


**Anticipated Ongoing Interaction Versus Channel Effects on Relational Communication in Computer-Mediated Interaction**

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Previous research on the interpersonal tone of computer-mediated communication shows different effects using longitudinal computer-mediated groups than are found in research using one-shot groups, even before the developmental aspects associated with time can accrue. One factor distinguishing these approaches is the anticipation of future interaction experienced by longitudinal groups. This research reports an experiment assessing the relative effects of anticipated future interaction and different communication media (computer-mediated versus face-to-face communication) on the communication of relational intimacy and composure. Asynchronous and synchronous computer conferencing and face-to-face groups were examined. Results show that the assignment of long-term versus short-term partnerships has a larger impact on anticipated future interaction reported by computer-mediated, rather than face-to-face, partners. Evidence also shows that anticipation is a more potent predictor of several relational communication dimensions than is communication condition. Implications for theory and practice are identified.

The way you meet people in cyberspace puts a different spin on affiliation: in traditional kinds of communities, we are accustomed to meeting people, then getting to know them; in virtual communities, you can get to know people and then choose to meet them. (Rheingold, 1993, pp. 26-27)

In the last two decades, research on computer-mediated communication (CMC) has mounted, it would seem, exponentially. CMC has become a widespread tool, and in some settings, may be "the medium of managerial choice" (Markus, in press). CMC interests interpersonal communication researchers, as a great deal of research on the nature of CMC focuses on social cognitive, interpersonal, and psychological processes that affect the way people exchange messages vis-à-vis the medium. and in comparison to traditional face-to-face and group communication (Culnan & Markus, 1987; S. Kiesler, Siegel, & McGuire, 1984). Although there are

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exceptions (e.g., Yates & Orlakowski, 1992), most theoretical accounts of CMC take into prominence cognitive and interpersonal antecedents and/or consequences of CMC effects. Although some argue that new media require new constructs and theories, others contend that there is more to be learned about new media using at least somewhat older general notions about interpersonal interaction.

Although much previous research reported depersonalizing effects of the medium, recent work has argued that developmental and social information exchange factors predict more positive interpersonal relations. Walther’s (1992a) social information processing perspective holds that the form and the rate of interpersonal information exchanged via CMC differs from face-to-face (FtF) interaction, but that over time relational effects via different media should be similar. Efforts to verify this position have met with mixed success. Although predictions were offered that longitudinal CMC would differ from FtF only in their initial interactions, findings have not demonstrated significant differences between media even in those early exchanges (Walther & Burgoon, 1992). This puzzling contrast emerges: One-shot CMC groups are less personal than FtF groups, but longitudinal groups’ first meetings are not. At present, no clear understanding has emerged that explains this contrast.

The purpose of this research is to re-examine propositions of the social information processing perspective on CMC, and to report an experiment involving communicators’ anticipation of future interaction. This latter variable has had an interesting, although inconsistent, history in interpersonal communication research. Its potential effects speak directly to some previously untested assumptions of social information processing theory and, as will be shown, accounts for a great deal of the mystery concerning when CMC is likely to feel one way or another.

LITERATURE REVIEW

CMC

The theoretical research on CMC falls into two general types. The first examines the effects of the CMC media on communication. The other seeks to explain media selection (e.g., Ciborra & Olson, 1988; Daft, Lengel, & Trevino, 1987; Fulk, Steinfield, Schmitz, & Power, 1987; Komsky, 1991; Korzenny, 1978; Kraut, Egido, & Galegher, 1988; Markus, 1987; Rice, Chang, & Torobin, 1992; Rice, Grant, Schmitz, & Torobin, 1990; Russ, Daft, & Lengel, 1990; Schmitz & Fulk, 1991; Steinfield, 1992; Trevino, Lengel, & Daft, 1987), although there are some exceptions and some hybrids. It is to this first concern that the present research is addressed.

Early laboratory research exploring CMC in group interaction reported empirical evidence that the content of CMC messages was more task-oriented than that of FtF groups (Hiltz, 1975; Hiltz, Johnson, & Agle, 1978; Hiltz, Johnson, & Turoff, 1986; Rice & Love, 1987; Siegel, Dubrovsky, S. Kiesler, & McGuire, 1986). Invoking Social Presence Theory (Short, Williams, & Christie, 1976), these effects have been attributed to the lack of nonverbal cues in CMC. The theory holds that as communication channels filter out these cues, there is less salience of the co-presence of other people.

Using a similar focus on the number and types of cues filtered out, Sproull, S. Kiesler, and others have found that the absence of nonverbal “social context cues” causes CMC users to become depersonalized and interpersonally hostile. Such communication is marked by increased excited and uninhibited messages such as “flaming” (insults, swearing, and hostile, intense language), greater self-absorption versus other-orientation, as well as messages reflecting status equalization (Dubrovsky, S. Kiesler, & Sethna, 1991; S. Kiesler et al., 1984; McGuire, S. Kiesler, & Siegel, 1987; Siegel et al., 1986; Sproull & S. Kiesler, 1986).

Such findings and theories have been widely reported and accepted (Rafaeli, 1988). For instance, Hiersma’s (1982) review of early experiments on group conferencing led him to judge that “the research so far points to a general conclusion: As bandwidth narrows from face-to-face interaction to computer terminal interaction, the communication is likely to be experienced as less friendly, emotional, and personal, and more serious, businesslike, depersonalized, and task oriented” (p. 883). Five years later, Rice and Love (1987) similarly summarized the literature as suggesting that “CMC, because of its lack of audio or video cues, will be perceived as impersonal and lacking in normative reinforcement, so there will be less socioemotional (SE) content exchanged” (p. 88). Even still, these approaches are propagated (Sproull & Kiesler, 1991b, 1992) and widely repeated (see Lea, O’Shea, Fung, & Spears, 1992).

Similar conclusions about the impersonal nature of CMC have come from research involving self-reported projective assessments of media utility, in which participants rate the appropriateness or effectiveness of several communication media (FtF, telephone, CMC, etc.) for several types of communication purposes ranging across different levels of assumed equivocality or need for personalization (see Rice, 1984, 1993; Rice & Shook, 1988). The results of these studies, as a whole, are mixed. Although some show more personalized assessments as a result of time and experience with the media (Foulger, 1990), others show effects that are robust to time (Rice, 1993). Elsewhere, there are anecdotal reports that “interpersonally involving interactions such as conflict resolution and negotiation consistently occur over electronic mail” (Fulk, Schmitz, & Steinfield, 1990, p. 120; see also Markus, in press). In the final analysis, although “expec-
tions about the effectiveness of using a channel have been shown to be positively related to use” in terms of media selection (Steinfield, 1986, p. 781; Rice, 1993), the frequency of socially-oriented uses of CMC in organizational field settings (see Walther, Anderson, & Park, in press) questions the correspondence between the projective and the actual use of CMC.

At the same time, a growing body of research has shown contradictory patterns. Field investigations have shown more supportive or more varied relations among communicators linked by CMC (e.g., Feldman, 1987; Ord, 1989; Weedman, 1991). Several case studies have described colleague ships forming from serendipitous information exchanges (e.g., Johansen, DeGrasse, & Wilson, 1978). Some cases have quantified these warmer relational patterns (e.g., Beals, 1991). Field experiments have demonstrated that CMC task orientation is affected by exogenous variables such as task complexity, task interdependence, environmental uncertainty, and the need for communication across locations (Steinfield, 1986) and organizational culture (e.g., Hiemstra, 1982). These efforts suggest that media bandwidth is an insufficient predictor of CMC effects on the nature of social interaction.

In light of these and other findings, some authors have claimed that technological determinist positions such as social presence and the lack of social context cues are a dead horse no longer to be beaten (Fulk, Schmitz, & Schwarz, 1992; Steinfield, 1992). Unfortunately, this rejection is accompanied by references to new theories and evidence about media choice rather than media effects. Much of this media selection research argues that attributions about media utility are socially constructed through interaction in social networks (e.g., Fulk et al., 1990; Schmitz & Fulk, 1991; see Rice & Aydin, 1991). Such critiques do not address actual channel effects on communication behavior past the point of selection. More critically, they dismiss previous media-effects theories without dealing squarely with the empirical between-condition communication differences reported in early experimental research.

A recent theoretical alternative has focused on CMC/FtF differences as a function of the way participants process interpersonal information within the constraints of channels and time. Noting the difference between lab and field studies, time and information-processing requirements have been taken into consideration with which to discriminate CMC and FtF communication. According to the theory, rather than eliminating social information or “blinding” participants to it, CMC’s limited bandwidth might simply retard normal impression development and relational communication. The cause of this retardation is that CMC forces both task-related and social information into a single verbal/linguistic channel, and it takes more “real time” to exchange the same number of messages in CMC as it does in FtF interaction. This approach has been called a “social information processing perspective” (Walther, 1992a).

Research investigating this perspective has produced mixed results. A meta-analysis of previous empirical findings determined that time was a critical moderator of relational tone (Walther et al., in press). This work contrasted research with limited time periods against those lab and field studies that allowed unlimited interaction. Socioemotional expression was greater where interaction was longer. In another study, Walther (1993) found that interpersonal impressions did develop over extended time interaction in CMC, and that they developed more slowly than in FtF interaction. These results support the social information processing approach.

Walther and Burgoon (1992) examined the relational communication dimensions of longitudinal FtF groups, and asynchronous CMC groups measured at three time points in five and a half weeks. Based on the social information processing perspective, they argued that differences between CMC and FtF should be confined to initial interactions and dissipate over time. Predictions specified initial differences between computer conferencing and FtF groups consistent with previous cues-filtered-out research, with convergence on relational communication dimensions between the two conditions over subsequent conversations. Participants’ reports confirmed the convergence trends for some relational dimensions (immediacy/affect, similarity/depth, composure/relaxation, dominance, attempted influence, receptivity/trust; see Burgoon & Hale, 1984, 1987). On other dimensions, no effects between the conditions appeared at all (i.e., formality). On yet another dimension—task versus social orientation—CMC was more relationally positive than FtF from the very inception of interaction, and over time. However, with the exception of this last dimension, in no cases were FtF scores at time one significantly different than CMC scores—contrary to hypotheses and in contrast to previous research.

In a similar analysis using outside coders’ observations, Walther (in press) found that asynchronous CMC was rated higher on all dimensions of relational intimacy (immediacy/affect, similarity/depth, receptivity/trust), and on social (vs. task) orientation, from time-one and throughout. Although these results refute a strict bandwidth/depersonalization approach, the lack of time-one channel differences in Walther and Burgoon (1992) and the superiority for CMC on some dimensions in Walther (in press) were not anticipated and are not accounted for by social information processing theory as originally articulated.

The question arising from these anomalous findings adds a different twist to the previous puzzles in the area. It was formerly simple enough to ask, why is CMC different in longitudinal versus restricted groups? The hypothetical answer was that groups develop over time and that one-shot experiments failed to capture these dynamics—the suspicion essentially that was tested by Walther and colleagues. The question now has become, why do CMC groups appear no less intimate and social than FtF groups
even in the initial meetings of longitudinal interaction, relative to one-shot CMC studies? The contention that CMC groups develop over time does not account for this phenomenon, because whatever effects may be gleaned over the course of time would not explain the similarity of longitudinal CMC groups to FtF groups in their initial encounters. These first meetings should resemble those of one-shot groups, as temporal dynamics would have had little chance to accrue. Some other effect may be operative, which may yield a differential impact in CMC conditions than it does in traditional FtF groups.

Anticipated Future Interaction

One suspicion has been that there may be some effect of the anticipation of future interaction on the uncertainty-reduction and affiliation processes employed by communicators in these longitudinal experiments (Walther, 1992b). Although the zero-history group members in these studies knew nothing about their partners as they undertook their meetings, partners knew they would be communicating with and interdependent upon their partners over time. At first glance, it might seem that the anticipation of future interaction should be constant across communication conditions, within either respective time frame: In both longitudinal and one-shot experiments, participants knew in advance whether their association was long-term or short-term. Were this the case, the anticipation factor should not account for the differences between the interpersonal behavior of longitudinal (similar) and short-term (dissimilar) CMC, relative to FtF. FtF communication in one-shot meetings might be much the same as one-shot CMC groups, because FtF partners had no specific indication of continued interaction.

There is good reason to suspect, however, that the anticipation of future interaction may actually be greater, and more of a constant in any FtF interaction, regardless of time frame, although lower and more variable in CMC. Previous research on anticipated future interaction in interpersonal communication reveals some anomalies that suggest this to be the case. In several such efforts, the anticipated future interaction variable has been difficult to manipulate. For example, Kellermann (1986) indoctrinated research participants by telling some participants they would definitely interact with an assigned partner two different times, told others they might interact again, and told others they would meet their partners only once. On a manipulation check, those who were told they would meet more than once indicated a high anticipation of future interaction. Interestingly, those who were told they would not meet again also showed a moderate anticipation of future interaction. Kellermann concluded, “individuals often don’t expect to meet others, though they ‘hedge’ their bets and allow for some possibility of another interaction” (p. 57). Douglas (1987) reported a similar problem: although continuously measured scores of actual anticipation did differ as a result of an anticipation manipulation, the mean score for the no-anticipation participants was surprisingly higher than expected. This lead Douglas to conclude that “no anticipated future interaction was not, in fact, operationalized” (p. 242). Both authors, in retrospect, felt that this phenomenon seemed especially plausible among student participants from the same college, who were not unlikely to recognize one another at campus or community locales.

Although the question of anticipated future interaction has not been considered in previous CMC research, it seems very likely that it may have been operative among FtF—control group—partners in early CMC experiments. Some anticipation of future interaction may be an inherent aspect of FtF conversation. FtF participants—especially student participants—may “infer that they may recognize and talk to each other in the future” (Douglas, 1987, p. 242). Such a phenomenon seems far less likely, however, in one-shot, zero-history, CMC-only groups such as those employed in early CMC experiments. The anticipation phenomenon is more likely to occur among people who see each others’ faces and hear their voices (as in experimental FtF groups) than among partners who never see or hear each other, as in zero-history CMC groups. Certainly they grasp the issue, how could they possibly know, down the road, whether they “bumped into each other,” or not? The upshot of this observation is that all FtF groups—one-shot or longitudinal—might experience some anticipation of future interaction, but that this effect is moderated in CMC and may only pertain where members are cognizant of a deliberate longitudinal relationship.

If this is indeed the case, then participants in CMC-only groups in their initial encounters should be affected much more by the anticipation of future interaction inherent in a longitudinal association than would be FtF partners. In other words, the knowledge of a long-term versus short-term encounter should affect CMC partners’ anticipation, but not FtF members’. This diagnosis is offered as a hypothesis.

H1: CMC partners’ anticipation of future interaction is more greatly influenced by a long-term versus short-term assignment than is the anticipation among FtF partners.

If such a pattern as the above exists, and if it is shown to relate to the interpersonal behavior of CMC groups, then this factor may account for the previously observed differences between the relational behavior of one-shot CMC groups and longitudinal groups’ initial interactions. Of even greater consequence, if it can also be shown that the anticipation factor operates differently in one-shot CMC and FtF groups, then it must
be considered that the depersonalizing effects of CMC observed in past research may not be a function of the medium at all, but rather a function of the anticipation of future interaction that the medium moderates. A rationale for such an effect follows.

The importance of the anticipation of future interaction on interpersonal behavior has received great attention in theoretical and empirical reformulations of Uncertainty Reduction Theory (Berger & Calabrese, 1975). According to the original theory, there is a positive relationship between uncertainty and information-seeking, and an inverse relationship between uncertainty and liking/affiliative expression/intimacy. Although these relationships suggest static states at the point of pre-interaction (see Kellermann & Reynolds, 1990), they are conceived to predict the process of initial exchanges; uncertainty causes information-seeking, which reciprocally decreases uncertainty, leading to increased liking and intimacy. Later reformulations (e.g., Berger, 1979; Berger & Bradac, 1982) have posited a role of anticipated future interaction, such that anticipation increases the motivation to reduce uncertainty. It can be reasoned, by extension, that greater anticipation of future interaction may lead to greater information seeking and intimacy/liking.2

At the same time, direct effects on interpersonal behavior or interpersonal evaluations have been shown to result from anticipated future interaction. Studies have shown that anticipation of future interaction increases the amount of biographical and demographic information exchanged among actors (Calabrese, 1975). Persons anticipating future interaction with a target person, when acquiring some information about the target, feel more similarity to that target person than do persons without such anticipation (Berger & Douglas, 1981). Anticipation causes actors to present themselves more positively and with greater friendliness (see for review Kellermann & Reynolds, 1990). Anticipated future interaction interacts with gender and gender of one’s partner on dyadic self-disclosure (Cline & Musolf, 1985). In negotiation settings, anticipation causes more cooperative behavior (see Heide & Miner, 1992). All these “symptoms” of anticipated future interaction seem very much like what FtF groups and longitudinal CMC groups have been found to do, relative to one-shot CMC groups. Indeed, in one of the few one-shot CMC experiments that did not find more positive interaction evaluations in FtF than in CMC, the participants in each condition “were led to expect that they would be interacting further with the other subjects in the experiment” (Matheson & Zanna, 1990, p. 4).

Finally, a research question was posed regarding the potential variation between two major classes of computer conferencing, synchronous (in which participants communicate simultaneously) and asynchronous (in which participants read and write messages at independent times). There are conflicting opinions regarding the effect of synchrony in CMC. Some researchers argue that the determining characteristic of CMC effects is the number and type of cues filtered out, and that asynchronous e-mail and synchronous conferencing should be similarly different than FtF interaction. Others, such as Rafaeli (1988), have argued that the degree of “interactivity” a system features affects user’s adaptation and the communication they transmit (see Nass & Mason, 1990; Rice, 1986). From this perspective, asynchronous CMC should differ from both synchronous CMC and FtF.

What might be the interpersonal effects of one or another level of synchrony? This is difficult to know, as few if any studies have examined both. Despite the potential negative reactions to the absence of nonverbal cues, or in response thereto, the potential for positive effects in synchro-
nous CMC are suggested by several observations. According to Rice (1986, p. 230), synchronous CMC allows immediate responses, and "personal cues often appear in new forms, while direct questions are almost always answered." Ferrera, Brunner, and Whittemore's (1991) linguistic analysis found that synchronous CMC users employ frequent you and I references, omission of articles and unstressed subject pronouns, the shortening of words through abbreviations and symbols, and copula omissions, all of which may connote more familiar interaction.

As for asynchronous CMC, there are mixed opinions on its potential interpersonal effects. McGrath (1990) speculates that the response lags in combination with the loss of nonverbal cues may increase uncertainty and disrupt groups' "entrainment"—their ability to synchronize their activities, manage their temporal commitments, and "regulate the flow of task and interpersonal interaction" (McGrath, 1991, p. 162). Walther (in press) counter-argues that asynchronous CMC alleviates entrainment problems of normal group activities. When partners need not coordinate in real time "temporal commitments become discretionary, and task versus interpersonal interaction becomes, in a sense, de-regulated; both task and social exchange may exist without one constraining the time available for the other." Asynchronous communication may facilitate more positive relational communication, according to Walther and Burgoon (1992, p. 79), as it may foster "selective self presentation and relational behavior(s) . . . which are more stereotypically desirable."

There seems no clear guideline as to which form of CMC is most appropriate for theoretical research about the medium. Most of the early CMC research experiments employed synchronous systems, although most field studies and organizational uses of CMC rely on asynchronous interaction (see Archer, 1990; Hiltz, Turoff, & Johnson, 1989). Some maintain that FtF/synchronous comparisons are more appropriate. Alternatively, Walther and Burgoon (1992) suggested that comparing FtF to asynchronous CMC maximizes experimental variance. One study which compared forced turn-taking in CMC to simultaneous CMC message generation found no effect on decision quality or task orientation of messages. The authors (Siegel et al., 1986) concluded that CMC effects are robust to these variations, but acknowledged that "greater generalizability would result from a study which compared simultaneous computer-mediated communication with [asynchronous] computerized communication" (p. 177). Given this suggestion, and methodological implications of the answer (discussed below), the following is offered:

RQ1: What differences exist between Asynchronous CMC, Synchronous CMC, and FtF communication on (a) immediacy/affection, (b) similarity/depth, (c) receptivity/trust, (d) composure/relaxation, and (e) social orientation?

**METHOD**

In overview, participants were recruited and assigned to CMC or FtF groups of three. Half of the group members in each condition were led to expect ongoing interaction for three tasks over six weeks; the other half were led to expect different partners for each task. Meetings took place in each condition after which questionnaires were administered.

**Participants**

In order to form zero-history groups, participants were recruited from several courses in three different departments in two colleges at a midwestern university. The project announcement indicated that the voluntary participation required several weeks' duration, and offered students course credit commensurate with that effort in accordance with the guidelines of the classes from which they came. Participants were randomly assigned to one of three communication conditions. Three-person groups were formed on the basis that participants came from different courses-of-origin. Groups were randomly assigned to anticipation versus no-anticipation of ongoing interaction manipulations. In order to satisfy requirements for another ongoing research project, the number of FtF assignments was larger than the two CMC conditions (although the regression procedures reported below are robust to unequal sample sizes). The final demographics after participants were dropped for incomplete responses and other technical problems were as follows: N = 114, with 48 in FtF, 27 in asynchronous CMC, and 39 in synchronous CMC. Ages ranged from 18 to 38 with a mean of 22. Forty-four percent of participants were male and 56% were female. The median class was the junior level.

Analysis of variance detected no differences between communication conditions or the anticipation manipulation groups in terms of demographic compositions.

**Anticipation**

Participants were instructed that they would be working in groups of three, on three consecutive tasks over a period of six weeks, to study some questions regarding group interaction. In order to vary anticipated future interaction, participants were told to expect one of the following assignments: (1) that they would work with the same two partners on all three tasks throughout the project—the long-term condition—or (2) that they would be assigned new partners for each of the three tasks they worked on—the short-term condition. This manipulation strategy is similar to those used in previous studies (e.g., Cline & Musolf, 1985; Douglas, 1987;
C. Kiesler, S. Kiesler, & Pallak, 1967), with obvious variations given the group nature, time frame, and communication channel.

CMC

Two CMC systems were used. The first was an asynchronous conferencing system, Vaxnotes. Vaxnotes participants read and entered comments at times of their own choosing, without the temporal co-presence of their partners. Messages were imprinted with usernames—first initial plus last name, in this case—and the date and time of entry. Messages were organized within topical areas, and users imprinted each message with a subject line; the topics, message numbers, and subject lines appeared at sign-on as a table of contents. The system also indicated which messages were new (yet unread), and users could advance between unread messages with a single keystroke. CMC participants were trained in the use of the system at one of six training meetings (arranged so that members of groups came to separate sessions). They were also acquainted with the participation details for the project and told that they would receive final participation details for the project and told that they would receive final groups came to separate sessions). They were also acquainted with the participation details for the project and told that they would receive final group assignments and instructions as to whether they would work with the same group or different groups on each of three projects.

Participants picked up final instructions posted on a (manual) bulletin board and began their conferences the next week. A manipulation check was included in the instruction material, along with an informed consent form, and some pretests (the results to be reported elsewhere). The manipulation check asked participants to confirm their subject number, username, group number, and long-term vs. short-term group assignment. It also listed the names of the other group members and asked whether any participants knew each other outside these groups, and none did. These questionnaires and informed consent forms were returned to a drop-off box below the bulletin board by the asynchronous CMC participants.

The other CMC system was synchronous, the “Phone” utility on the Vax minicomputer. Phone requires all participants to participate in real time. The screen is split into several horizontal areas, in this case four (one for each group member and one for a recording device). Each pane shows the username of the participant who writes in that frame. The Phone system displays each message to all participants as it is being composed, a character at a time. Participants all used the system in different rooms within the same building, but because they were instructed to report to different places, they did not encounter each other off-line. Participants were given instructions on the use of the system along with pretests, manipulation checks, and consent forms. When all questions had been answered satisfactorily, conferencing began.

The participants addressed one of three tasks used in previous conferencing research (Walther & Burgoon, 1992). Each task presented an academic policy dilemma and asked the participants to review all relevant issues, discuss alternatives, and to make a consensual recommendation to university administration. They were instructed to indicate when they had completed the task, in a conference note. The tasks were assigned to groups through simple rotation. Asynchronous CMC groups read the task, along with their completion deadline, as the first message in each conference; synchronous groups read a photocopy. As the deadline approached, asynchronous participants were informed in a conference note that there was a questionnaire to pick up from the bulletin board, to be filled out immediately after the task was completed and returned to the drop-off box as soon as possible. Participants were instructed that their next task (or task plus group assignment) would be posted on the bulletin board.

FtF

FtF groups received an orientation via printed instructions and individual discussions in secluded rooms prior to their meeting. These instructions also informed them of their condition assignments. They received the same pretests, questionnaires, and forms as the CMC participants.

FtF discussions took place in interaction laboratory rooms resembling conference rooms. A conference table with table-top microphone, three upholstered chairs, paper name placards, and the same tasks—in printed form—met participants as they entered the room. A one-way mirror covered a portion of one wall. Participants were given no other guidance regarding how to proceed, except to notify an assistant in the next room when they deemed their task complete. Participants were separated into individual rooms and completed dependent measure questionnaires when they finished their task. They were told that they would be informed of the date for their next meeting (or the date plus their new group members) on the bulletin board.

When all of these “first” meetings were completed and all questionnaires were returned, participants were notified that their participation requirements were actually complete. Participants received and signed a debriefing form to indicate their understanding of the true purpose of the experiment and the deceptive manipulation. They were further informed that they would receive full credit as if they had participated in three, rather than one, meetings; no complaints were registered.

Measures

A measure was devised to assess participants’ perceived anticipation of future interaction with other group members, as a continuous variable.
Although the dichotomous assignment into long-term/short-term teams should affect anticipation of future interaction, previous manipulation failures (see Douglas, 1987; Kellermann, 1986) and interest in specificity suggested that the wisest course was to tap participants’ actual, rather than assigned, anticipation. The measure included items based on previous research on anticipation, including items designed to assess participants’ expectation that they might recognize their partners during some later encounter at various locations (see Kellermann, 1986). The latter items were included because this recognition has been troublesome in previous explorations of anticipated interaction. Interviews with an offset participant group determined the most expected places for chance meetings to occur, in order to generate expected recognition items. In total, nine items administered in the posttest assessed the anticipation variable (see Appendix 1).

A factor analysis was conducted on the anticipation scales. A priori criteria for the acceptability of factors included eigenvalues of 1.5 or greater, no fewer than three items, acceptable alpha reliability, and meaningfulness and interpretability of each factor. Initial principal components analysis suggested eigenvalues for three factors, but two factors contained only two items even after rotation. A two-factor model (which suggested *expectancy* and *recognition* dimensions) met the above criteria except that reliability for the second factor was .48 with any more than two items. A unidimensional model produced lower-than-desirable alpha reliability of .78 with one item deleted, but seemed to describe the data in the most meaningful way, and was used in subsequent analyses.

Also included in the posttest were scales measuring relational communication. As is well-accepted, messages may vary along many dimensions besides their content, and relational communication refers to those message aspects people employ to reflect and to manage their interpersonal affect, status, and their relationship definition (see Burgoon & Hale, 1984). Using a multidimensional approach to explore the interpersonal tone of CMC offers researchers more refined analyses than reliance on less complex measures (see Lea, 1991; Walther, 1992a). In order to untangle unexplained trends on certain relational communication dimensions from previous research using these measures, several dimensions were selected for assessment in the present study. These included dimensions related to intimacy: *immediacy/affection*, incorporating affection, inclusion, and involvement; *similarity/depth*, the expression of openess, rapport, and confidence. The other dimensions include *composure/relaxation*, or the degree to which communicators express calmness versus tension and arousal, and *social-versus task-orientation*, reflecting the range of personal to work-related concern (Burgoon & Hale, 1987, which offers the original measurement items; the version used in

RESULTS

**Anticipation by Condition**

Hypothesis one predicted that CMC groups’ actual anticipation of future interaction is more influenced by assigned group longevity than is that of FtF groups. Analysis of variance was conducted using a 3 (conditions) by 2 (short-term/long-term) design. H1 was supported. Actual anticipation score was affected by a condition by term-assignment interaction, *F*(2,91) = 3.02, *p = .054. A main effect for communication condition also emerged, *F*(2, 91) = 30.47, *p < .001. The pattern of means indicates that Asynchronous CMC and Synchronous CMC members reflected the anticipation of future interaction in accordance to that expected by their length of continued association, but that FtF participants’ anticipation was unaffected by the longevity of their groups (see Table 1). Post hoc Newman-Keuls’ tests revealed that among the short-term group members—those with no solid basis to expect another encounter—FtF had significantly higher anticipation of future interaction than did either CMC condition.

These results show that communication media affect anticipated future interaction perceptions, and that anticipation is differentially amenable to the effect of a long-term versus short-term assignment depending on the medium of discussion. They establish a necessary first step in clarifying the differences between the relatively impersonal behavior of one-shot CMC groups in past research, compared to the more personal behavior of one-shot or long-term FtF groups and longitudinal CMC. This clarification depends, however, on the extent to which anticipated future interaction affects relational communication, relative to the effect of communication condition, as proposed in the second hypothesis.

Prior to the analyses for hypothesis 2, RQ1 was addressed by comparing the means from communication conditions on each relational communication variable. This test was also used to confirm whether either CMC condition differed from FtF. Had they not, further analysis comparing the conditions effect to the anticipation effect would be far less informative. This test also had the capability to reveal whether or not both CMC conditions differed from each other and from FtF levels. If they did not,
then the amount of variance due to the difference between all three conditions might be attenuated by the similarity of two conditions, in subsequent tests, when compared to the variance due to anticipation.

Research question 1 was explored by means of a one-way analysis of variance procedure, and the results were analyzed using a liberal Least Significant Difference (LSD) test at alpha = .05. These tests showed that of the two CMC conditions, only Asynchronous CMC differed from FtF on immediacy/affection, similarity/depth, receptivity/trust, and composure/relaxation. In each case, CMC was lower than FtF (see Table 2). There were no differences for social vs. task-orientation. Asynchronous CMC also differed from Synchronous CMC on similarity/depth, receptivity/trust, and composure/relaxation. For the next hypotheses, then, only Asynchronous CMC and FtF conditions were compared, in order to provide the most clear and meaningful hypothesis tests. This combination comprises the most conservative test of the anticipation effect, not only because there is clearly more difference between these two conditions than among the three, but also because, as it happened, they are the two with the least variance in anticipated future interaction as a result of the manipulation.

Hypotheses 2a through 2d were tested using multiple regression analysis, regressing each dependent variable on the effect of perceived anticipation, condition (effect coded), and their interaction. Although a stepwise, forward entry regression procedure would determine which predictors accounted for the greatest variance for each relational dimension, this approach was rejected because a theoretical guided this effort, that is, does condition produce any difference when the effects of anticipation are partialled out?

Following the “experimental design approach” to regression (Pedhazur, 1982), a full regression model was run with main effects first, plus the interaction effect vector, to see if the interactions accounted for significant incremental variance beyond the main effects. When the interaction term was not significant, it was dropped from consideration and analysis returned to the main effects; interaction effects will not be discussed, below, except where significant. For the primary analysis, anticipation was entered into the regression equation first, and the conditions variable, second. This order allows the variance associated with anticipation to be partialled out before the conditions factor entered. Following Pedhazur (1982), each analysis was then repeated reversing the order of entry for main effect predictors, in order to see whether there was indeed any effect of the other variable. In a sense, this replicated the LSD tests using regression, with the added benefit of illustrating the mutual effects of the two predictors, to see if Conditions might compete with Anticipation’s effects.

**Immediacy/Affection**

H2a was supported. Anticipation was positively associated with immediacy/affection, and it was a better predictor of immediacy than was communication channel. Anticipation of future interaction was significant, adjusted $R^2 = .15$, $F(1, 73) = 14.43$, $p = .0003$ $b = .16$. The subsequent entry of the Condition effect failed to achieve a significant change in variance accounted for.

When the order of entry was reversed, Conditions was significant as entered on the first step in the regression. Anticipation accounted for a significant increment in variance on the next step. With both factors in the model, the Conditions term became nonsignificant as revealed by the t-tests of all bs in the model (see Table 3).

**Similarity/Depth**

Hypothesis 2b was also supported. Anticipated future interaction had a positive association with similarity/depth, and Anticipation was the
best predictor, compared to the effects of communication condition. Anticipation was statistically significant, adjusted $R^2 = .12, F(1,73) = 11.08, p = .001, b = .10$. The Conditions effect did not achieve significance on the next step. Reversing the order of entry, Conditions was significant on step one. Anticipation was significant on step two, and with its inclusion, Conditions became nonsignificant.

**Receptivity/Trust**

Hypotheses 2c was confirmed as well. The Anticipation variable was significant, adjusted $R^2 = .233, F(1,73) = 23.56, p < .0001$. Anticipation was positively related to receptivity/trust, $b = .185$. The entry of the Conditions variable was not significant in the primary analysis. Conditions was significant when it entered the model first, but with the significant entry of Anticipation on the second step, the Conditions term dropped out.

**Composure**

Similar results were obtained in confirmation of hypothesis 2d. The anticipation of future interaction variable proved a significant predictor, adjusted $R^2 = .164, F(1,73) = 15.54, p = .0002$. Anticipation was positively associated with composure, $b = .16$. The Conditions term did not account for a significant increment in variance beyond the effects of Anticipation. When the predictors were entered in the opposite order, a similar pattern was obtained with composure as with other outcomes. The Conditions variable was initially significant, but with the significant inclusion of Anticipation, the Conditions term became nonsignificant. H2d was also supported.

**Social Orientation**

Hypothesis 2e was not confirmed. Anticipation did not enter the model significantly. The addition of the between-conditions vector did not yield significance, either. The overall regression equation, including the interaction term, reflected only multiple $R^2 = .03, F(3, 71) = .249, p = .86$. No effects obtained significance with the variables entered in reverse order.

**Synchronous CMC/FtF Replication**

A complete reanalysis was conducted using FtF and synchronous conditions. These results must be considered ancillary, because they risk alpha inflation from the second analysis of the FtF data, and some findings that might normally be considered at a more liberal alpha level (especially interaction terms) become especially tenuous. Additionally, the failure of these conditions to differ using the LSD analysis warrants caution. A summary of the trends revealed in these analyses follows.

For immediacy/affection, the interaction of Anticipation and Condition obtained significance. Separate regression lines were calculated for each condition. These revealed that participants exhibited somewhat opposing responses in immediacy/affection as a result of anticipated future interaction. Synchronous CMC's intercept was higher than FtF's; in CMC immediacy/affection declined slightly with greater Anticipation, whereas in FtF communication immediacy/affection increased with greater Anticipation. No main effects were significant.

On similarity/depth the Anticipation term was not significant when entered alone, but with the inclusion of the Conditions term, both factors were significant. These conditions are best described as parallel, with the intercept for synchronous CMC greater than FtF but with a common slope ($b = .104$) for the Anticipation effect.

Opposing trends were apparent for the receptivity/trust dimension. The interaction term was significant. Asynchronous CMC had a higher intercept, but showed declining receptivity as anticipation increased. FtF communication showed more receptivity as anticipation went up. A similar effect was found in the significant interaction on social- vs. task-orientation, where asynchronous CMC was more task-oriented but became less so in the face of Anticipation. FtF showed little change as a result of Anticipation, with a $b$ of .014 in the direction of greater task-orientation. No effects were obtained on composure/relaxation.

**DISCUSSION**

The present results offer very strong indications that the impersonal effects attributed to CMC in many early, one-shot experiments are not direct effects of the communication media. Rather, CMC acts as a moderator, by which participants may come to expect or not to expect ongoing interaction with their partners. This moderation takes place to a greater extent in CMC than in FtF communication. In FtF interaction, partners in one-shot encounters expect to recognize and interact with their partners in the future significantly more than do partners in synchronous or Asynchronous CMC.

The actual anticipation of future interaction held by participants using asynchronous computer conferencing and FtF meetings significantly accounts for relational intimacy and composure, and communication medium has little effect once Anticipation is considered. In the cases of immediacy/affection, similarity/depth, receptivity/trust, and composure/relaxation, communication condition did not account for a significant amount of the variance after the anticipation effect was removed. Only in
TABLE 3
Effects of Anticipated Future Interaction, Communication Channel, and Their Interactions on Relational Communication

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<th>Outcome &amp; Predictors</th>
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<th>$R^2$ change</th>
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NOTE: Three sets of results are presented for each outcome variable. For Asynchronous CMC/FtF regressions, the primary analysis entered (1) Anticipation of Future Interaction (AFI) first, (2) Conditions second, and (3) the interaction term; secondary analyses entered (1) Conditions first and (2) AFI second. For Synchronous CMC/FtF regression, AFI was entered first. * denotes that the predictor became non-significant upon the inclusion of the term on the next step. ** denotes that the predictor achieved significance upon the inclusion of the next term on the next step.

the case of social-orientation did anticipation fail to predict communication, but the condition effect similarly failed to reach significance. This is the same outcome variable that showed greater social orientation in asynchronous conferencing than in FfF communication in previous longitudinal research (Walther & Burgoon, 1992); there may be some other factor operating on this construct than has been examined heretofore. The present results must be reckoned against theoretical positions regarding CMC. Clearly the restricted bandwidth approaches are severely challenged by these results. The filtering out of cues position dictates a very strong medium effect over and above whatever antecedents and dynamics participants experience. Clearly this was not the case. The present research directly assessed whether the impersonal communication of CMC versus FfF communication seen in one-shot experiments, and CMC's positive character in longitudinal settings, could be explained through specification of an intervening variable. The anticipation of future interaction accounted for the specified effects. The social presence and lack of social context cues perspectives are insufficient in this regard.

What then of the rival social information processing perspective? This position, too, has predicted but failed to find differences between CMC
and FtF in initial meetings. It has not previously accounted for the anticipation moderator. Yet this perspective offers some assumptions in its calculus that may be reconsidered.

The social information processing perspective holds that the motivation to affiliate is similar among persons communicating FtF or via CMC (Walther, 1992a). It also assumes that the affiliation motive acts as a drive, suggesting a "uniform propulsion" among all interactants to pursue positive relational states through communication, with the medium of that communication subsequently expediting or retarding relational development. Elsewhere, the assumptions by Berger (1979) and work of those exploring anticipated future interaction show that this "uniform propulsion" assumption may be too simple. The affiliation motive may be a variable, affected by anticipation. A weakness apparent in the social information processing perspective is that it has not allowed for differences in the affiliation drive; they have implicitly been assumed away as random error. The current work suggests that the effects of anticipated future interaction on CMC groups' interpersonal behavior may indeed be more systematic and influential than previously expected. The social information processing perspective must be re-examined in this light.

The differences among synchronous and asynchronous CMC, relative to FtF communication, have been the source of conflicting opinions. The results of the research question offer intriguing points for continued speculation about these variations and their effects. Mean comparisons between communication conditions on relational communication most often showed the difference lying between asynchronous CMC against the two synchronous (computer conferencing and FtF) conditions. The "interactivity" approach seemed to see some initial backing here: Media differed along the lines of participation simultaneity rather than as a result of a partial-cues (CMC) versus full-cues (FtF) distinction. Yet such a conclusion would be premature. The interaction trends among synchronous CMC and FtF that showed opposing reactions to Anticipation on immediacy, receptivity, and task-orientation, suggest that the two synchronous conditions differ in other ways yet.

The final results of the research question—which CMC condition is more like FtF—poses a paradox. Synchronous CMC is most like FtF in that there is less mean variation in relational communication between these two conditions, yet some differences between them emerge in their interactions with Anticipation. Asynchronous CMC, on the other hand, is least like FtF relational communication, at a gross level, but in their development and response to temporal variations, the difference between these channels becomes insignificant. It is beyond the scope of the present article to suggest what other factors are at work in these variations. However, researchers are cautioned not to accept swiftly either synchronous or asynchronous CMC as "the right medium" for testing theoretical claims about the media.

There is always some concern about generalizing to the world from findings drawn from students. This may be especially so as it was explicitly recognized that students are very likely to experience serendipitous future interaction. These concerns are somewhat mitigated, however, for two reasons. First, most previous CMC research has also used student participants; there would be less replication value if the anticipation variable was tested on a different subpopulation. Second, and more importantly, CMC in the "real world" is most frequently used among those with ample opportunity for other forms of contact. Rockart and DeLong (1988) report that corporate e-mail users often employ group distribution lists for messages to nearby co-workers. Finholt and Sproull (1990) found an average of 19% of e-mail originated within a hundred yards of its destination, with another 13% from elsewhere in the same building in one organization (see Culnan & Markus, 1987; Schaefermeyer & Sewell, 1988; Sherblom, 1988). It seems that nonstudent CMC users may find themselves in circumstances to expect future interaction, too. It is also noted that the present design does not necessarily generalize to interaction among people who regularly use many media in their ongoing communication.

At the same time, there is some ecological reality to conditions in which partners expect longitudinal CMC-only associations. Numerous examples of this may be found in the literature, reflecting academic, organizational, and social groups (e.g., Bikson & Eveland, 1990; Finholt & Sproull, 1990; Hiltz, 1986; Kerr & Hiltz, 1982; Lea & Giordano, 1993).

Implications for the use of asynchronous CMC—the form most common in field applications—are readily apparent. CMC appears to be more interpersonally positive when used by members who at least think that their association will have some longevity. The use of CMC for "meetings," or ad hoc, one-shot groups—rather than ongoing "teams" or "task forces"—runs some risk of greater impersonality. Further research must explore the influences of media, temporal dynamics, and relational communication on the effectiveness and satisfaction of CMC groups under varying arrangements; as we know from the sometimes curvilinear relationship of group cohesion to task activity (see Shaw, 1981), what is most interpersonally satisfying is not always most productive.
APPENDIX 1.
Anticipation of future interaction
(7-interval semantic differential) scales.

1. To what extent do you anticipate future interaction with your conversational partner in the near future?
2. To what extent do you expect to meet your conversational partner again whether you want to or not?
3. What is the likelihood you could have a chance meeting with your conversational partner somewhere?
4. How likely are you to recognize your conversational partner if you bumped into him/her somewhere?
5. To what extent do you want to meet your conversational partner again?
6. If you met your conversational partner somewhere else, how likely would that person be to recognize you?
7. What is the likelihood you might recognize your conversational partner at the student union?
8. ... at the grocery store?
9. ... in the library?

NOTES

1. Although two reviews and one research report by these theorists have reported positive as well as negative emotional expressions in CMC, and that physiological arousal did not differ in CMC and FtF interaction (S. Kiesler et al., 1985), their theoretical position—the "lack as well as negative emotional expressions in CMC, and that physiological arousal did not vary across conditions. Each r was converted to a Fisher z and contrast analyses were performed (Rosenthal, 1991). The effect of the manipulation on anticipated future interaction in synchronous CMC was greater than its effect in FtF; binomial Z = 2.025, p = .022. The manipulation effect did not differ between asynchronous CMC and FtF conditions, Z = .34. A post-hoc, nonorthogonal test showed no difference in the effects between the two CMC conditions. These tests provide partial support for the hypothesis. The salience of a long-term versus short-term partnership affected the anticipation of future interaction in at least one form of CMC more than it did in FtF communication.

4. Immediacy/affectation in synchronous CMC = (3.97 - .07 x Anticipation); in FtF communication, immediacy/affectation = (3.52 + .19 x Anticipation). Similarity/depth in synchronous CMC = (3.24 + .10 x Anticipation); for FtF, similarity/depth = (3.00 + .10 x Anticipation). For synchronous CMC, receptivity/trust = (4.12 - .05 x Anticipation), although FtF receptivity = (3.56 + .12 x Anticipation). On task-social orientation, synchronous CMC showed (4.35 - .27 x Anticipation); task-orientation in FtF was (3.73 + .014 x Anticipation).

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