camera was used to tape the interaction, and participants were explicitly informed that their interactions would be monitored.

**Time allocated to CMC versus FTF groups.** A pilot study was conducted to calculate the amount of time required for an equivalent number of words to be exchanged between CMC and FTF groups (for more detail, see Chang et al., 2001). CMC groups take more time to exchange the same number of messages as FTF groups, so to capture the effects of the medium rather than time constraints, CMC groups required more time. The total number of words in a 60-minute interaction was divided by 60 to gain a word-per-minute amount for participants interacting face to face or via computer. At an average typing speed of 55 words per minute (pretested using the typing test), the CMC group had a rate of 59 words per minute, whereas the FTF group had a rate of 142 words per minute. Therefore, CMC groups were given 2.4 times longer than FTF groups.

**RESULTS**

Figures 1, 2, and 3 depict the average amount of task, relationship, and process conflict in CMC and FTF groups at each time (controlling for the covariates of group size and gender diversity).
Figure 1: Frequency of Task Conflict in Face-to-Face (FTF) and Computer-Mediated Communication (CMC) Groups Across the Three Time Periods

Figure 2: Frequency of Relationship Conflict in Face-to-Face (FTF) and Computer-Mediated Communication (CMC) Groups Across the Three Time Periods
Tables 1, 2, and 3 report the intercorrelations between conflict types overall (CMC and FTF combined) and within CMC and FTF groups separately. A repeated-measures multivariate analysis of covariance (MANCOVA) was performed to test for overall differences between media on conflict over time. This analysis was conducted using group size and gender diversity (as a dichotomous variable) as covariates. T-tests were conducted to examine the significance of the difference between CMC and FTF groups in the expression of conflict at each time.

The repeated-measures MANCOVA showed a significant multivariate effect for gender diversity (Wilks’s lambda = .73), $F(3, 32) = 3.95, p < .05$; and group size (Wilks’s lambda = .75), $F(3, 32) = 3.53, p < .05$. A significant effect was found for condition (Wilks’s lambda = .73), $F(3, 32) = 3.95, p < .05$; but not time (Wilks’s lambda = .88), $F (6, 29) = 0.67, ns$. Overall, there was more conflict in CMC groups compared to FTF groups. There was
no significant overall effect for the interaction of time and condition, (Wilks’s lambda = .76), \( F(6, 29) = 1.56, \) ns.

To examine the significant multivariate effects, results from the univariate ANCOVAs were interpreted. In addition, as the statistical power for the multivariate analysis was greatly restricted (due to a sample size of only 39 teams) and because the hypotheses were exploring the effect of time and media on different types of conflicts, we decided to continue to explore the univariate ANCOVA results for the interactions between time and media.

**Covariates.** Gender diversity was a significant predictor of relationship conflict, \( F(1, 34) = 10.94, \) \( p < .01; \) and process conflict, \( F(1, 34) = 10.75, \) \( p < .05; \) and group size was a significant predictor of task conflict, \( F(1, 34) = 9.30, \) \( p < .01. \) The bivariate correlations

### TABLE 1: Intercorrelations Between Conflict Types for Computer-Mediated-Communication (CMC) and Face-to-Face (FTF) Groups (Combined)

<table>
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<tr>
<th>M</th>
<th>SD</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>1. Group size</td>
<td>3.74</td>
<td>0.79</td>
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<tr>
<td>2. Gender diversity</td>
<td>0.69</td>
<td>0.47</td>
<td>0.14</td>
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<tr>
<td>3. Time 1: TC</td>
<td>8.42</td>
<td>5.49</td>
<td>0.39*</td>
<td>0.21</td>
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<td></td>
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<tr>
<td>4. Time 2: TC</td>
<td>8.74</td>
<td>5.45</td>
<td>0.47**</td>
<td>0.26</td>
<td>0.52***</td>
<td></td>
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<tr>
<td>5. Time 3: TC</td>
<td>6.36</td>
<td>5.73</td>
<td>0.27</td>
<td>0.13</td>
<td>0.50***</td>
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<td>6. Time 1: RC</td>
<td>2.39</td>
<td>2.63</td>
<td>0.03</td>
<td>0.46**</td>
<td>0.23</td>
<td>0.19</td>
<td>0.03</td>
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<tr>
<td>7. Time 2: RC</td>
<td>1.85</td>
<td>2.13</td>
<td>0.28</td>
<td>0.22</td>
<td>0.18</td>
<td>0.15</td>
<td>0.16</td>
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<tr>
<td>8. Time 3: RC</td>
<td>2.20</td>
<td>2.45</td>
<td>0.07</td>
<td>0.41**</td>
<td>0.10</td>
<td>0.13</td>
<td>0.22</td>
<td>0.40*</td>
<td>0.26</td>
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<td>9. Time 1: PC</td>
<td>3.18</td>
<td>3.87</td>
<td>0.14</td>
<td>0.21</td>
<td>0.28</td>
<td>0.28</td>
<td>0.25</td>
<td>0.52***</td>
<td>0.24</td>
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<tr>
<td>10. Time 2: PC</td>
<td>2.05</td>
<td>2.21</td>
<td>0.22</td>
<td>0.41**</td>
<td>0.14</td>
<td>0.26</td>
<td>0.35*</td>
<td>0.17</td>
<td>0.05</td>
<td>0.12</td>
<td>0.32*</td>
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<tr>
<td>11. Time 3: PC</td>
<td>1.56</td>
<td>2.02</td>
<td>0.25</td>
<td>0.28</td>
<td>0.01</td>
<td>0.22</td>
<td>0.32*</td>
<td>0.11</td>
<td>0.02</td>
<td>0.54***</td>
<td>0.20</td>
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**NOTE:** TC = task conflict; RC = relationship conflict; PC = process conflict. *\( p < .05. \) **\( p < .01. \) ***\( p < .001. \)
between gender diversity and relationship and process conflict indicated that the association was positive. Gender-heterogeneous teams experienced more relationship and process conflict than gender-homogeneous teams. The bivariate correlations between group size and task conflict indicated that the association was positive. As group size increased, task conflict increased.

Task conflict. Contrary to Hypotheses 1a and 1b, the interaction of time and media was not significant for task conflict, $F (2, 68) = 0.12, ns$.

Relationship conflict. The interaction of time and media was not significant for relationship conflict, $F (2, 68) = 1.92, p = .15$. Despite this nonsignificant interaction, the pattern of means showed
an initial difference between media. Thus, we ran t tests for relationship conflict at each time. At Time 1, there was significantly more relationship conflict in CMC groups than FTF groups, \( t(36) = 2.54, p < .05 \); but this difference was not apparent at Time 2, \( t(37) = 1.05, ns \); or Time 3, \( t(37) = 0.15, ns \). These results do not support Hypothesis 2a but do provide support for Hypothesis 2b.

Process conflict. The condition effect was significant for process conflict, \( F(1, 34) = 9.01, p < .01 \), where there was more process conflict in CMC groups than FTF groups overall. The interaction between time and media was significant for process conflict, \( F(2, 68) = 5.38, p < .05 \). At Time 1, there was significantly more process conflict in CMC groups than FTF groups, \( t(36) = 3.26, p < .01 \). This difference was not apparent at Time 2, \( t(37) = 1.28, ns \); or

### TABLE 3: Intercorrelations Between Conflict Types for Face-to-Face (FTF) Groups

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<th>M</th>
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<th>1</th>
<th>2</th>
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<td>1. Group size</td>
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<td>2. Gender diversity</td>
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<td>0.49</td>
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<td>4.95</td>
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<td>8. Time 3: RC</td>
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**NOTE:** TC = task conflict; RC = relationship conflict; PC = process conflict. *p < .05. **p < .01.
Time 3, $t(37) = 0.37, ns$. These results do not support Hypothesis 3a but rather support Hypothesis 3b.

DISCUSSION

The results of this study add to the current understanding of the expression of intragroup conflict in FTF and CMC groups. In summary, the following results were obtained: (a) Initially, CMC groups exhibited more relationship and process conflict than FTF groups, but these differences were not apparent in later stages; and (2) CMC and FTF groups exhibited similar amounts of task conflict at all times.

MEDIA DIFFERENCES

In relation to the differences between media across time, the cues-filtered-out theory was not supported, as it was found that initial differences between CMC and FTF groups on relationship and process conflict did not remain across the 3 days. In addition, there were no differences apparent for task conflict on any day. These results support the proposition of SIP theory: that with enough time for equivalent message exchange, CMC groups will achieve the same level of development as FTF groups.

Task conflict. For task conflict, there was no significant difference between CMC and FTF groups at any time. These results do not support previous research, which has found that CMC groups have higher (Straus, 1997) or lower (Miranda & Bostrom, 1994) levels of task conflict compared to FTF groups. Our contrasting results may be partly due to our reconceptualization of task and process conflict as separate constructs. Straus’s (1997) coding of task conflict may have included instances of process conflict, and Miranda and Bostrom’s (1994) participants may have also reported procedural conflict as task conflict.

Alternatively, our results may be somewhat congruent with Straus’s (1997) and Miranda and Bostrom’s (1994) findings. Straus
found that CMC groups expressed more task conflict compared to FTF groups in a cross-sectional study, whereas Miranda and Bostrom found that CMC groups expressed less task conflict compared to FTF groups in a longitudinal study. Due to limited time and disrupted conversation flow, CMC groups tend to focus on task completion and therefore reduce their motivation to communicate about nontask topics as compared to FTF groups (Straus, 1997). However, in this study, the CMC groups received 60 minutes on each of 3 days to work on the task. Participants may have perceived this amount of time each day as more than enough for task completion, and therefore they may not have felt the urgency to engage in high levels of task-related conversation. This reduced task focus in CMC groups could explain the similar levels of task conflict to that expressed by FTF groups. Presumably, given even more real time to work on the task, CMC participants may have further reduced their level of task-focused conversation, which would result in even lower levels of task conflict. The lower levels of task conflict in CMC groups compared to FTF groups found in Miranda and Bostrom’s longitudinal study may have occurred due to the perception of ample time for task completion.

**Relationship conflict.** For relationship conflict, CMC participants were more likely to engage in negative interpersonal comments during initial interactions than were FTF participants. This result is consistent with Bhappu et al.’s (2000) findings but does not support the results of Straus (1997) or Miranda and Bostrom (1994). The higher levels of relationship conflict in CMC groups at Time 1 could be explained by the reduction in social norms in an anonymous setting consistent with the cues-filtered-out theory. However, perusal of the pattern of conflict over CMC groups at Time 1 indicated that a substantial amount of conflict was expressed in a few CMC groups. For example, one CMC group expressed 11 instances of relationship conflict within their first meeting. Also notable is the fact that relationship conflict expressed in CMC groups (e.g., A: “Is your arse the real world B?” B: “If u want a showing I’ll be glad to oblige let’s not get rude now”) appeared to be more negative in strength than that observed in FTF
groups (e.g., A: “Interesting job [in reference to a previous comment about Person B saying that neurosurgery would be an interesting job] . . . when would you be one?”). These results suggest that some CMC groups may have naturally developed a norm accepting of relationship conflict and their behavior was polarized toward this norm.

The idea of norms to explain uninhibited behavior has been articulated by Lea and Spears (1992) in a theory aimed at explaining behavior in CMC groups. The Social Identification/Deindividuation (SIDE) Theory (Lea & Spears, 1992) argues that anonymity associated with being in a CMC group can act to highlight the salience of group membership and the influence of group norms. Consistent with SIDE predictions, some CMC groups expressed a lot of relationship conflict, suggesting they developed a norm accepting of relationship conflict. In comparison, FTF groups exhibited less relationship conflict, and the variability across groups was lower. This result is congruent with the idea that a salient group identity is not as relevant in FTF groups due to the fact that this setting has a wealth of individuating information about group members (Walther, 1997).

Although SIDE theory could explain the pattern of results for relationship conflict at Time 1, the results at Times 2 and 3 did not continue to support its predictions. The pattern of heightened levels of relationship conflict in CMC groups did not remain at Times 2 and 3. Here, the amount of relationship conflict was low and similar between conditions, and the amount of variability within CMC was reduced. Thus, the expression of conflict at Time 1 may be due not only to the institutionalization of a norm for some groups but also to the normal conflict phase of group development. The conflict phase, which usually occurs during early group interactions (Chang, Bordia, & Duck, in press; Wheelan, 1990), may be exaggerated in some CMC groups because of the existence of conflict norms and a strong group identity. By Times 2 and 3, the group had passed the conflict stage, and group members had presumably exchanged equivalent amounts of information to that of FTF groups to reach similar levels of relational development (consistent with SIP theory). At this stage, conflict norms were not exhibiting
as strong an effect. Thus, the SIDE theory may work in conjunction with natural group development phases and SIP theory to explain relationship conflict expression in CMC groups.

Process conflict. For process conflict, it was found that CMC groups expressed higher amounts during initial interactions. This difference can be explained by the fact that CMC groups spent more time on procedural matters than FTF groups (e.g., how to utilize the medium). Similar to the pattern noted for relationship conflict, a few select groups exhibited a lot of process conflict, indicating that these groups took more discussion to resolve procedural issues. This may indicate that some group members were not competent enough to resolve the issue of how to utilize the media to perform the task.

The amount of process conflict in CMC and FTF groups converged over time, supporting SIP theory predictions. This indicates that during the initial meeting, the group had more discussion about how to do work on the task and how to use the medium, but by Time 2, these matters reached the same level as FTF groups. This pattern of development is also congruent with the AST (Poole & DeSantis, 1989, 1990), which stresses that group members appropriate the technology by developing rules and procedures in using the technology to communicate. This phase of appropriation would most likely occur during initial meetings and may have contributed to the heightened levels of process conflict observed during the first meeting in this study. Our findings for procedural conflict are consistent with Chidambaram et al.’s (1991) finding of computer-supported groups’ being less able to handle conflict until they become more comfortable with the technology.

ASSOCIATIONS BETWEEN CONFLICT TYPES

The intercorrelations between conflict types indicate that there were associations between conflict types. For CMC groups, it was found that relationship conflict was significantly positively correlated with process conflict at Times 1 and 3; and for FTF groups, it was found that process conflict at Times 1, 2, and 3 was signifi-
cantly positively related to task conflict at Time 3. These results can
be explained by the idea that conflict types may influence each
other. For example, members may express dissatisfaction with and
hostility toward others if their ideas are challenged or disputed.
Also, members who are irritated by another person may be more
ready to disagree with their opinions and ideas (Eisenhardt & Bour-
geois, 1988; Ross, 1989). Our results confirm previous findings of a
positive relationship between different types of conflict in FTF
groups (Jehn et al., 1999). Furthermore, it appears that this associa-
tion occurs even within a computer-mediated environment and that
conflict can affect future conflict. This idea has recently been
addressed by Okhuysen and Jehn (2000) and Okhuysen (2000).
Their results showed that groups can become engaged in “spirals”
of conflict (Okhuysen & Jehn, 2000) where earlier conflict affects
future conflict. This phenomenon highlights the importance of
eyear detection of groups exhibiting conflict. Okhuysen and Jehn
suggest that once detected, variables such as perceived similarity
and identification with the group help to break this continuous
nature of conflict.

LIMITATIONS AND FUTURE DIRECTIONS

It may be argued that because the groups were ad hoc and
time-limited, results regarding conflict development may not gen-
eralize to the long-term development of more permanent groups
who anticipate future interaction. Thus, to examine the
generalizability of our results, future research should examine the
prevalence of conflict in ongoing CMC groups. It may be that our
results would apply more to project-based groups with a limited
tenure.

Future research may extend the current research by including
implicit rather than explicit measures of conflict and objective pro-
ductivity measures. In addition, future research should examine the
role of group identification and perceived similarity as a possible
deterrent to the development of destructive conflict. Such research
will help to further our understanding of the conflict processes
within both CMC and FTF environments.
Although not the focus of this study, we found significant effects for gender diversity on conflict. This supports previous research examining the effects of demographic diversity on conflict in FTF groups (Jehn et al., 1997, 1999). Of further interest is the fact that there has been little examination of the influence of diversity in CMC groups (Bhappu et al., 2000). Our study was limited in statistical power to undertake a more fine-grained analysis of the associations between gender diversity and conflict in different media. However, the correlation results showed that gender diversity was positively associated with conflict typically during initial interactions in a CMC environment, whereas it was positively associated with conflict typically during later interactions in an FTF environment. Given the increase in work force demographic diversity, and the use of geographically distributed teams, future research should explore the influence of different types of demographic diversity on conflict across time.

Future research may also wish to examine the interrelationships between conflict types in CMC and FTF groups and how these relationships change over time. This study found that earlier conflicts were related to later conflicts and that CMC groups showed strong associations between relationship and process conflict, whereas FTF groups showed strong associations between process and task conflict. This pattern of results suggests that there may be different underlying conflict dynamics occurring in different media.

This study would have also benefited from the inclusion of an additional CMC condition that provided equal time for task completion to that of the FTF condition. By including the comparison of time-equal and time-equivalent CMC and FTF groups, we would have a complete test of the competing approaches of cues-filtered-out and SIP.

CONCLUSION

This study has provided a more detailed view of the types of conflict exhibited in CMC and FTF groups by drawing on literatures in the areas of intragroup conflict and media differences. The study also used a design that allowed more time to CMC groups, thereby
removing the time-constraint explanation for greater conflict in CMC. The results suggest that although CMC groups do not follow the same pattern of conflict development as FTF groups, they do reach the same level. Thus, CMC groups simply require more time to allow for equivalent message exchange and accompanying social development.

Our findings show that the amount of relationship and process conflict exhibited in FTF settings is less than that in CMC groups during first meetings. Thus, during initial interactions, it may be better for CMC members to meet each other via FTF before communicating in a computer-mediated context. This would help to efficiently resolve responsibility and procedural issues and to set up norms of acceptable behavior within the team. As Poole et al. (1991) suggested, training in the use of computer-mediated technology’s features would also help people to utilize the technology productively. Furthermore, team leaders need to clearly distinguish between conflict types so that individuals feel free to offer their critical opinions without others taking the debate personally.

APPENDIX

Coding Definitions and Examples

CONFLICT

Each thought unit (statement) of disagreement is coded as a conflict. The following are different types of conflict:

Task conflict: A rejection or disagreement with proposals that are contributions to task content (e.g., proposing task solutions, generating ideas for the task product). Conflict is based on the substance of the group’s task, that is, disagreements over ideas and opinions regarding the task. Some examples include “I don’t think that music is suitable”; “No, UQ is not the only one with colleges”; “The commercial is not going to be persuasive if we just mention those things.”

Relationship conflict: A negative interpersonal comment. Relationship conflict is based on the group’s interpersonal relations, that is, interpersonal tension, personality clashes, and jealousy/rivalry. Some examples include “You’re silly”; “You’re a pessimist”; “Next time we’ll get someone who can write fast and legible, and who listens to what is being said, and contributes every now and then.”
**Process conflict:** A disagreement with proposals that are contributions to group processes. These include proposals about strategies of attacking the task (how to do the task) and those that keep the task moving by proposing a specific next step. “No, I think we should work on an overall plan of the script rather than working on specifics”; “I think we should work on that part of the script later.”

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**REFERENCES**


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