RELATIONAL COMMUNICATION IN COMPUTER-MEDIATED INTERACTION

by

Joseph B. Walther

A Dissertation Submitted to the Faculty of the
DEPARTMENT OF COMMUNICATION
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Joseph B. Walther

entitled Relational Communication in Computer-Mediated Interaction

and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Judee Burgoon	10/26/90 Date
Suzanne Weisband	10/26/90 Date
Douglas R. Vogel	10/26/90 Date
Dirk R. Scheerhorn	10/26/90 Date
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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director	11/19/90 Date

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SIGNED: Joseph B Walther

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Mrs. Denno, you were wrong.

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ABSTRACT

This study involved an experiment of the effects of time and communication channel--computer conferencing versus face-to-face meetings--on impression development, message personalization, and relational communication in groups. Prior research on the relational aspects of computer-mediated communication has suggested strong depersonalizing effects of the medium due to the absence of nonverbal cues. Past research is criticized for failing to incorporate temporal and developmental perspectives on information processing and relational development. In this study data were collected from, and observations made of 96 subjects assigned to computer conferencing or traditional zero-history groups of three, who completed three tasks over several weeks' time. Results showed that computer-mediated groups increased in several relational dimensions to more positive levels, and that these subsequent levels approximated those of face-to-face groups. Boundaries on the predominant theories of computer-mediated communication are recommended, and future research is suggested.

CHAPTER 1

INTRODUCTION

Rationale

Computer-mediated communication (CMC) systems have become popular tools among large organizations and among private computer users. In university and military research, CMC networks connect workers across the globe (see Rice, 1980). In automated office systems, CMC systems follow word processors and electronic spreadsheets as the most popular application (Rockart & DeLong, 1988). In electronic bulletin boards in every major city, invisible organizations of computer aficionados post and retrieve messages. In high tech organizations and research facilities, variations of CMC are harnessed to decision making tools in the developing field of "electronic meeting systems" (Dennis, George, Jessup, Nunamaker, & Vogel, 1988). Although the existence of these systems reaches back a scant two decades, their utility is evidenced by their popularity. Like other communication media, CMC's diffusion has been trailed by the study of its effects (Williams, Rice, & Rogers, 1988). In the last decade, however, the study of CMC effects has become a growing field, especially in regard to its effects on group processes. But in the rush to describe and catalogue effects, theory, when it has appeared, may have developed and become reified prematurely.

Social presence theory (Short, Williams, & Christie, 1976) has been adopted to account for the effects of computer mediation on interpersonal and group communication processes. This theory holds that electronic communication media filter out communicative codes which are generally rich in relational information. The absence of such codes affects users' perceptions of the communication context and other participants, and constrains users' interpretation of messages. Other theories are emerging which also focus on the differences between media as a function of the number of cues available. Consistent with these positions, numerous empirical reports in the growing literature about computer-mediated communication report that CMC is

less personal or socioemotional than is face-to-face (FtF) communication (Hiltz, Johnson, & Turoff, 1986; Connolly, Jessup, & Valacich, 1990; see also Rice, 1984).

A critical examination of the CMC research, however, leads one to question the validity of claims regarding how people relate to one another in CMC and the applicability of social presence and related theories. Weaknesses in CMC research designs arise in light of other knowledge about group and relational processes. Contradictory findings cannot be accounted for by the social presence perspective. Despite a general recognition that studying the effects of repeated interactions over time may illuminate a great deal about CMC behavior, almost no research has examined a temporal effect (Williams et al., 1988).

The subject of affective tone is also a concern of relational communication study. Relational communication is the term for the messages and message dimensions people use to define or redefine relationships (Millar & Rogers, 1976; Parks, 1977), how they regard their relationships, and how they regard themselves and their partners within their relationships (J. Burgoon & Saine, 1978). By using multidimensional relational communication measures, the precise nature of relational tone in CMC may be determined, as well as the extent of channel differences, if they truly do exist.

This investigation is intended to explore relational communication in computer-mediated interaction and to test boundary conditions of the social presence/cues-filtered-out perspective. First, previous research on CMC is reviewed and criticized. The implication of these criticisms is that the fixed, impersonal relational qualities of CMC may not be inherent to the medium, but strictly bounded to initial interaction conditions among previously unacquainted CMC partners, if these effects occur at all. Second, an experiment is described which tested alternative explanations and predictions about the development of interpersonal impressions, message personalization, and relational communication in ongoing computer-mediated encounters.

Cues-Filtered-Out

Social presence theory (Short et al., 1976) has been used to account for task-oriented and impersonal tone in CMC (Culnan & Markus, 1987; Hiltz et al., 1986; Rice, 1984; Steinfield, 1986). The construct, social presence, is defined as the degree of salience of another person in an interaction and the consequent salience of an interpersonal relationship. Social presence is conceived to be a differential property of communication media, and social presence theory was created to explain differences between teleconferencing systems. According to the theory, the fewer channels or codes available within a medium, the less attention that is paid by the user to the presence of other social participants. Short et al. (1976, p. 65) state that electronic communication systems differ in their "capacity to transmit information about facial expression, direction of looking, posture, dress and nonverbal, vocal cues." Computer-mediated communication, with its paucity of nonverbal elements and backchanneling cues, is said to be extremely low in social presence in comparison to face-to-face communication. As social presence declines, messages are more impersonal.

In related research, Sproull and Kiesler (1986) define the critical difference between FtF communication and CMC as having to do with the absence of "social context cues" in CMC. Social context cues include aspects of physical environment and actors' nonverbal behaviors which define the nature of the social situation and the actors' relative status. In FtF settings these cues might be conveyed by spatial features, artifacts, and physical adornments (Edinger & Patterson, 1985; see Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1986). The absence of such cues in CMC leads to increased excited and uninhibited communication such as "flaming" (insults, swearing, and hostile, intense language), greater self-absorption versus other-orientation, and messages reflecting status equalization (Kiesler, Siegel, & McGuire, 1984; Siegel et al., 1986; Sproull & Kiesler, 1986). The lack of social context cues is also conducive to

equalized participation. When these cues are absent, actors become disinhibited who would otherwise defer speaking turns to higher status participants.

Social presence theory and the lack of social context cues hypothesis both point to similar causes and effects regarding the relational nature of CMC. Indeed, these theories have been collectively dubbed the "cues-filtered-out" approach by Culnan and Markus (1987), who articulated their common assumptions:

> (1) communication mediated by technology filters out communicative cues found in face-to-face interaction, (2) different media filter out or transmit different cues, and (3) substituting technology-mediated for face-to-face communication will result in predictable changes in intrapersonal and interpersonal variables (p. 423).

As this perspective provides that the structure or bandwidth of the medium alters the nature and interpretation of messages, it implies that such effects are inherent, constant, and context-invariant. By implication, there are no identifiable boundary conditions associated with this perspective.

Effects

Several effects on relational aspects of communication have been associated with CMC, and seem to support the cues-filtered-out explanations. These include greater impersonality and negative affect, task-orientation, and equality.

Messages in CMC have been described as characteristically impersonal, cold, and unsociable relative to FtF communication (Hiltz et al., 1986, p. 228). Users are self-absorbed, and are less likely to form impressions of other actors as distinct individuals. Emotional expression in computer conferencing is often negative and/or inflammatory (Kiesler, Zubrow, Moses, & Geller, 1985; Sproull & Kiesler, 1986; see also Rice, 1984; Rice & Love, 1987).

Participants in CMC have been found to be more task-oriented than are FtF interactants in their communication. Early empirical studies in CMC employing Bales' (1950) Interaction Process Analysis (IPA) found that participants in computer conferencing groups offered more

opinions and evaluations of proposals (task-oriented IPA messages) and fewer statements of agreement (IPA socioemotional messages) than they did in FtF settings (Hiltz, 1975; Hiltz, Johnson, & Agle, 1978; Hiltz & Turoff, 1978). These studies have been cited often and by many, such that the task-oriented nature of CMC is generally well-accepted (see Rice, 1984). In computer conferencing there is greater equality of participation, less dominance, and greater status equality in comparison to FtF group discussions (Hiltz & Turoff, 1978; Siegel et al., 1986; Smith, 1988; see also Dennis et al., 1988). Dominance has been measured as a disproportionately large part of total group interaction (on the presumption that more dominant actors speak more than others; see Siegel et al., 1986). The tendency for an individual or a faction of a group to dominate group discussions dissipates in the computer environment.

Weaknesses in CMC Research

The inherency, constancy, and unboundaried validity of the cues-filtered-out perspectives may be challenged on several grounds. The following critique discusses problems in the CMC research related to chronometry, transcript-only data, contradictory results, and coding.

Chronometry

Limitations in the amount of time users communicate in computer conferencing experiments may pre-empt normal communication patterns of group discussion. Experiments in computer conferencing typically use previously unacquainted subjects in group problem-solving situations, whether FtF or through CMC, giving them limited time in which to reach a group decision. In comparing CMC to FtF communication, a time-limit by channel interaction may occur. This potentially confounding effect of time has been overlooked in most CMC research.

CMC groups take more time to communicate than FtF groups (Hiltz, et al., 1986; Siegel et al., 1986; Weisband, 1989; see also Rice, 1980). This might be due to typing requirements, fewer messages being exchanged (Hiltz et al., 1986; Siegel et al., 1986), difficulty organizing, lack of leadership emergence (Rice, 1984), or other variables slowing down the group process.

On the other hand, when computer-mediated groups were given as much time as they need to reach consensus, Welsband (1989) found, the average number of messages exchanged did not differ from FtF groups making the same decision. Based on these findings, it appears that CMC and FtF groups may operate at different rates.

Changes in relational tone may not appear in time-limited CMC exchanges. Relational communication in groups is known to vary during a group's evolution through time. Several studies on the progression of small groups through decision-making stages typically describe the first exchanges in group development as heavily task-oriented, followed by conflict, then solidarity (Bales & Strodtbeck, 1951; Fisher, 1974; Tuckman, 1965). If computer-mediated groups are indeed working more slowly than FtF groups, then the finding that CMC is more task-oriented may be a result of cutting off the experiment before other, more socioemotional phases such as "emergence" or "performance" stages occur. If groups in general show different relational patterns at correspondingly different stages in their existence, then comparing FtF to CMC groups at systematically different stages of their evolution may yield artifactual findings. These combined aspects of time, messaging rate, and group development might account sufficiently for the less personalized communication effects reported in the CMC research, without recourse to social presence or context cues' effects. At best, these effects may be bounded to initial interactions among unacquainted partners in CMC.

Contrary Findings

Several field studies of e-mail (electronic mail) use have detected greater positive socioemotional message frequency (using Interaction Process Analysis) than group conferencing experiments of CMC report (Rice & Love, 1987; Steinfield, 1986). Hiemstra (1982) confirmed the presence of face-saving and face-threatening constructions in e-mail exchanges. These relational tone differences between field and experimental findings may have to do with differential relationship development within the respective research settings. It has already been mentioned that the group conferencing studies employed zero-history groups. Since the

explorations of e-mail were field studies, the lengths of the electronic relationships varied. Participants may have interacted with one another over longer periods of time, and/or many electronic communicators knew their counterparts by way of other communication channels (Finholt & Sproull, in press; Rockart & DeLong, 1988; Schaefermeyer & Sewell, 1988; Sherblom, 1988). The position that CMC is by nature inherently more task oriented than socioemotionally-oriented, in comparison to FtF communication, is challenged by these findings.

Data and Coding

While the cues-filtered-out approaches recognize that nonverbally-transmitted messages are of great importance in communication, no CMC research to date has examined the nonverbal behaviors of FtF groups as part of their total expressive output. These nonverbal behaviors might convey formality and nonimmediacy--less personal messages--task-oriented messages, or disagreement--negative socioemotional behavior. If the nonverbal as well as verbal messages of FtF groups were observed, then the overall ratio of socioemotional expressions to total messages may be no different in FtF than in CMC groups. CMC researchers have reached their conclusions about CMC/FtF differences without actually observing the very nonverbal cues through which relational effects are most likely to be transmitted.

In terms of detecting relational tone, the range of relational messages is untapped by the bifurcation of messages as task- or socioemotionally-oriented. Bales' (1950) task-social dichotomy, which has been criticized over the years (see Hirokawa, 1988; McGrath, 1984), has been the construct of choice for many of the studies on the interpersonal aspects of CMC (e.g. Hiltz, 1975; Hiltz, et al., 1978; Hiltz, et al., 1986; Rice & Love, 1987; Steinfield, 1986; Vallee, Johansen, Lipinski, Spangler, Wilson, & Hardy, 1975). There at least two problems associated with this measure as it has been used in CMC, or other group research. First, it fails to account for other, multi-dimensional relational qualities untapped by the IPA. Second, as McGrath (1984, p. 143) points out, since "any act fits one and only one category," it assumes that "every action

serves either a task instrumental or a social-emotional function; no behavior serves any other function; and no behavior serves both of those functions." These assumptions have been rejected in more functionally-oriented views of small group interaction (Fisher, 1974) and relational communication (see J. Burgoon, Buller, Hale, & deTurck, 1984; J. Burgoon & Hale, 1984; Watzlawick, Beavin & Jackson, 1967).

Alternatively, the multidimensional approach to relational communication and its coding scheme allow multiple interpretations of a given behavior. For example, J. Burgoon and Hale (1987) suggest that task-related comments may vary in regard to other dimensions such as affiliation/inclusion. Such interpretations are not possible with the IPA. With multidimensional relational communication measures it could be determined more precisely if channel differences exist, and whether computer-mediated communicators imbue their messages with relational elements typical of FtF interactants. The case for such verbal adaptation to occur is argued next.

Verbal/Textual Accommodation of Relational Cues

If the relational tone effects of the cues-filtered-out research are limited to initial interactions among strangers, then changes in relational communication should be expected to occur when such communicators continue their interactions over time. Some CMC researchers have posited that CMC users may come to adapt their textual messages to socioemotional content (Hiltz & Turoff, 1978; Rice & Love, 1987), but no compelling explanation or evidence has yet been offered for this phenomenon.[1]

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[1] Rice and Love (1987) tested the hypotheses that the percentage of socioemotional content in CMC would increase over time, and that socioemotional content would constitute around one-third of the total message content in CMC. These hypotheses assumed that CMC users "develop an ability to express missing nonverbal cues in written form" (p. 89), a notion consistent with arguments in this paper. No impetus to make such adaptations nor any requisite interpersonal processes were offered by Rice and Love. A modified IPA coding scheme (Bales, 1950) was used to determine the content of messages in a public electronic bulletin board. Twenty-eight percent of coded messages were positive socioemotional, four percent were negative socioemotional, and seventy-one percent were task-oriented, supporting the latter--descriptive--hypothesis. The hypothesis regarding change over time was not supported.

The following section proposes how relational communication changes from initial impersonal levels to more developed forms in CMC. In order for this adaptation to occur, interactants must desire to achieve more personal exchanges, and they must be able to do so in the CMC environment. Users should develop distinctive impressions of other interactants by decoding text-based cues. As this occurs they exchange more personal messages and encode new levels of relational messages in CMC.

While impression development, message personalization, and relational change may ultimately reach similar levels through CMC and FtF exchanges, the progressions of these changes are unlikely to be identical between conditions. Although linguistic cues may provide potent personal and relational cues, it is also acknowledged that the limited bandwidth of CMC offers less total information per exchange than does FtF exchange. These effects may require more verbal message exchanges in the CMC channel than will similar changes derived from verbal exchanges plus accompanying nonverbal cues in FtF. Thus a channel-by-exchange interaction may occur in the development of impressions, message personalization, and relational communication dimensions over time, such that changes may occur at different rates in FtF communication than in CMC. Eventually, however, these levels should converge. The specific patterns of these changes will be discussed below.

Desire for Personalization

While Culnan and Markus (1987) imply that comparing CMC with FtF communication is unjustified, others believe that FtF interpersonal communication is the standard against which all communication events are compared. FtF transactions contain within them the prototypical dimensions and expectations to which communicators are accustomed (Durlak, 1987; Gumpert & Cathcart, 1986). There is more to this position than just the affordance of a methodological baseline--communicators in a variety of contexts and media may attempt to imbue textual messages with verbal, grammatical, and punctuation features intended to replicate a FtF oral,

more personal style (Gumpert & Cathcart, 1986; see also Beniger, 1987). The desire for personalization is thus assumed, where actors anticipate future interaction with each other.

Impression Formation

It has been posited that the lack of nonverbal (social context) cues in CMC dampens the ability of users to form impressions of each other. Indeed, where nonverbal information is available, people form impressions of others extremely quickly using such cues (J. Burgoon & Saine, 1978). Yet, communicators do attribute characteristics to others based on verbal cues. According to M. Burgoon and Miller (1987, p. 199), "By evaluating our language choices, others make attributions about social and professional status, background and education and even the intent of communication." A research review by Bradac, Bowers, and Courtright (1979) also concludes that a variety of impressions result from changes in language intensity, verbal immediacy, and lexical diversity. By extension, impression formation through CMC seems very possible.

There are mixed opinions about impression formation in CMC research. DeSanctis and Gallupe (1987) speculated that computer-mediation reduces interpersonal attraction and group cohesiveness by increasing the psychological distance between discussants. These effects should not be expected to change over time if the paucity of nonverbal cues in CMC is the only factor affecting such impressions. This prediction is refuted, however, by the results of a field experiment by Lim and Facciola (1988). They found that subjects in an ongoing asynchronous computer conference rated their partners significantly more attractive and more credible in the computerized setting than in FtF encounters. It is apparent that textually-based, computer-mediated information can provide the data for interpersonal impression development.

While the lack of social context cues approach predicts that the medium should prevent varied and well-defined interpersonal impression formation, the arguments above suggest the opposite. After a number of message exchanges, CMC interactants may well develop a number of discrete impressions about their partners. Thus, the following hypothesis,

H1: Given previously unacquainted participants, interpersonal impressions after later interactions are more developed than impressions after initial interactions in CMC.

The above within-subjects hypothesis contests the inherency of the cues-filtered-out perspective. The next hypothesis offers more precise predictions about the nature of cue processing as affected by medium and message frequency. Interactional partners in FtF settings build first impressions very quickly, using nonverbal information. Impression development in FtF settings is therefore expected to increase rapidly, then stabilize during the duration of the groups' interaction. In CMC, however, impression formation cues are less abundant, and participants will require more exchanges to obtain similarly developed impressions; their development will occur more gradually.

H2: The effect of message frequency on impression formation is mediated by the communication channel such that impressions are developed earlier in FtF communication, and more slowly in CMC, and that impression development is similarly greater after many exchanges in either medium; i.e., initial intercepts are higher in FtF than CMC, while terminal positions are equal.

This hypothesis suggests that the trend for impression development may produce a linear/quadratic plateau in FtF while impression formation may increase linearly in CMC.

Developing Personalized Messages

Miller and Steinberg (1975) argue that truly interpersonal communication is that in which sources' messages are based on psychological/individual-level knowledge of the receiver(s). M. Burgoon and Ruffner (1978) define group communication similarly, as that which is based on personal-level knowledge of group members. Previously unknown interactants, therefore, should not be expected to employ interpersonal messages. As interactants' impressions of each other develop from initial impressions to individualized knowledge, more personalized messages should result.

Like the development of initial impressions, the development of interpersonal epistemologies is probably retarded in CMC encounters. According to Miller and his colleagues (Berger, Gardner, Parks, Schulman, & Miller, 1976; Miller & Steinberg, 1975), such individuating knowledge is gained through ongoing interaction over time. One method of generating such knowledge is by the use of "strategic probes" (Berger et al., 1976, p. 156).[2] Since these probes, and their responses, can be conveyed through verbal behavior (Berger et al., 1976), the process of interpersonal knowledge acquisition may be similar in CMC and FtF communication. Yet as the knowledge gained through these strategies amplifies deviations from stereotypic first impressions, then interpersonal knowledge acquisition may be slower in CMC than in FtF processes; FtF participants have a head-start, so to speak.

Between initial and terminal interaction points, it is not clear whether these processes progress linearly through time, or whether there is an exponential J-shaped growth in knowledge and personalization. The patterns are expected to fit generally linear trends, however, with a difference in intercepts reflecting the slower development among CMC groups.

H3: Initial messages in CMC are less personalized than later CMC messages.

H4: The effect of message frequency on message personalization is mediated by the communication channel such that personalization is greater in initial FtF than in CMC conversations, and that personalization is similarly greater after many exchanges in either medium; i.e., initial intercepts are higher in FtF than CMC, while terminal levels are equal, and message personalization increases linearly with message frequency in both FtF and CMC exchange.

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[2]These strategic probes, or "patterns of communication used by an individual to gain information about another person's beliefs, motives, and intentions," according to Berger et al. (1976, p. 156), include interrogation, self-disclosure, deception detection, environmental structuring, and deviation testing.

The process of interpersonal development over time is also posited to be reflected in the relational messages CMC users exchange. The following discussion focuses on how relational communication through textual cues may change in CMC.

Relational Exchange in CMC

An underlying assumption in the following discussions is that verbal and textual behavior can convey relational meanings. While some readers may not dispute this notion, it deserves some comment nevertheless. After all, the cues-filtered-out research suggests that it is unlikely. Much research on relational communication "has focused on nonverbal codes as best suited to the relational function, relegating verbal codes to a content function," according to Donohue, Diez, Stahle, and J. Burgoon (1983, p. 1). Alternatively, language behavior and verbally transmitted message strategies also convey secondary relational messages (J. Burgoon, Pfau, Parrott, Birk, Coker, & M. Burgoon, 1987). There are precedents and possibilities for the conveyance of relational messages by computer-linked communicators in the communication literature, although they are not as abundant on some relational dimensions as others. Examples of such language-based indicators are offered in Table 1. Other behaviors which may affect relational meanings have been discovered in CMC interactions. These, too, appear in Table 1.

As communicators develop relationships over time, levels in relational communication in CMC are expected to change in proportion to message accumulation. Following social penetration theory (Altman & Taylor, 1973), Knapp, Ellis, and Williams (1980) suggest that when interpersonal relationships develop, several dimensions of relational/communicative behavior increase toward greater affiliativeness in generally linear trends, with plateaus marking latter periods of relational stabilization. While these general trends may occur in several dimensions, Knapp et al. (1980) note, the precise progression rate or plateau in any one dimension may differ from those of other dimensions.

Table 1

Verbal/Textual Cues of Relational Communication

IMMEDIACY/AFFECTION

Verbal immediacy (Wiener & Mehrabian, 1968)--grammatical and lexical measures of spatio-temporally indicative demonstratives, denotative specificity, selective emphasis, agent-action-object relationships

RECEPTIVITY/TRUST

Self-disclosure (J. Burgoon & Hale, 1984)

Vulnerability pattern* (Millar & Rogers, 1976)

Freely stated overt judgments (Knapp, 1984)

COMPOSURE/RELAXATION-AROUSAL

Flaming (Kiesler et al., 1984, 1985)

Language intensity (Bradac et al., 1979)

Intentional misspellings, punctuation marks (Carey, 1980)

Capitalization (Allen, 1988)

Relational icons (Asteroff, 1987)

FORMALITY-INFORMALITY

Form of address communicators use (Argyle & Cook, 1976)

Lexical surrogates** (Carey, 1980)

DOMINANCE/INEQUALITY-SUBMISSIVENESS/EQUALITY

Proportion of group participation (Kiesler et al., 1984)

Manipulation of verbal floor-managing cues (Shimanoff, 1988)

Relational control grammatical constructions (e.g. imperatives),

Compliance-seeking (Millar & Rogers, 1976; Rogers & Farace, 1975)

Redundant signature (Sherblom, 1988)

SIMILARITY/DEPTH

First person plural, private symbols, verbal shortcuts (Knapp, 1984)

Self-disclosure (J. Burgoon & Hale, 1984)

*Vulnerability pattern is the combined frequencies of the times actors have put themselves in a position of vulnerability to another; a vulnerable position is one in which outcomes are controlled by the other, and outcomes are potentially less rewarding than the actor's costs.

**E.g., typing out "hmmm" or "yuk."

There are several factors which may affect the applicability of these trends toward greater affiliativeness. Social penetration processes do not always lead to ever-increasing intimacy (Altman, Vinsel, & Brown, 1981). Yet group development literature indicates that members begin to affiliate with one another on the basis of attitude and similarity in initial interaction stages, and terminal interaction stages are marked by increased cohesiveness and solidarity (see Fisher, 1974). This suggests that greater degrees of affiliativeness should be expected as group relationships develop over time. While the dynamics and personalities of groups may vary from one another, the patterns of relational communication posited below should be expected to occur more often not. More importantly, whether or not the precise predictions for the within-group patterns of relational communication changes obtain, the critical aspect of the hypotheses pertains to the between-group differences. In general, it is predicted that as goes FtF, so goes CMC, with time-by-channel interactions discriminating the channels' intercepts and/or rates of change.

To test these notions in the group and CMC contexts, predictions about the valences of relational communication in initial interactions are posited for FtF and CMC groups, and explanations for their subsequent alteration through textual cues are specified. Using J. Burgoon and Hale's (1984, 1987) relational topoi as a framework, the following discussion undertakes these points.

Immediacy/Affection. The immediacy construct incorporates affection, inclusion, and involvement (J. Burgoon & Hale, 1984). According to the characterizations of CMC from the cues-filtered-out perspectives, this dimension seems to be the least likely to gain in CMC. On the other hand, theoretical and empirical work on immediacy indicates that the verbal channel not only conveys immediacy, but may also compensate for immediacy reductions in other channels (Argyle & Cook, 1976; Argyle & Dean, 1965; Donohue et al., 1983; Wiener & Mehrabian, 1968).

It is suggested that initial interactions among unacquainted others in CMC are relatively low in immediacy/affection, and that interactants increase immediacy/affection over time. FtF interactants may more easily manifest this increase through nonverbal and verbal cues, producing a rapid increase in immediacy/affection, which may then plateau (in accordance with Knapp et al., 1980, above). This could easily produce a quadratic trend for FtF. CMC interactants, limited to verbal cues, should reach this same level of immediacy/affection, but more gradually. The CMC trend may be linear. Accordingly, the following hypotheses are offered:

H5: Initial messages among previously unacquainted interactants in CMC are lower in immediacy/affection than are later messages.

H6: The effect of message frequency on immediacy/affection is mediated by the communication channel such that immediacy/affection is greater in initial FtF than in CMC conversations, and that immediacy/affection is similarly greater after many exchanges in either medium; i.e., initial intercepts are higher in FtF than CMC, while terminal positions are equal.

Similarity/Depth. This dimension of relational communication pertains to "the degree to which a communicator stresses similarities and interest in a deeper relationship", as defined by Newton and J. Burgoon (1989, p. 7). Knapp (1984) claims that as relationships develop partners' communication becomes less awkward and more smooth--conversationally similar and less strained, according to J. Burgoon and Hale (1984), who join this to the similarity dimension of relational communication.

Another approach to the aspect of similarity pertains to the links among similarity, attraction, and propinquity. It is known that persons who reside near each other are more likely to form friendships (Wegner & Valacher, 1977; see for review J. Burgoon, Buller, & Woodall, 1989). This may be a result of the positive effect of frequent contact (a result of propinquity) on perceived similarity (associated with attraction) (see McCroskey, Larson, & Knapp, 1971). In

CMC, the effects of increased contact among interactants should effect the same interaction-similarity result. Indeed, Korzenny (1978) has coined the term, "electronic propinquity." He proposed that communication through interactive electronic media creates a feeling of greater propinquity with others, regardless of their actual geographic dispersion.

In social penetration theory (Altman & Taylor, 1973), depth refers to the degree of knowledge about extremely personal information relational partners have of each other. This information is transmitted through self-disclosure, so that the degree of disclosure "indexes" the depth of the relationship (J. Burgoon & Hale, 1984). Although self-disclosure is known to occur among strangers who do not expect to meet again, it is less expected in the early stages of ongoing relationships than in later stages. Thus depth is more likely to increase as conversations continue. Considering the ability for communicators to reveal attitudes through verbal/textual cues regardless of additional nonverbal cues (see Byrne & Clore, 1966), the progression of this dimension should be similar between the two media conditions. In examining the effects of message frequency, channel, and their interaction, on depth, a main effect for message frequency only is expected.

H7: Initial messages among previously unacquainted interactants in CMC are lower in similarity/depth than later messages.

H8: Depth increases monotonically in both CMC and FtF as the number of exchanges accrues.

Composure/Relaxation. The composure/relaxation dimension reflects the degree to which communicators express relaxation and calm, or tension and arousal (J. Burgoon & Hale, 1987; J. Burgoon, Buller, & Woodall, 1989). While arousal has been associated with other dimensions such as immediacy (J. Burgoon & Hale, 1984), arousal--particularly negatively-valenced arousal--may be similar to the tension, discomfort, and nervousness aspects of the composure dimension's measurement.

Initial interactions in CMC should be less relaxed and composed, and more tense and aroused than later interactions. Many relationships become more relaxed as they develop (Knapp, 1984) and arousal reactions to immediacy violations dissipate as communicators grow accustomed to each other (see Le Poire, 1989). Communicators who may at first be anxious about meeting new partners should relax as their uncertainty is reduced by interpersonal knowledge acquisition. Kiesler et al. (1985) found that CMC and FtF communicators' physiological arousal (pulse and palmar sweat) declined significantly across three measurement points in both conditions. At the same time, slower uncertainty reduction due to the absence of nonverbally-transmitted information may yield less composure in CMC than FtF in initial conversations only. The following hypotheses are offered.

H9: Initial messages among previously unacquainted interactants in CMC are lower in composure/relaxation than later messages.

H10: The effect of message frequency on composure/relaxation is mediated by the communication channel such that composure/relaxation is greater in initial FtF than in CMC conversations, and that composure/relaxation is similarly greater after many exchanges in either medium; i.e., initial intercepts are higher in FtF than CMC, while terminal positions are equal.

As in the case of immediacy/affection, this prediction suggests that FtF composure/relaxation may become asymptotic sooner than CMC.

Formality. There are mixed expectations for the communication of formality in CMC. Initial FtF interactions are typically somewhat formal (Berger & Calabrese, 1975). According to Knapp (1984), relationships generally become more informal as they develop. In the case of groups who interact only in the context of task resolution, however, informality should not be expected to become extreme. A plateau level of moderately high informality should be achieved in time.

There is some reason to believe that the medium might override the traditional process in this case. According to Siegel et al. (1986), the lack of turn-taking in computerized group meetings may lead to greater informality. In this respect, group conferencing systems are drastically different from FtF meetings. In asynchronous computer "meetings," participants each read and write independently of each other's active presence. This factor may lead to between-group differences in CMC/FtF comparisons of formality.

Yet another aspect of CMC may, alternatively, lead to increased formality: in CMC, messages are all written, and written messages may be perceived as more formal than oral messages (Gibson & Hodgetts, 1986). While this aspect of the medium may have some initial effect on perceived formality of messages, users are likely to develop and imbue their messages with informality cues as they become accustomed to each other and the medium. In light of the initial prediction that communicators will express less formality over time, the lack of turn-taking effect or the written messages effect should discriminate FtF and CMC groups only in initial interaction stages. For the following hypothesis, it is assumed that even if initial CMC messages are somewhat informal, they will become moreso after time.

H11: Initial messages among previously unacquainted interactants in CMC are higher in formality than are later messages.

H12: The effect of message frequency on formality is mediated by the communication channel such that formality is different in initial CMC than in FtF conversations, and that formality is similarly lower thereafter in either medium; i.e., initial intercepts are significantly different between CMC and FtF, while terminal positions are equal.

Dominance/Inequality. Dominance is associated with efforts to control, command, and persuade others. Equality connotes cooperation and mutual respect. The two themes are combined into one dimension in the following hypotheses. While equality-inequality has been treated as a separate dimension in many relational communication studies, there is some

conceptual overlap with the dominance theme (see J. Burgoon & Hale, 1987). In one recent study, scale items assessing equality factored into the dominance dimension (J. Burgoon et al., 1987). In CMC literature, too, the concepts of dominance and inequality are viewed through a single operational outcome: proportion of group participation (see Kiesler et al., 1984). When contemplating what verbal messages convey equality, potential equality messages also seem to connote non-dominance.

Little has been said at the theoretical level about predicting the development of dominance-submission in relationships generally (Parks, 1977). Predicting normative levels of dominance is made more difficult by the different approaches to measuring the dominance construct. In CMC research, dominance has been defined as disproportionate speaking time. This approach does not take into account message content or style attributes. In studies examining communication interacts, the development of dominance by one actor in a relationship is a product of either (a) complementary submissive behavior (suggesting an increase in variance over time), or (b) symmetrically dominant behavior by others (suggesting a net increase in dominance over time) (Millar & Rogers, 1987; Parks, 1977).[3] Among task groups, Ellis (1979) found that dominance messages were countered by neutral responses in two stages of interacts, followed by a neutral period, and finally a period marked by reciprocal submissive moves.

In the above interact-based studies, dominance is achieved only when a submissive response is countered. At the level of relational message characteristics, however, a slightly different picture can be construed. Messages may be considered as dominance seeking (i.e., efforts to control), regardless of their complementary or reciprocal response. From this, a net level of dominance-seeking could be interpreted through aggregated relational communication coding of each interactant's messages. This approach might portray Ellis' (1979) findings as

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[3] It is theoretically possible that a state in which dominance and submission do not develop. This kind of relationship is described as "Neutralized Symmetry," about which very little is known, according to Parks, Farace, Rogers, Albrecht, and Abbott (1976, as cited in Parks, 1977, p. 374).

increased net dominance in initial phases (i.e., during one-up/neutral interact phases), and a net decrease in dominance during terminal phases (i.e., reciprocal one-down patterns).

Messages among previously unacquainted interactants should be lower in net dominance compared to intermediate messages. In initial interactions generally, messages are non-threatening, short, and balanced (Berger & Calabrese, 1975). As groups develop, members size up each others' task expertise and resources as they assert dominance. Caplow's (1959) research on triads shows that when one actor attempts domination, the remaining partners combine their resources so as not to be overcome by the first. According to Putnam (1986, p. 187), both "the powerful and the less powerful members use communication strategies to form coalitions and advance their preferred alternatives." In initial to intermediate interactions, dominance messages should increase. As groups head toward closure, however, this trend should revert toward net submissiveness. It is predicted that most, if not all, communicators will come to use increasingly dominant messages in initial and intermediate interactions, and less dominant messages in subsequent conversations.

CMC may mediate this trend, fostering more dominating messages in early interactions than exhibited in FtF groups, due to lack of social context cues. While the CMC experiments show greater equality in CMC as opposed to FtF conditions, it has been a participation equality. The messages themselves, however, were similarly aggressive attempts to persuade others, suggesting a dominance-seeking function, and these messages were more frequent in CMC than FtF conditions. Over time, CMC participants should exhibit patterns similar to FtF communicators, i.e., first increased, then decreased dominance.

H13: Initial messages among previously unacquainted interactants in CMC are higher in dominance/inequality than later messages.

H14: The effect of message frequency on dominance/inequality is mediated by the communication channel such that dominance/inequality is higher in initial CMC than in FtF conversations, and dominance/inequality increases and decreases in

FtF in a quadratic, inverted "U-shaped" relationship with message frequency, while CMC declines toward a similarly lower level; i.e., initial intercepts are higher in CMC than FtF, and terminal positions are equal.

Receptivity/Trust. This dimension pertains to the expression of rapport, openness, and the desire to be trusted (Newton & J. Burgoon, 1989). Indeed, trust--as evidenced by cooperative versus competitive strategies in Prisoner's Dilemma simulations--was shown to decrease from FtF to electronic and written media in a study by Short et al. (1976). Trust should be low in initial CMC interactions. It should be noted, however, that behavior in social traps like the Prisoners' Dilemma reflects more mutual trust when players are allowed to communicate freely with each other (see Marwell & Ames, 1979).

As relationships progress, trust may increase. A communication behavior denoting openness and trust may be seen in the tendency for established relational partners to freely state overt judgments; people do not divulge such in less developed relationships (Knapp, 1984). This, like other relational communication dimensions, may plateau as relationships mature.

Little is known about the verbal expression of receptivity. Statements in which communicators refer to future interactions should provide such a signal of receptivity. Given that trusting behaviors seemed to be affected by communication medium in limited duration interactions, but that trust/receptivity may increase as relationships and communication exchanges progress,

H15: Initial messages among previously unacquainted interactants in CMC are lower in receptivity/trust than later messages.

H16: The effect of message frequency on receptivity/trust is mediated by the communication channel such that receptivity/trust is greater in initial FtF than in CMC conversations, and that receptivity/trust is similarly greater after many exchanges in either medium; i.e., initial intercepts are higher in FtF than CMC, while terminal positions are equal.

Task-Social Orientation. This continuous dimension measures the extent to which messages range from work-related to personal. Theoretical and empirical claims about task- versus social-orientation have been provided at length above, and do not bear repetition here. While greater task-orientation may appear in initial CMC interactions, interpersonal solidarity is an outcome of task accomplishment (Beebe & Masterson, 1986), and participants in both CMC and FtF discussions should become more socially-oriented over time. As in the case of informality, where groups continue to work on decision-making tasks, they should not become exceptionally social, but reach a balanced state of task- and social-orientation. Given that CMC and FtF decision-making groups exchange the same number of messages in completing a task (Weisband, 1989), the patterns of task- to social-orientation should be similar across conditions.

H17: Initial messages among previously unacquainted interactants in CMC are higher in task-orientation than later messages.

H18: The effect of message frequency on task-orientation is mediated by the communication channel such that task-orientation is greater in initial CMC than in FtF conversations, and that task-orientation becomes similarly lower after many exchanges in either medium; i.e., initial intercepts are more task-oriented in CMC than in FtF, while terminal positions are equal.

CHAPTER 2

METHOD

In overview, subjects were randomly assigned to CMC or FtF conditions, and assigned in zero-history groups of three for repeated interaction in three decision-making scenarios. Ss' interactions were recorded. Message units were counted to assess the amount of interaction in each group. Participants responded to written measures of the dependent variables after each decision. Additionally, outside observers evaluated Ss' behaviors on several of the same dependent measures.

Participants

Ss (N = 132) were undergraduate students at the University of Arizona who participated in this project for course credit. Students came from two sections of an upper-division course and another single-section upper-division course in Management Information Systems (MIS), and from several sections of a lower-division course in Communication. Thus Ss represented several majors and class levels. MIS students were required to participate as part of their course; communication students volunteered for the project as one option among several for completing course requirements.

As will be discussed below, several groups of Ss were eliminated from the final analysis. The final sample consisted of 96 Ss, divided equally into CMC and FtF conditions, in groups of three. Of these Ss, 43% were seniors, 27% were juniors, 22% were sophomores, and 8% were freshmen. Students in the communication course comprised 51% of the sample and 49% were in the MIS courses. There were slightly more males, 55%, than females, 45%. Of the 48 CMC Ss, two had used the computer conferencing system previously in other contexts and seven had participated in electronic bulletin boards. A small number of Ss--eight--had their own computers with no modem; an additional 13 had computers and modems.[4]

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[4] Effects of demographic and experience items on dependent variables were assessed using oneway analyses of variance. Year in school affected time three dominance, $F(3,92) = 3.93$, $p = .01$ (freshmen were most dominant, juniors were least). Seniors were most task oriented at

Indoctrination and Manipulation

Some general guidelines for research using zero-history partners were followed, beginning with the enlistment announcements. First, group members were told that they would meet in their groups together over several sessions. Second, as McGrath (1984) indicates of groups, such "concocted" or "temporary" alliances must be presented with some real incentive tied to the outcome of their task accomplishment. In these ways, aggregates of randomly selected individuals become real partnerships by definition, and their behaviors should be generalizable and realistic. Accordingly, Ss were informed that their course grades would be determined in part by their performance on several decision tasks they would perform in the conferences/groups. These conditions were introduced to Ss on the first day of their classes as Ss were read and given copies of announcements describing the project (see Appendices 1 and 2).

All Ss completed an information form to assist experimenters in assigning conditions and groups, to collect demographic information, and to help track the Ss as needed as the project progressed. Included in the demographic questions were items pertaining to course, class standing, previous use of the conferencing system, previous use of electronic bulletin boards, and computer/modem ownership. Each S also completed the ASO/LPC scale (Fiedler, 1954, 1967), a measure of trait task orientation, for research to be completed and reported later.

Assignment to condition

Ss were assigned numbers and then were randomly assigned to communication condition (CMC or FtF). Then, within each treatment condition, Ss were assigned to groups of

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time one, and freshmen were least task oriented, $F(3,92) = 6.44$, $p < .001$; the same occurred at time two, $F(3,92) = 2.86$, $p = .041$. Task orientation was also affected by the courses in which Ss were enrolled (although this may overlap with year in school): MIS 411 Ss were most task oriented and COMM 103 Ss were least, $F_{time1}(2,93) = 7.37$, $p = .001$; $F_{time2}(2,93) = 7.49$, $p = .001$; $F_{time3}(2,93) = 3.12$, $p = .049$. S gender affected perceived message personalization at time one: males experienced more personalization than did females, $F(1,92) = 4.79$, $p = .031$. Among CMC Ss, no significant effects emerged for past experience with ICOSY, past use of electronic bulletin boards, computer ownership, or computer-plus-modem ownership.

three. Previous experimental studies in CMC have employed zero-history groups of three (Kiesler et al., 1984; Siegel et al., 1986; Weisband, 1989), and five (Hiltz et al., 1986); most of the experimental CMC studies are based on three-person groups. This smaller sized group also allows for greater participation per member, increasing the possibility of interpersonal knowledge and relational development.

Assignment into groups was based on several criteria: first, that no S in a group was in the same section as another S; second, that groups reflected a mixture of students from the three different courses as much as possible; and third, for the FtF groups, that their schedules allowed a common day and time for two hour meetings. In this way twenty-two zero-history groups of three were formed within each condition, and there was a minimal chance for group members to associate outside of their respective meetings. Condition assignments were revealed to Ss in their respective classes, along with meeting dates and times for FtF Ss, and training session sign-ups and conference codes for CMC Ss.

CMC Procedures

Training. CMC Ss signed up for and attended one of six training sessions. Two Ss who could not attend these sessions were instructed individually at later times. Participants received standard training on the ICOSY computer conferencing system from several experimenter's assistants, using handouts and hands-on experience, similar to training provided by the university's instructional computing staff. Training took place in a computer laboratory using terminals directly connected to the mainframe computer hosting the conferencing system. Practice conferences were established and used for the training. At that time Ss could not yet join their small-group conferences and were ignorant as to whom their two partners would be. When they first logged on, Ss were directed to read an electronic message in their practice conference instructing them on several points: (1) they were to work on three tasks over several weeks; (2) all interaction with other group members was to take place within the conference, and they were not to attempt to contact each other through FtF, other computer systems, or

other means; (3) they would be receiving questionnaires to fill out at the completion of each task; and (5) their comments were subject to storage, retrieval, and analysis. Appendix 3 presents a transcript of this message.

Additional instructions were presented orally to participants. They were informed that they should log on about every other day. The phone numbers of the experimenter and several assistants were given in case participants ever had trouble using the system. They were also informed that the conferences would be monitored daily in order to assess whether individuals seemed to be having any trouble. They would be telephoned if they appeared to need assistance. Finally, campus terminal access locations were mentioned.

Conferencing. The asynchronous CMC system used was the Instructional computer COnferencing SYstem (ICOSY) (see Smith, 1988). Participants were able to access ICOSY with a personal computer and modem, or from several campus terminal locations 24 hours-a-day. Each message in this system is automatically imprinted with the user's last name, message number, date, time, and length of message. Although ICOSY usually features a private e-mail function in addition to its conferencing function, participants were told not to use mail ("other features of ICOSY"), as such messages would not be stored as conference data. The ICOSY system itself is a text based electronic communication medium. Conference members need not be on-line simultaneously, but may access the system individually to read and write conference messages at their own discretion and convenience.

In ICOSY, participants are directed to new messages (previously unread) within one of several "topic" groups when they log on. They may read messages, "attach" comments to prior comments of their own or their partner', or initiate new, "unattached" comments.

Tasks. Participants faced three decision-making tasks over the 5-week course of the conference. The order of the tasks was counterbalanced across groups. Instructions for these tasks requested group discussion and the presentation of a group recommendation for the

decision solution. Deadlines were announced, and participants were reminded that they would be evaluated on the quantity of their participation and the quality of their decision.

Two decision-making problems were original and one was adapted from a scenario used in another pilot project in group decision-making and technology. The scenarios were intended to be involving and relevant to the subjects' interests, in order to generate discussion and authentic group behavior (see McGrath, 1984). Participants were given no other guidance by the experimenter regarding the content or methods of task completion. Deadline reminders appeared in the conferences 3 days before each deadline (see Appendix 4). These reminders also announced the "topic," or electronic location, of the second and third task, which was to commence in three days. Transcripts of these tasks and instructions appear in Appendix 5.

Ss were instructed to complete dependent measure surveys immediately upon completing each task. This was done in order to reduce memory degradation about the behavior of the other participants each S rated. Survey packets were delivered to and picked up from Ss in their classes in order to facilitate this procedure. Due to technical problems with the mainframe computer system, the first session began several days later than anticipated, and participants were accorded eleven days per task. Conferences were monitored, and participants were telephoned when they did not log into a conference topic after three days. Ss who failed to participate whatsoever within a single task were excluded from further participation, and remaining group members were notified of this. These groups were dropped from further analysis for the present study. An additional group was dropped from analysis on the basis that in each of its tasks, at least one member logged on only once, negating the interactive aspect of a group. Sixteen groups remained for analysis.

Face-to-face Ss

These subjects were instructed to attend a classroom for their three meeting dates and times over a five week period. Assistants placed reminder calls the day prior to each meeting. Meetings were rescheduled as often as possible when conflicts arose. Ss who failed to attend a

meeting were canceled from further participation, and those groups were dropped out of analysis for the present study. Sixteen groups completed all three meetings.

Setting. The classroom used for the FtF meetings featured a large desk, and three padded chairs positioned at each side except that closest to the videocamera, across the room. On the desk was a tabletop microphone, three pens, and three copies of the decision task. Also on the desk was a name tag for each respective S. These tags were placed close together in the center of the table, so that Ss had to sort them out rather than use them to infer seating position. In this way seating selection was performed by the group, and at the same time Ss could associate their partners' names appropriately with the names on the dependent surveys. The exposure of the videocamera to the FtF groups paralleled the CMC groups' knowledge of the experimenter's constant perusal of their messages. One of several lab assistants conducted meeting sessions.

Procedures. When Ss arrived for their first meeting they were asked to read and initial a notice, almost identical to that which the CMC Ss read in training, reminding them about the ongoing meetings, the surveys, and the prohibition against attempting contact with their group members outside of the experiment.

The first two Ss to arrive were offered magazines to read while they waited for the other. They were asked not to speak with each other until the session began. When the third member arrived, they were directed to the desk and to begin reading the task for that session. The tasks were identical as those used in the CMC condition, with the instructions modified slightly to accommodate the FtF administration. When Ss indicated they were ready to begin their task discussion, the assistant started the videorecorder asked Ss to state their names. The assistant then deliberately diverted his/her attention from the groups for the duration of their discussions. When Ss indicated that they were finished, they were separated within the room and dependent measures were administered.

Message Accumulation

In order to determine the values for the second independent variable, message accumulation, several assumptions about messaging behavior must be explicated and verified. First, on the basis of Welsband's (1989) research, it was assumed that the number of idea units generated per task would not differ between communication media. Similarly, group decision topics were designed so that the amount of discussion required for each would be similar across tasks. With the satisfaction of these assumptions, the administration of dependent measures at the end of each task would represent equal or near-equal intervals of message accumulation.

The verification of these assumptions required counting the number of messages exchanged by Ss. It was originally hoped that equality of message counts could be verified using a systematic sampling of groups, conditions, tasks, and order. This analysis was begun prior to the completion of data collection (and the elimination of some groups). Initial counts reflected some unevenness across some variables. It was decided at that point to continue counting all Ss'/groups' messages at every point.

The procedure for counting message units was as follows. Eight coders were trained to identify propositional "idea units," (see, e.g., Welsband, 1989) from videotapes and from CMC transcripts. Instructions to coders are represented in Appendix 6. Conversations were coded for the number of propositional idea units exchanged verbally. Any single coder rated both videotapes and transcripts.

Inter-coder reliability was assessed by having all coders unitize the same ten subject/task episodes (5 CMC and 5 FtF) over the course of the coding task. For each analysis episode, unitizing marks were broken into 5-minute intervals (FtF) or into comment number (CMC) and the resultant data points were analyzed for inter-rater reliability. Since coders were counting units, rather than using judgment scales, their accuracy should be very high and an a priori acceptability standard of alpha .98 was established. Two coders' work differed from that

of others, and reduced the obtained alpha. These coders' work was re-done by other coders, whose counts became part of the overall analysis. Final reliability coefficients equalled or exceeded .98. Additionally, a test was conducted to determine whether coders were counting the same number of idea units from video as they were from text. One videotaped meeting was transcribed by an assistant, and formatted to resemble an ICOSY transcript. All coders unitized both presentations; half watched the tape first, and the other half read the text first. Each coding effort by a single coder was separated by a three-day lag. A matched-groups t-test revealed no significant differences for medium on the total units counted, $t(5) = -0.72$, $p > .20$.

Dependent Measures

Each subject in each condition completed a questionnaire after the completion of each meeting. These questionnaires contained three major instruments. Subjects reported their impressions of one of the other two partners, then assessed the relational communication behavior of the same partner, repeated these instruments for the other partner, then completed a measure assessing how personalized the group's communication was. The order of the person being rated rotated and was counterbalanced across the three sessions. The names of the target persons were written on the questionnaire forms before Ss received them. Despite the order rotation, there may be some danger of reactivity in this multiple administration of the same instrument. However, the effects of such a threat may be negligible in the overall purpose of the study. Although the repeated administration of this measure may affect the accuracy of the mean response estimates, the determination of changes between conditions over time--the central concerns of this research--may be less affected; any nonrandom effect in one condition should also affect the other. Although the addition of different bogus items in each administration would have been desirable, the length of the questionnaire with the dependent measures alone made this option seem imprudent.

Impression Development

In order to measure the extent of Ss' impressions of their other group members (hypotheses 1 and 2), participants completed self-report interpersonal impressions questionnaires regarding the others with whom they communicated. These measures featured fourteen four-interval scale items about others' character, adapted from items used in classroom exercises on first impressions (see J. Burgoon & Saine, 1978; Newton, J. Burgoon, & Buller, 1989) with an additional "don't know" response for each attribute (see Appendix 7). While a four-interval scale is highly atypical, the centroid of a scale with an odd number of intervals is often explicitly or implicitly a "don't know" response; it was crucial to be able to differentiate a S's "don't know" responses from median assessments of a trait. From this measure, the number of the "don't know" responses versus otherwise completed items were counted as an index of impression development, such that a lower number reflects a more developed impression. Participants repeated the measure after the completion of each of the three tasks.

Personalization

Knapp, Ellis, and Williams' (1980) research on differences between types of relationships produced a measure of the extent to which dyads experience their communication behavior as personalized (see Appendix 8). This scale reflects how "special" partners' communication is, and their closeness. Research in which the instrument was originally tested established Cronbach alpha reliability of .83 for eight items. In this study, reliability was assessed using data from each participant rating one other participant, after they had completed the first task, alpha = .82.

Relational Communication

Ss completed 64 Likert-type items of the relational communication questionnaire (J. Burgoon & Hale, 1987) at the end of each task (see Appendix 9). Although shorter versions of this coding instrument have been used in recent research (most recently J. Burgoon, Newton, Walther, & Baesler, 1989), a previous 64-item measure was used for several reasons. J. Burgoon and Hale (1987) recommend that a fuller array of items be employed in novel arenas

for relational communication study, and the greater precision allowed by using more scale items was endorsed by J. Burgoon and Newton (in press). Since the instrument has not been applied to the CMC nor the small group context, this course seemed well advised. Another recommendation from J. Burgoon and Hale (1987) was that the task-social orientation dimension be assessed in appropriate settings despite its weak performance as an independent factor in their validation study. Given the attention to the task-orientation construct in CMC, this suggestion seemed practically mandated. The items were worded to indicate the triadic nature of the group, as opposed to the dyadic wording of the original items.

A primary objective in approaching the data analysis on the relational communication measures was to preserve previously-validated dimensions. There was some concern, however, whether the data from the current administration would produce the same factors as found in prior studies, so a factor analysis was conducted to see whether the current factor structure was somewhat consistent with the dimensions nominated in the hypotheses. There was no simple approach to deciding which responses should be included in the factor analysis, since relational communication data came from both participants and observers (see below) at several time points. An analysis strategy was adopted to maintain independence of observations as much as possible. In an effort to reduce extraneous heterogeneity by incorporating a common stimulus, data were confined to ratings of group member one, with one exception. Data from members two and three were ratings about member one at time one; member one's ratings were about member three. Coder data included each coder's ratings about member one, although these ratings were generated from observations of that subject at either time one, two, or three (depending on the coder's assignment to time).

Principal components factor analysis with varimax rotation yielded a seven-factor solution which was very similar to previous configurations of the relational communication measures, with a few exceptions. The factor matrix is displayed in Appendix 10. The three equality items did not load on the dominance factor, as had been anticipated, nor did they form

a unique factor in this analysis. Instead, they loaded on factors one and three. Because equality was of conceptual interest, and as it had been conceptualized as the opposite of dominance, it was treated as a separate dimension in subsequent analyses, but should be interpreted with caution. The dominance factor also separated into two dimensions. Items such as "tried to persuade," "didn't attempt to influence," "tried to gain approval," and "try to win favor" suggested a dimension pertaining to attempted influence; this factor has emerged in previous research as well (see "persuasion/ingratiation" in J. Burgoon & Hale, 1987, p. 27). Remaining dominance items pertain to a member's attempt to control the interaction, maintain the upper hand, assert, have higher status, dominate the conversation, act powerful, and so forth. Because these dimensions emerged separately here and in previous research, it was decided that a more refined analysis was afforded by looking at each of these dimensions separately. Thus attempted influence and equality were analyzed on an exploratory basis in order to reveal more of the underlying processes, while dominance was still the dimension of hypothetical interest.

Items for immediacy/affection and similarity/depth clustered within a single factor; in past research, both these measures have been conceptually and empirically related to intimacy, and their emergence as single factor may be a result of forced orthogonality in the present analysis (cf. J. Burgoon & Hale, 1987; J. Burgoon & Newton, in press). These dimensions' common loading could be the result of another influence: an error on the part of the experimenter resulted in all the items related to intimacy being grouped together on the instrument, rather than randomly-ordered. The effect of this presentation on respondents may have led to a response set, affecting the factor analysis of those dimensions. In light of these conditions, and in the interest of greater specificity, immediacy/affection and similarity/depth were treated as related but separate dimensions in the analyses to follow. The viability of treating these dimensions as separate was further examined via reliability analysis.

Reliability was analyzed for all relational communication dimensions, tested from the data from each subject regarding one other subject after the first task. One item was dropped which severely reduced reliability of equality ("...wanted to cooperate"). Resulting Cronbach alpha coefficients were generally high, ranging from .77 to .93 (see Table 2).

Table 2

Observed Cronbach Alpha Reliabilities for Relational Communication Dimensions

	Participants	Observers	# of items
Immediacy/Affection	.88	.90	14
Similarity/Depth	.80	.88	11
Composure	.87	.84	8
Formality	.89	.89	5
Dominance	.86	.93	7
Attempted Influence	.78	.79	4
Equality	.82	.77	2
Reciprocity/Trust	.84	.82	8
Task-Social Orientation	.80	.86	4
			63

Observational Assessment

A second phase of the research involved the assessment of Ss' relational communication by outside coders. Both observers' and actors' sources of data are important, since J. Burgoon and Newton (in press) have detected differences between actors' and observers' relational interpretations of involvement behavior. They found significant differences for the dimensions of intimacy, composure/relaxation, and equality; actors rated their partners more favorably than did the coders. While the perceptions of the actual actors are, in a sense, more telling descriptions of what it is like to be in a CMC or FtF group, most previous studies involving CMC/FtF comparisons used outside analysis of the Ss' messages. For the sake of

replicating these past efforts in the over-time conditions introduced in this study, portions of Ss' behavior were assessed by observers.

The median portions of each group at each time were reproduced for outside coders to observe and evaluate. This means that, for FtF groups, the central ten minutes of each videotaped interaction were copied onto another tape; for CMC transcripts, it took ten minutes to read nine pages, so the central nine pages of each transcript were duplicated. Each transcript section was copied three times, and for each copy, one participant's comments were highlighted with a pencil line. In this way a coder could focus primarily on one participant's comments at a time, then the next, then the next, over the course of three readings. Likewise, each videotape coder viewed each tape three times, each time focusing primarily on a different participant in the group. Each coder rated all three members in a group.

One hundred and ninety-two coders were used in the analysis. These coders were recruited from a variety of undergraduate courses in Communication and given research credit for their participation. Coders were given no training other than the instructions (see Appendix 11)--read aloud and "walked through" by the experimenter, and re-read by the coders--before beginning their observations and questionnaire completion. These instructions directed coders to complete their evaluation of one participant before they began observing the next. They were also asked to pay attention to participants' nonverbal behavior and "the way they said things" in addition to the content. Coders were scheduled to arrive two at a time; each member of such a pair observed different participant groups. They were assigned to video or transcript depending on the availability of video playback equipment when they arrived at the coding laboratory. Each coding session took about one hour. Two coders observed and assessed each group/time episode; the order of the participants observed was rotated, as indicated by the order of the subjects' name on the coders' rating sheets. Scale reliabilities based on observer ratings were high, as reported in Table 2 (above).

CHAPTER 3

RESULTS

Group Effect

When persons are operating within a relationship, one's behavior is likely to be affected not only by individual and contextual factors, but partly by one's partners and the relationship itself (Sabatelli, Buck, & Kenny, 1986). Since all Ss operated in ongoing groups of three it was prudent to assess whether their behavior was affected by their group membership. While it is intuitively likely that a group effect should be least apparent after an initial round of interaction, rather than terminal sessions, Kenny and Malloy (1988) found stronger partner effects in shorter, rather than longer, interaction times. Participant data were therefore analyzed from both time one and time three to assess the extent of group effects.

To assess the effect of the group on relational communication, intraclass correlations were computed for each group on each relational communication outcome variable, in each communication condition. Several variables showed intraclass correlations with large magnitudes (see Table 3). It was apparent that group members' behavior was largely affected by other members of their respective groups.

Based on this analysis, it was decided that further tests of the hypotheses would take the group effect into account by including a between-subjects groups factor nested within CMC/FtF condition. Results from the 2 x 3 x 16 analyses of variance yielded significant univariate effects for group nested within condition on impression development, $F(30,64) = 3.23$, $p<.001$, $\eta^2 = .60$; message personalization, $F(30,64) = 1.71$, $p = .038$, $\eta^2 = .46$; immediacy/affection, $F(30,64) = 3.45$, $p< .001$, $\eta^2 = .62$; receptivity/trust, $F(30,64) = 3.83$, $p< .001$, $\eta^2 = .64$; composure, $F(30,64) = 3.77$, $p< .001$, $\eta^2 = .64$; formality, $F(30,64) = 2.63$, $p = .001$, $\eta^2 = .55$; similarity/depth, $F(30,64) = 4.16$, $p<.001$, $\eta^2 = .66$; and task-social orientation, $F(30,64) = 2.87$, $p<.001$, $\eta^2 = .57$. Additionally, a significant group by time interaction obtained on impression development, $F(60,128) = 1.83$, $p = .002$, $\eta^2 = .46$; immediacy/affection,

Table 3

Intraclass Correlations on Relational Communication Scales

		Time 1	Time 3
Immediacy/Affection			
	CMC	.58	.61
	FtF	.48	.38
Similarity/Depth			
	CMC	.43	.65
	FtF	.13	.43
Composure			
	CMC	.69	.67
	FtF	.29	.06
Formality			
	CMC	.33	.67
	FtF	.16	.45
Dominance			
	CMC	.01	.35
	FtF	-.04	.18
Attempted Influence			
	CMC	.04	.26
	FtF	.22	.49
Equality			
	CMC	.42	.46
	FtF	.20	.38
Receptivity/Trust			
	CMC	.51	.52
	FtF	.13	.43
Task-Social Orientation			
	CMC	.44	.74
	FtF	.30	.15

$F(60,128) = 1.73$, $p = .005$, $\eta^2 = .45$; composure, $F(60,128) = 1.49$, $p = .030$, $\eta^2 = .41$; formality, $F(60,128) = 1.47$, $p = .036$, $\eta^2 = .41$; similarity/depth, $F(60,128) = 1.65$, $p = .010$, $\eta^2 = .44$; and task-social orientation, $F(60,128) = 1.43$, $p = .048$ $\eta^2 = .40$. While these were not hypothesized effects, the large effect sizes of these factors cannot be overlooked in the analysis of group behavior. Methodologically, these findings add merit to the approach of using groups-within-conditions in several analyses which follow.

Message Accumulation

In order to validate the assumption of equality in message frequency between media and across time intervals, analysis of the frequencies of idea units was conducted. A 2 x 3 x 16 repeated measures analysis of variance with time as a repeated factor revealed no significant differences across conditions, $F(1,30) = .85$, $p > .05$, or time, $F(2,128) = 2.98$, $p > .05$, or due to the condition by time interaction, $F(2,60) = 1.58$, $p > .05$. The means and standard deviations for conditions and times are displayed in Table 4.

Table 4

Means and Standard Deviations for Message Units by Condition and Time.

Condition	Time 1	Time 2	Time 3
CMC	81.52	76.92	111.42
	(75.70)	(62.99)	(98.55)
FtF	132.85	105.52	95.88
	(60.94)	(57.37)	(64.17)

Note. Standard deviations in parentheses.

While there were significant differences between groups, $F(30,64) = 7.64$, $p < .01$, and a group by time interaction, $F(60,128) = 7.73$, $p < .01$, these differences did not favor one condition over another; these merely document that some groups spoke more than other groups, and more in some intervals than in others. Thus the assumption that message frequencies across communication medium and time intervals would be equivalent seems to have been

demonstrated. Accordingly, time intervals were used as the operationalization for message accumulation in the following analyses.

Hypothesis Tests

Hypotheses were tested in two stages. First, data were analyzed preliminarily for interaction and main effects with a 2 (condition) by 16 (groups nested in condition) by 3 (time) ANOVA with time as a repeated factor. Second, direct tests of the hypotheses were conducted with one degree of freedom contrast analyses for hypothesized trends in both conditions; contrast analyses were also used for between-condition time one tests and for time one versus time three tests within CMC (see Rosenthal & Rosnow, 1985). These contrast tests are reported as one-tailed *t*-tests (except where noted).

Every attempt was made to devise sets of orthogonal contrasts; where contrast weights could not be devised that were orthogonal to prior contrasts, however, no alpha correction was made (although these cases are noted). As noted by Rosenthal and Rosnow (1984) and Winer (1971), some statisticians argue that nonorthogonal contrasts may risk inflated error, but orthogonality is a minimal concern in the case of planned contrasts; rather, the meaningfulness and total number of contrasts should dictate whether alpha protection should be invoked, rather than orthogonality (see Keppel, 1982).

Finally, in respect of the largely exploratory nature of this investigation, and to examine more closely some of the trends and patterns, post hoc analyses were conducted with 1 df contrast or polynomial tests. In the case where these tests required contrasts weights which were nonorthogonal to prior planned comparisons, or when there was not a significant corresponding *F*, Bonferroni corrections of the alpha were applied (see Rosenthal & Rosnow, 1985).

In the following, results for each hypothesis from participants' data are presented first, followed by results based on observer data.

Impression Development

Hypothesis 1 predicted greater impression development at time three than at time one in CMC. The second hypothesis predicted a condition by time interaction on impression development with (H2a) initial, time 1 impressions being more developed in FtF than CMC, and (H2b) an increase in impression development in FtF to a plateau, with a linear increase in impression development in CMC.

These hypotheses received mixed support. The condition by time interaction obtained, $F(2,60) = 3.65, p = .032, \eta^2 = .05$. Initial impressions were more developed in FtF than in CMC, as predicted, as demonstrated directly by a significant 1 df contrast (with the group-within-condition MS used as MS_{error}), $t(30) = 2.56, p < .01, \eta^2 = .11$.[5] Additional support was provided by a significant main effect for condition, $F(1,30) = 8.47, p = .007, \eta^2 = .22$, since conditions differed most in impression development at time one. The means (with standard deviations) are presented in Figure 1.

The predicted interaction trends toward greater impression development within each condition received support. Trends were tested simultaneously using a single 1 df test with contrast weights indicating a linear CMC trend (4, 1, -2) and a "plateau" FtF trend (1, -2, -2); the resulting $MS_{contrast}$ was tested against the MS for time x group-within-condition. The statistic was significant, $t(60) = 6.21, p < .001, \eta^2 = .26$. The trend also supports H1, that impressions are more developed at time 3 than at time 1 within CMC. Additional support was found in a main effect for time, $F(2,60) = 4.76, p < .025, \eta^2 = .06$. An inspection of the means, however, suggested that the trend result may be accounted for primarily by CMC means since there was little variation among FtF means across time. In order to evaluate this suspicion, post hoc 1 df

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[5] The η^2 values for the time one between-conditions difference was computed as $SS_{contrast}$ over SS_{total} where SS_{total} was comprised of all terms related to the between-conditions effect, i.e. $SS_{condition} + SS_{groups\ within\ condition} + SS_{subjects/groups/conditions}$. The SS_{total} for the estimation of η^2 for trends and for within-condition contrasts was comprised of all terms related to within-subjects effects, i.e. $SS_{time} + SS_{time\ by\ condition} + SS_{time\ by\ groups/condition} + SS_{within}$.

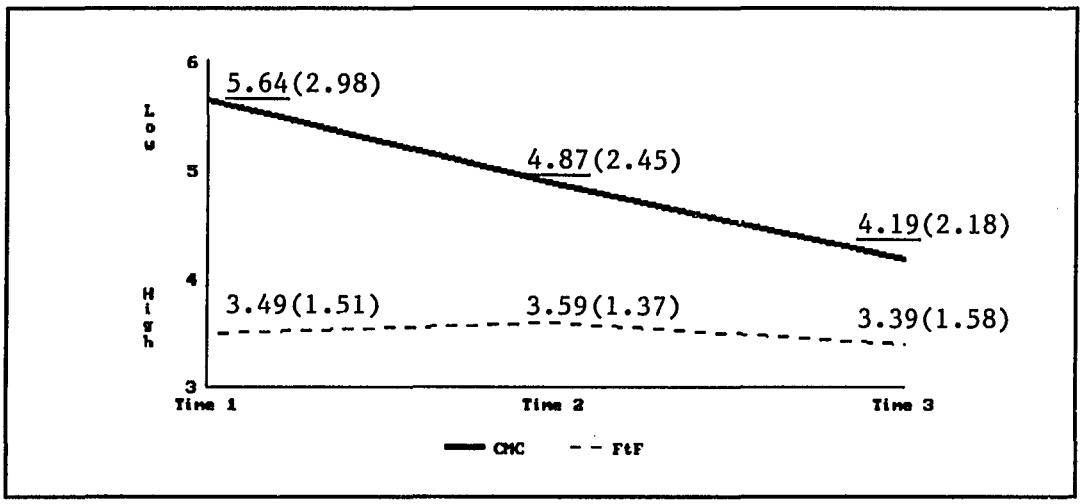

Figure 1. Impression development by condition and time.
CMC means are underlined. Standard deviations in parentheses.

polynomial probes of the CMC and FtF trends were conducted within each respective condition. These post hoc tests upheld the linear trend for CMC, $t(60) = 4.07$, $p<.001$, $\eta^2 = .11$, but there was no effect among FtF means, $t(60) = .0009$.

While the development of impressions did not match the trend prediction in the FTF condition, and the initial difference between conditions was not entirely overcome over time, neither was impression development static in CMC. Impressions did become more developed among CMC participants as messages were exchanged, as predicted, and CMC groups approached the level of impression development experienced in FtF groups. Since the condition by time interaction was ordinal, and because of the significant main effect for condition, it cannot be ventured that the levels of CMC and FtF impression development became equal within the time limitations of the present study. However, the CMC trend suggests that such groups might continue to develop impressions with even more time. Overall, H1 was supported but H2 was partially supported, since the trend patterns did not accrue for FtF.

Message Personalization

H3 and H4 were not supported. H4 predicted a condition by time interaction with (a) greater personalization among FtF than CMC groups at time one, and (b) linear trends in both

conditions toward similar, greater personalization. Regarding H3, the means for CMC and FtF at time 1 were in the opposite direction than predicted (but the difference was not significant, $t[30] = .74$, $p > .05$ [two-tailed]) (see Figure 2).

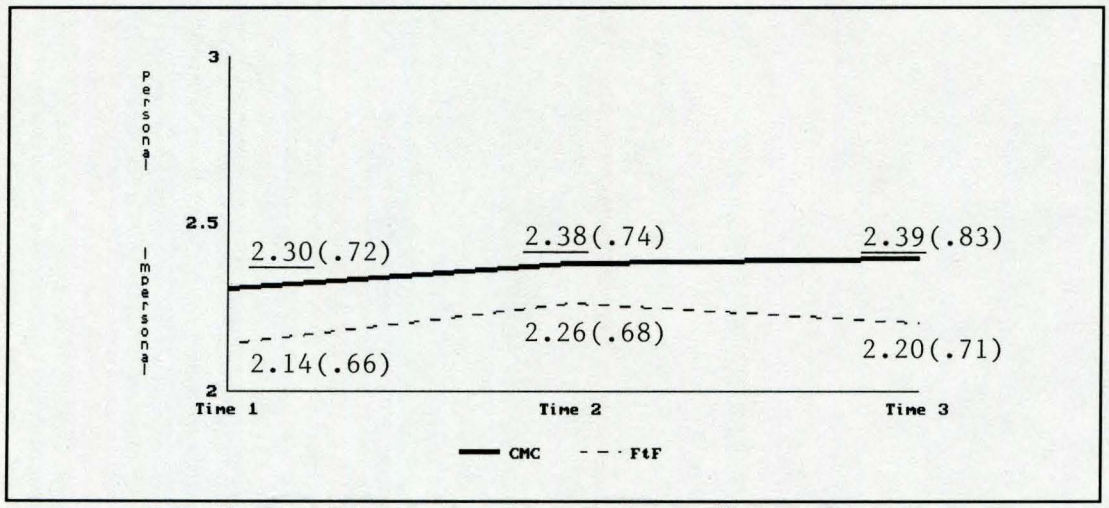

Figure 2. Message personalization by condition and time.

The condition by time interaction failed to reach significance, F (2,60) = .11, p = .896. Since the time one means were in the opposite direction than predicted, the planned contrast weights for the converging linear trends (-1, 0, 1 for FtF and -3, -1, 1 for CMC) were inapplicable. Instead, the patterns of means were examined for a general linear trend over time (against the MS for time x group-within-condition). This trend was not significant, $t(60) = 1.23$, $p > .05$. Nor was a test for time one/time three difference within CMC alone, $t(60) = 1.05$, $p > .05$, so the trend hypotheses, as well as H3--that initial messages in CMC are less personalized than later CMC messages--were not supported. Overall, the means were similar across conditions and time, grand mean = 2.28.

Immediacy/Affection and Similarity/Depth

The tests for each of these dependent variables employed a Bonferroni corrected alpha, $p = .025$. In a principle components factor analysis with varimax rotation, items from these dimensions loaded on a single factor. Although reliability analysis showed their viability as separate measures, they must be considered as highly related. Their relatedness leads to an

increased chance of familywise error among tests of the variables, against which the Bonferroni correction protects.[6]

Immediacy/Affection. H5 predicted that initial messages among previously unacquainted interactants in CMC are lower in immediacy/affection than are later messages. H6 predicted a condition by time interaction such that (a) immediacy/affection is greater in initial FtF than in CMC conversations, and (b) immediacy/affection increases to similar levels after many exchanges in both mediums.

CMC groups were not significantly more immediate/affectionate after time three than after time one, as had been predicted in H5, $t(60) = 1.08$, $p > .05$.

Although FtF ratings of immediacy/affection appeared somewhat higher at time one than the CMC ratings, they were not significantly different, $t(30) = 1.14$, $p > .05$, as had been predicted in H6a. The condition by time interaction approached significance (at the adjusted alpha), $F(2,60) = 3.91$, $p = .025$, $\eta^2 = .12$. Since the pattern of means at time one was in the predicted direction, the 1 df trend analysis was conducted as planned, with contrast weights of -1, 2, 2 for FtF and -4, -1, 2 for CMC. This test was significant, $t(60) = 2.14$, $p < .025$, $\eta^2 = .03$. Despite the significance of this test, inspection of the means (see Figure 3) showed that the FtF groups did not demonstrate the predicted trend perfectly--time two was lesser than time one--and CMC did not gain in immediacy/affection at time three. A post hoc probe of the CMC

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[6] An alternative strategy would have been to enter both variables into a single multivariate analysis of variance, determine significant multivariate effects, then probe corresponding univariate effects as the multivariate results allowed. This strategy was not adopted for several reasons: (1) an un-probed nonsignificant multivariate effect might allow significant univariate effects within the set to go undetected. Huberty and Morris (1989) argue that the failure of multivariate analysis achieving significance does not rule out a legitimate univariate effect within a cluster of variables. (2) Huberty and Morris also point out that the MANOVA procedure does not provide adequate protection against familywise error in the absence of some other form of correction such as the Bonferroni adjustment. Based on these reasons, and considering the exploratory nature of this research, multiple univariate analyses with adjusted alphas seemed warranted. Additionally, (3) the statistical analysis package used was not amenable to testing the trends and planned contrasts for all dependent variables simultaneously with MANOVA. The planned contrasts conducted offered more direct tests of the hypotheses. This rationale is also applicable to the analyses for dominance, attempted influence, and equality.

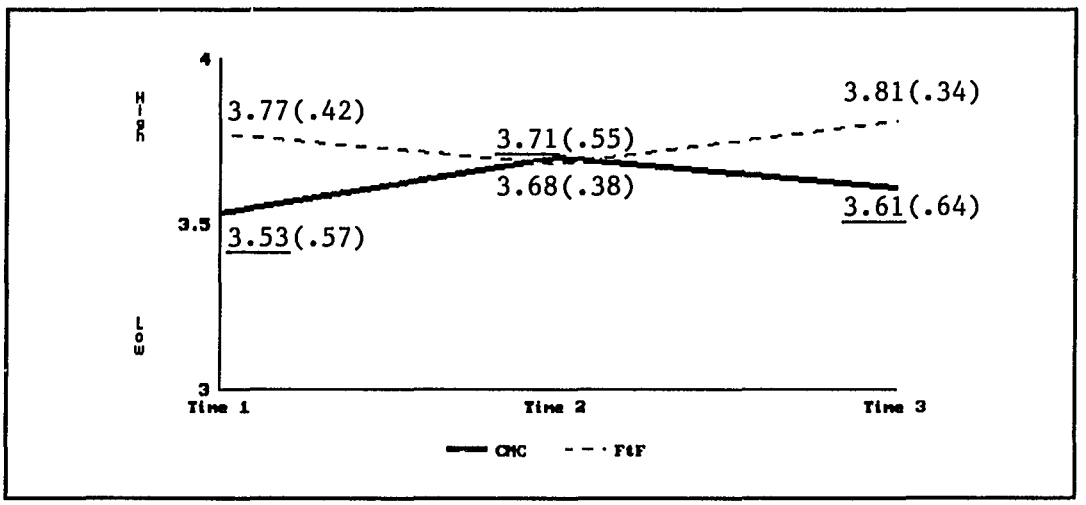

Figure 3. Immediacy/affection by condition and time.

means showed that a significant increase occurred between times one and two, t (60) = 2.31, p <.025, η^2 = .04, which may have produced much of the change detected in the trend analysis.

While H6b received mixed support, some of the test results add credence to the underlying rationale nevertheless. The near-significant interaction and the pattern of means indicate that the two conditions converged on immediacy/affection in their first two sessions. Although the development patterns of immediacy/affection within CMC and FtF conditions were not entirely as predicted, the CMC groups did appear to change over time and the convergence between conditions--at a point higher than CMC's initial level--did occur.

Similarity/Depth. Similarity/depth was expected to be greater at time three than time one within CMC (H7). Concurrently, similarity/depth was hypothesized to increase linearly in both conditions over time (H8); no time one between-conditions difference was predicted. These hypotheses received general support. The contrast test of the predicted linear trends was significant, t(60) = 2.09, p <.025, η^2 = .03, supporting both H7 and H8. The values of the means indicate that both conditions increased in similarity/depth; CMC rose most between times one and two (since time two and time three CMC means are identical), while FtF increased at time three (since time one and two are near-identical among FtF means). The means are presented graphically in Figure 4.

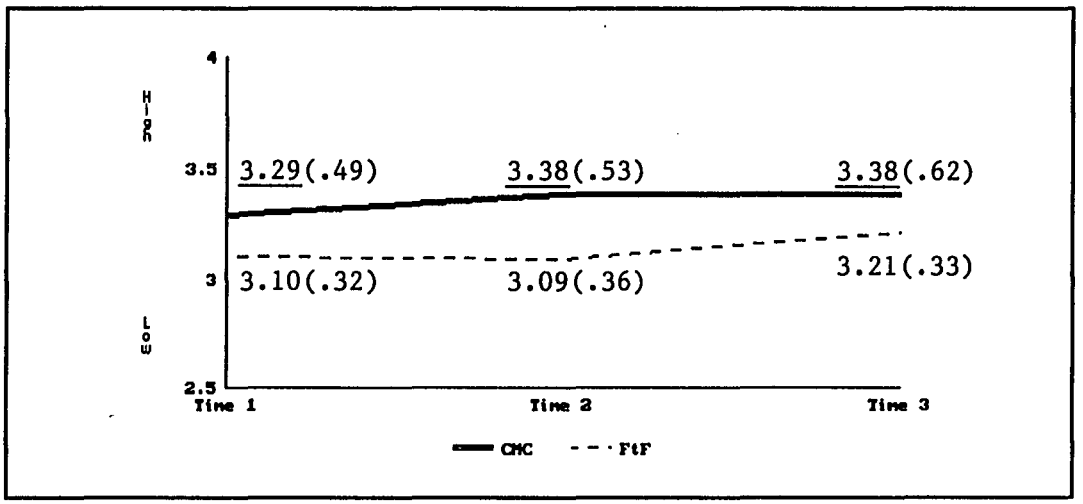

Figure 4. Similarity/depth by condition and time.

Overall, both conditions increased in similarity/depth much as expected, although it remains unclear whether the two conditions achieved equal levels.

Composure/Relaxation

H9 predicted initial messages in CMC are lower in composure/relaxation than later messages. H10 predicted a condition by time interaction, such that (a) composure/relaxation is greater in initial FtF than in CMC conversations, while (b) composure/relaxation levels both increase after time one to similar levels. H10a was not supported. Although the means at time one were in the predicted direction, FtF was not significantly higher in perceived composure/relaxation than was CMC, $t(30) = .99$, $p > .05$. Despite the failure of H10a, the planned contrast for the trends predicted in H10b were supported, $t(60) = 4.82$, $p < .001$, $\eta^2 = .14$, although the umbrella condition by time interaction was not significant, $F(2,60) = 1.68$, $p = .19$. (see Figure 5).

Finally, since inspection of the means showed that CMC was not higher at time three than time two, a planned comparison of the initial versus terminal CMC means was conducted to test H9. This test showed a significant increase as predicted, $t(60) = 2.58$, $p < .01$, $\eta^2 = .04$. Additionally, a main effect for time was significant, $F(2,60) = 8.21$, $p < .001$, $\eta^2 = .10$.

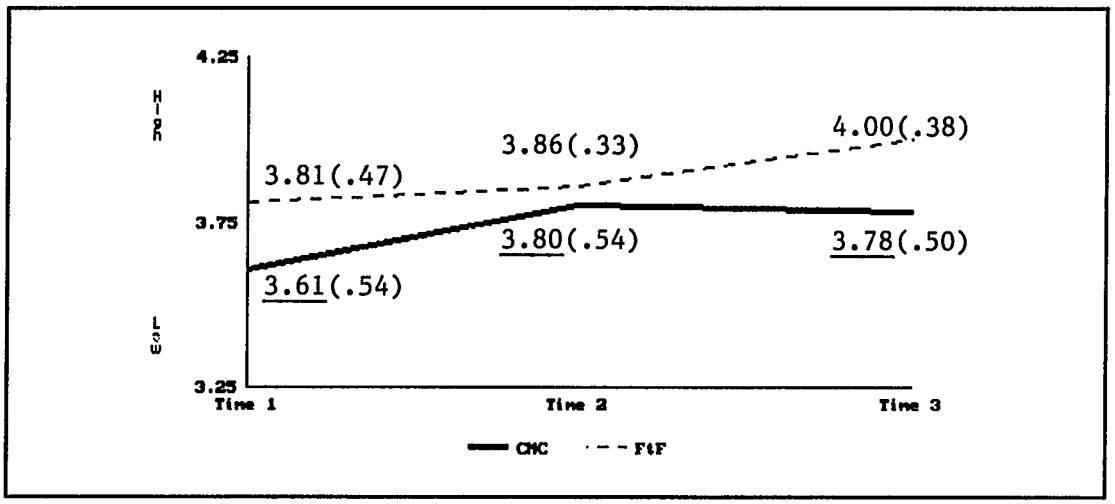

Figure 5. Composure/relaxation by condition and time.

Overall, the composure/relaxation predictions received mixed support. While CMC groups were not significantly less composed than FtF at first, both conditions experienced greater composure/relaxation as they continued. CMC and FtF composure/relaxation levels appear to be even more similar at time two than at time one (although FtF may have increased in composure/relaxation at time three).

Formality

H11 predicted that CMC groups become less formal from time one to time three. Although the CMC means at time one and time three were in the predicted direction, the difference was not significant, $t(60) = .80$.

H12 predicted a condition by time interaction such that (a) CMC differs in formality from FtF in time one, and that (b) both CMC and FtF become less formal approaching a similar level over time. The predicted interaction term was not significant, $F(2,60) = 1.74$, $p = .184$. H12a was not supported; CMC was not significantly different than FtF at time one, $t(30) = .51$, $p > .05$ (two-tailed) (see Figure 6).

Since there was no time one difference, the trend analysis for H12b was conducted as a probe for a linear decrease in both conditions in formality, which was significant, $t(60) = 2.73$, $p < .005$, $\eta^2 = .05$. Additionally, a main effect for time emerged, $F(2,60) = 4.74$, $p = .025$, $\eta^2 =$

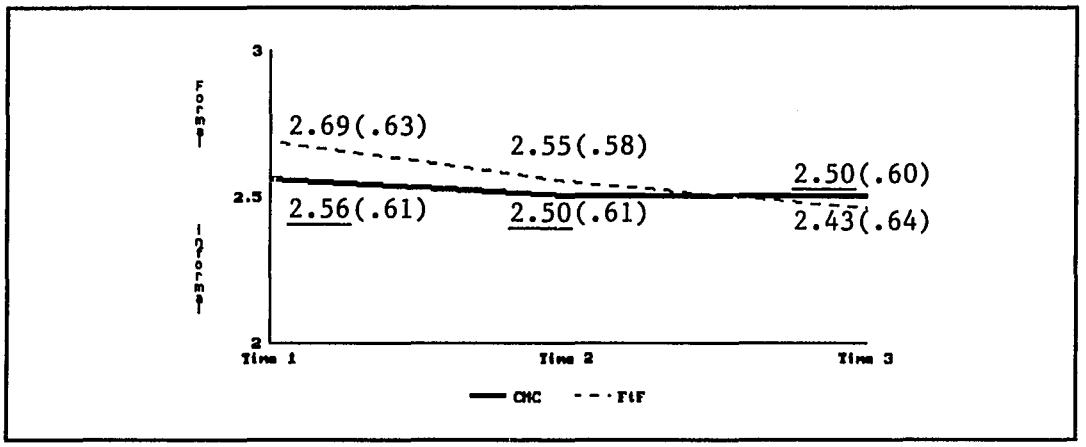

Figure 6. Formality by condition and time.

.06, as groups became less formal over time. Since CMC did not differ significantly between times one and three, FtF may have contributed more to the overall linear trend. Other than this deviation, however, the conditions did not appear to differ, and later means overlapped at more informal levels, offering support for the underlying rationale.

Dominance, Attempted Influence, and Equality

Although hypotheses were advanced regarding a combined dominance/inequality dimension, the results of the previously discussed factor analysis dictated that dominance and equality were not a single dimension. The attempted influence dimension, too, separated from previous dominance items. While the factor analysis forced orthogonality, these dimensions may yet be strongly related. For this reason it was decided to protect for familywise error through Bonferroni corrected alphas (.016) in the tests of each of these dimensions.

Dominance. H13 predicted that terminal CMC messages were lower in dominance than were initial CMC messages. H14 predicted a condition by time interaction on the progression of dominance behavior such that (a) CMC groups are higher in dominance than FtF groups at time one, and (b) FtF groups exhibit a curvilinear, inverted U-shaped trend over time, and CMC converges with FtF over time at a lower level than CMC's initial point.

These predictions received mixed support. H13 was supported, with terminal CMC exchanges rated less dominant than the initial exchanges, $t(60) = 2.49$, $p < .01$, $\eta^2 = .05$. CMC

groups appeared higher in dominance at time one than FtF groups (as predicted in H14a), but the difference was not significant, $t(30) = .44$, $p > .05$. The trends were assessed using contrast weights of -1, 2, -1 for FtF means and 1, 0, -1 for CMC. This test supported H14b, $t(60) = 6.07$, $p < .001$, $\eta^2 = .19$ (see Figure 7).

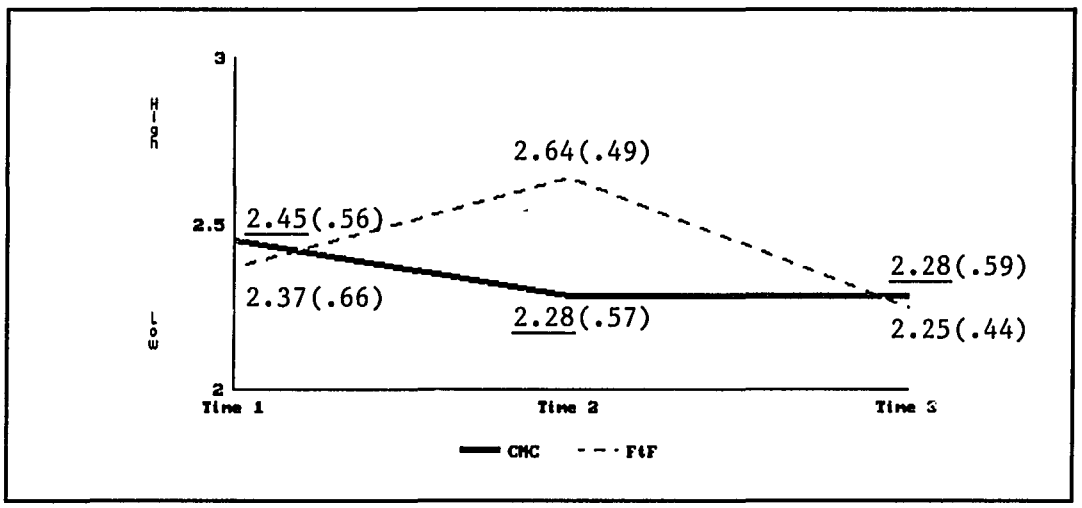

Figure 7. Dominance by condition and time.

While the omnibus interaction term did not reach significance, $F(2,60) = .28$, $p = .756$, an unhypothesized main effect for time did obtain, $F(2,60) = 5.57$, $p < .005$, $\eta^2 = .06$. The presence of the time effect, with no condition or interaction effect, suggested that dominance changed similarly over time across conditions. The pattern of means seemed to suggest otherwise. Overall, groups in both conditions were similarly dominant in their first interactions while the slopes for each condition differed thereafter. FtF groups displayed a quadratic development in dominance, and CMC declined, with the conditions converging at time three as expected. Except for the failure of H14a (no differences at time one), the dominance predictions were largely supported.

Attempted Influence. While no hypotheses had been advanced for this factor, exploratory tests were conducted. A main effect for time was once again significant, $F(2,60) = 11.27$, $p < .001$, $\eta^2 = .10$. An inspection of the means suggested that the patterns associated

with the dominance hypothesis were inapplicable for attempted influence: FtF did not demonstrate an inverted-U, nor did CMC decline over time (see Figure 8).

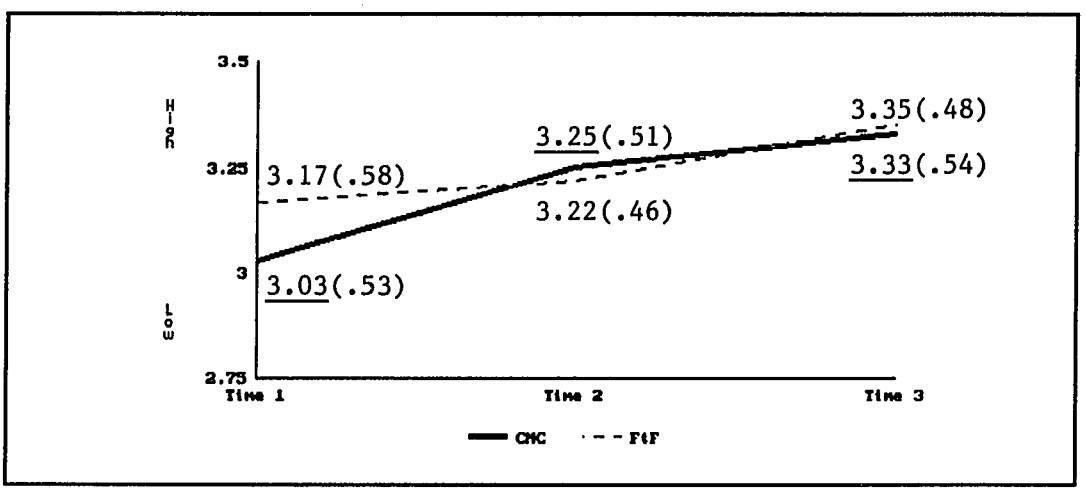

Figure 8. Attempted influence by condition and time.

Rather, the pattern of means suggested an overall linear increase in attempted influence, which was assessed in a post hoc probe using a polynomial contrast. This test was significant, $t(60) = 4.71$, $p < .001$ (two-tailed), $\eta^2 = .10$. Although the mean for FtF groups appeared higher than the CMC groups' at time one, this difference was not significant, $t(30) = .88$, $p > .05$ (two-tailed).

Considering that no a priori predictions had been offered for this dimension, no further probes seemed warranted. It seems that participants tried to influence each other more as they continued over time; communication condition did not mediate this effect.

Equality. Equality was affected by a near-significant main effect for time, $F(2,60) = 3.08$, $p < .05$; no other main or interaction effects obtained. The pattern of means was analyzed using predictions from the original dominance/inequality hypotheses, i.e., that FtF is higher than CMC in equality at time one, and that terminal CMC conversations were higher in equality than initial CMC conversations.

The CMC means between time one and time three did not differ significantly, $t(60) = 1.47$, $p > .05$. Results indicated that FtF groups did not perceive greater equality at time one than did CMC groups, $t(30) = 1.05$, $p > .05$. It was clear that the FtF trend did not conform to

the quadratic, inverted-U pattern predicted for inequality over time, as had been hypothesized (see Figure 9), so this trend was not tested statistically.

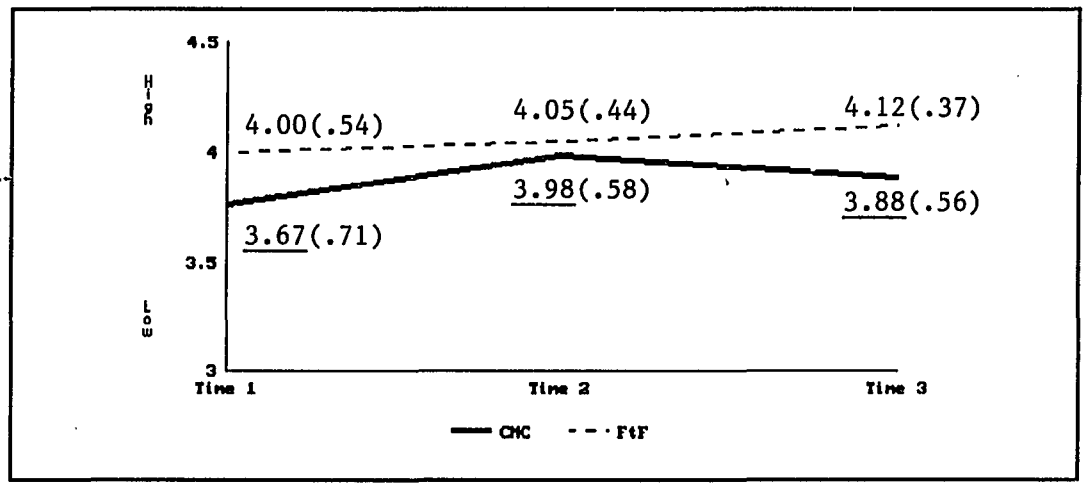

Figure 9. Equality by condition and time.

The effect of time most likely impacted the combined means across conditions, or one condition only, in an unforeseeable way. It seems reasonable to conjecture that the two conditions were similar in equality, especially at their median interactions.

Receptivity/Trust

H15 predicted an increase in receptivity/trust within CMC from time one to time three. H16 specified a condition by time interaction such that (a) receptivity/trust is greater in initial FtF than in CMC conversations, while (b) receptivity/trust increases thereafter to an equal level. The predicted interaction was significant, $F(2,60) = 3.39$, $p = .040$, $\eta^2 = .10$, and the planned contrasts demonstrated several of the predicted effects. H16a, though, was not supported. FtF groups appeared higher in receptivity/trust than were CMC groups at time one, but the test was not significant, $t(30) = .83$. H16b received support. The test of the trends toward greater receptivity/trust was significant, $t(60) = 3.12$, $p < .005$, $\eta^2 = .05$. Since CMC was not higher at time three than at time two, the previous trend test did not test H15 directly. An additional, nonorthogonal test of CMC means at times one and three was conducted, which demonstrated

that CMC was indeed higher at the end than at the beginning, $t(60) = 2.34$, $p < .025$, $\eta^2 = .03$ (see Figure 10).[7]

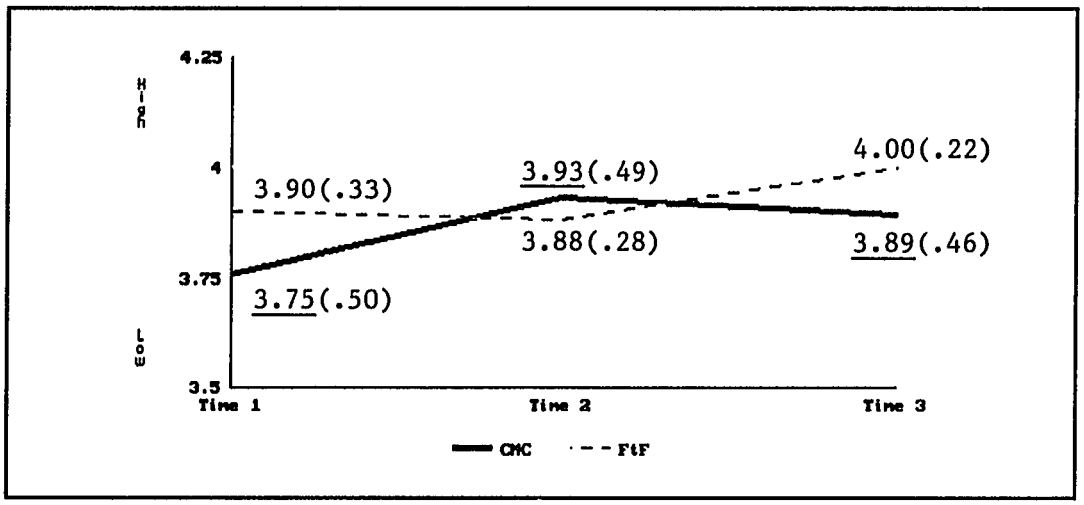

Figure 10. Receptivity/trust by condition and time.

A significant main effect for time also emerged, $F(2,60) = 4.40$, $p < .025$, $\eta^2 = .05$, although the significant interaction effect overrides the main effect.

It also appears that CMC and FtF converged (if not crossed) in their levels of receptivity/trust in time two (although divergence at time three is possible). Overall, H15 and H16b were supported, while H16a was not.

Task-Social Orientation

H17 predicted a decline in task-orientation within CMC from time one to time three. H18 specified a condition by time interaction on task-social orientation such that (a) CMC is more task oriented than FtF at time one, and (b) both conditions become lower in task orientation over time to a similar level.

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[7]These two significant, nonorthogonal contrast tests involving the same means and similar patterns are subject to an inflated chance of type I error. Since these contrasts reflect planned comparisons, however, no alpha correction was adopted. It should be noted that the time one/time three t-test would not achieve significance were a correction applied. Interpretations of this result should be approached with caution.

H17 was supported. CMC groups were less task oriented at time three than at time one, although this effect was small $t(60) = 1.70$, $p < .05$, $\eta^2 = .02$. Some aspects of H18 received support, while other aspects did not. The trends toward more social orientation predicted in H18b were supported, $t(60) = 2.69$, $p < .005$, $\eta^2 = .05$, but the two conditions may or may not have converged. A significant main effect for conditions obtained, $F(1,30) = 10.32$, $p = .003$, $\eta^2 = .26$, but in the opposite pattern than anticipated for time one: altogether, CMC was less, rather than more task oriented than FtF throughout (see Figure 11). Whether this between-conditions effect differentiated time three means is not known.

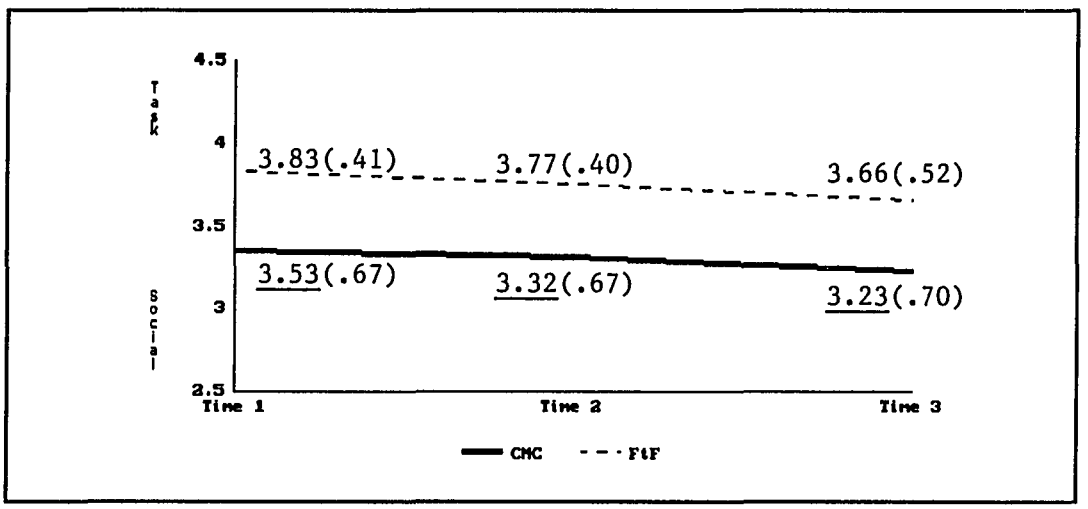

Figure 11. Task-social orientation by condition and time.

There was also a main effect for time, $F(2,60) = 4.11$, $p < .025$, $\eta^2 = .05$. Thus the means of the two conditions may have exhibited two essentially parallel lines, both becoming less task oriented over time, but not converging. In opposition to many previous findings about task-social orientation in CMC, it was groups in the computer-mediated condition that were less task oriented than the FtF groups. And CMC groups, as well as FtF groups, became less task oriented as they progressed.

Observers Ratings

Observers rated CMC transcripts and FtF videotapes using the Relational Communication Coding Instrument, as described above. The results of these ratings are presented below.

Immediacy/Affection and Similarity/Depth

As with the subject-generated data, scores on these dimensions are expected to be related, and hypothesis tests were therefore assessed against a Bonferroni corrected .025 alpha.

Immediacy/Affection. Hypotheses 5 and 6 were not supported by observers' data. Rather, a main effect for condition obtained, $F(1,30) = 11.26$, $p = .002$, $\eta^2 = .05$; and a significant time effect also emerged, $F(2,60) = 6.91$, $p = .005$, $\eta^2 = .05$; the condition by time interaction was nonsignificant (at even .05 alpha). The pattern of means is presented in Figure 12.

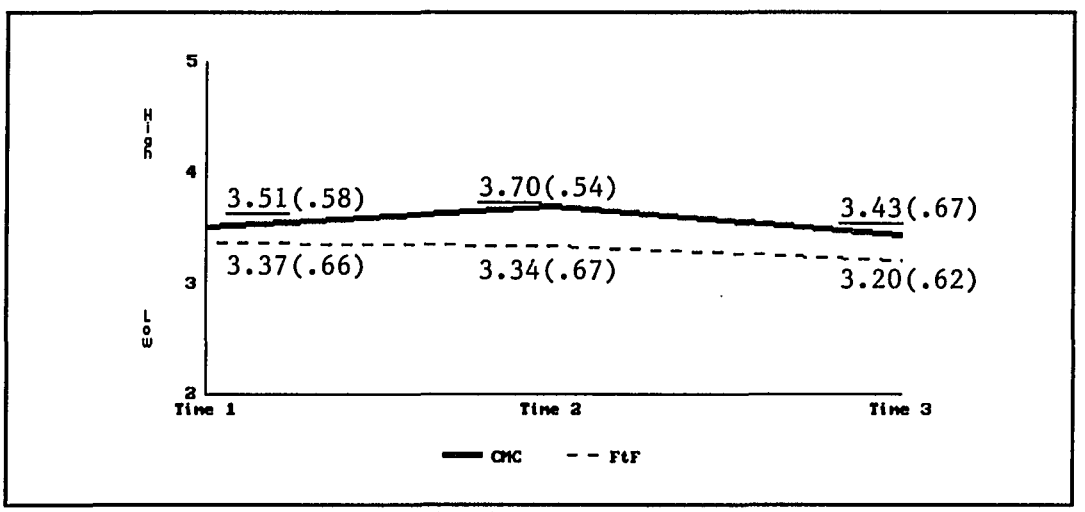

Figure 12. Observed immediacy/affection by condition and time.

The condition effect is explained in that CMC groups were rated marginally higher in immediacy/affection than were FtF groups across times (contrary to H6), especially at time two. This differs from the Ss' assessments, in which the opposite (but nonsignificant) pattern emerged. The time effect was not a result of a predicted trend (as it had been by Ss' accounts),

since means for time three were not higher than in time one in either condition (contrary to H5 and Ss' scores).

Similarity/Depth. As was the case with participants' scores, CMC groups were rated higher in similarity/depth than were FtF groups across all three times (see Figure 13). By observers' ratings, though, the between conditions main effect was significant, $F(1,30) = 20.32$, $p < .001$, $\eta^2 = .10$. Overall ratings for CMC and FtF conditions hovered just over and under the scale midpoint of 3; the grand mean was 3.08.

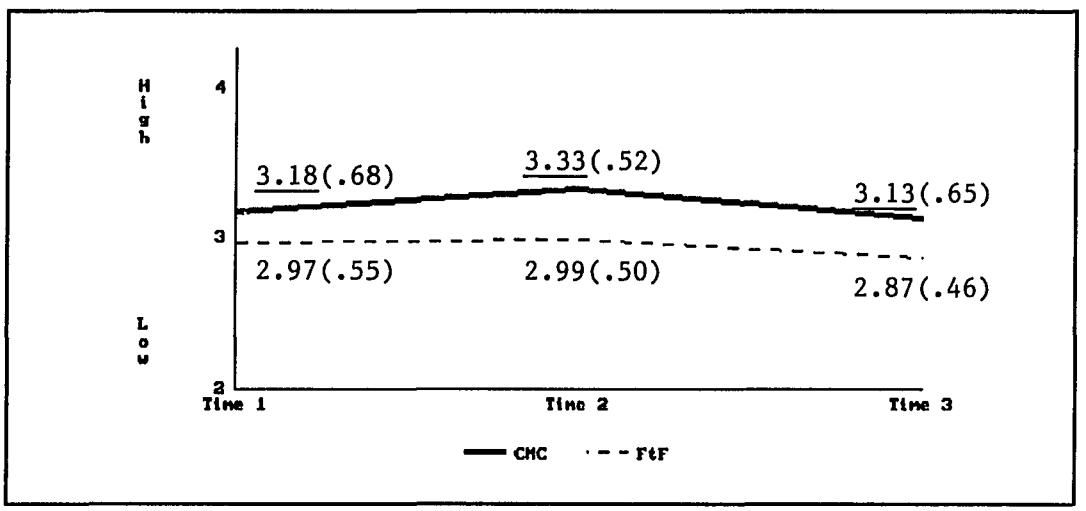

Figure 13. Observed similarity/depth by condition and time.

No other effects were significant. As is seen in the pattern of observed means, similarity/depth was not greater at time three than at time one within CMC, where the Ss' scores increased linearly across time. These patterns do not support the hypotheses about similarity/depth in any way, save for the underlying rationale that communicators can express this dimension through CMC.

Composure/Relaxation

While the composure hypotheses (H9 and H10) predicted increased composure in both conditions over time, such was not the case. Time three did not differ from time one within CMC, $t(60) = .20$, as had been predicted in H9 and found in the Ss' ratings. CMC groups were rated higher in composure/relaxation than were FtF groups in general, although time one scores

were nearly identical, which resulted in a condition by time interaction, $F(2,60) = 3.96$, $p = .024$, $\eta^2 = .05$, and a significant main effect for condition, $F(1,30) = 11.88$, $p = .002$, $\eta^2 = .10$. CMC showed some increase in composure at time two, while FtF groups declined (see Figure 14), so the test for the predicted trends was inapplicable. Where Ss' CMC/FtF seemed to become more similar from time one to time two, observers' scores began as similar and then split; while FtF was expected to be higher than CMC in composure/relaxation at time one, CMC appeared more composed/relaxed to observers overall.

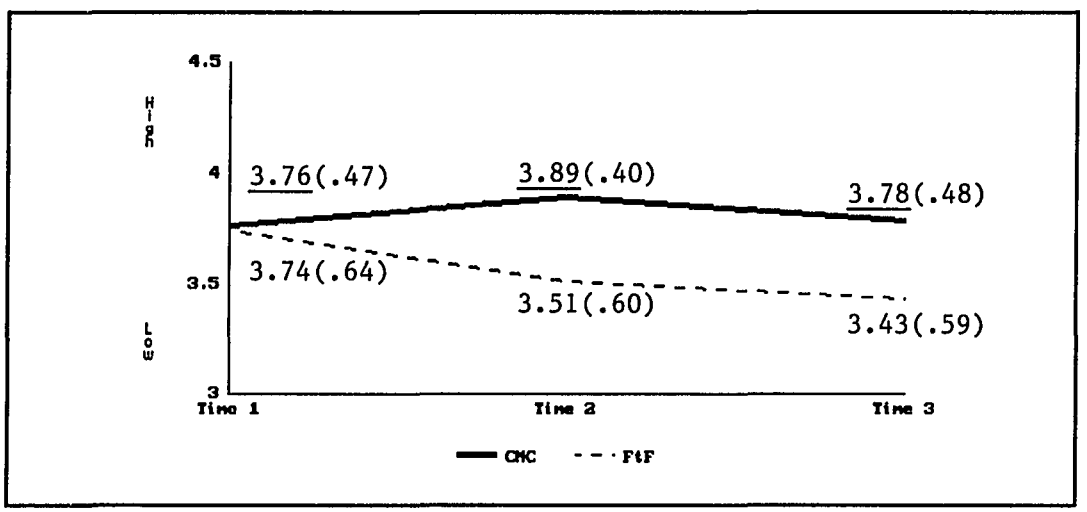

Figure 14. Observed composure/relaxation by condition and time.

A post hoc trend analyses was conducted to explore the progression within the FtF condition (since the test of H9 showed no linear increase within CMC), at a Bonferroni corrected alpha of $p < .025$. The 1 df contrast for FtF yielded a significant negative linear trend, $t(60) = -3.06$, p (two-tailed) $< .01$, $\eta^2 = .06$, in the opposite direction than hypothesized, with groups lower in composure/relaxation at time three than at time one. Observer data suggest rejection of H9 and H10, although it is interesting that CMC was rated higher on this construct than was FtF.

Formality

Although CMC appeared more formal than FtF in time one, there was no significant difference, $t(30) = .51$, $p > .05$. After time one, CMC became less formal, while FtF moved toward greater formality (see Figure 15). The CMC means alone were tested for a linear decrease with a 1 df polynomial contrast. This test was significant, $t(60) = 2.44$, $p < .01$, $\eta^2 = .04$, supporting H11 (the time one/time three CMC difference, which was not upheld by Ss' data) and the CMC aspect of the H12b trend. The condition by time interaction on formality approached significance, $F(2,60) = 3.09$, $p = .053$, $\eta^2 = .093$.

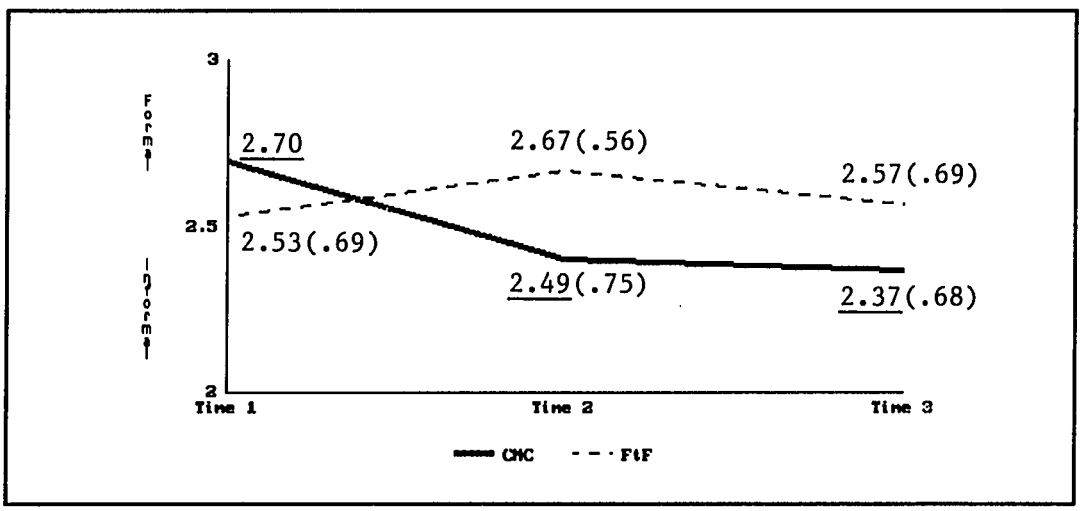

Figure 15. Observed formality by condition and time.

According to observers, then, CMC groups became less formal after time one, as participants also reported, while FtF groups did not differ from CMC or due to time (whereas Ss indicated a decline). The observers' scores supported only the CMC trend in H12, while H11 was more clearly supported.

Dominance, Attempted Influence, and Equality

As with the subject-generated scores, it was expected that observer ratings of these three dimensions were related, and univariate results were assessed with a Bonferroni adjusted alpha, .016.

Dominance. Two 1 df contrast analyses revealed the following: CMC groups were rated more dominant than FtF at time one, $t(30) = 2.55$, $p < .01$, $\eta^2 = .007$, in support of H14a (which did not reach significance in Ss' scores). CMC did not decline significantly in dominance between time one and time three, $t(60) = 1.31$, $p > .05$, in contrast to the presence of this effect from participants' scores and in contradiction to H13. FtF groups were not rated more dominant at time two (see Figure 16), obviating the predicted curvilinear trend. As was also the case with participants' scores, CMC appeared to decline in dominance at time two.

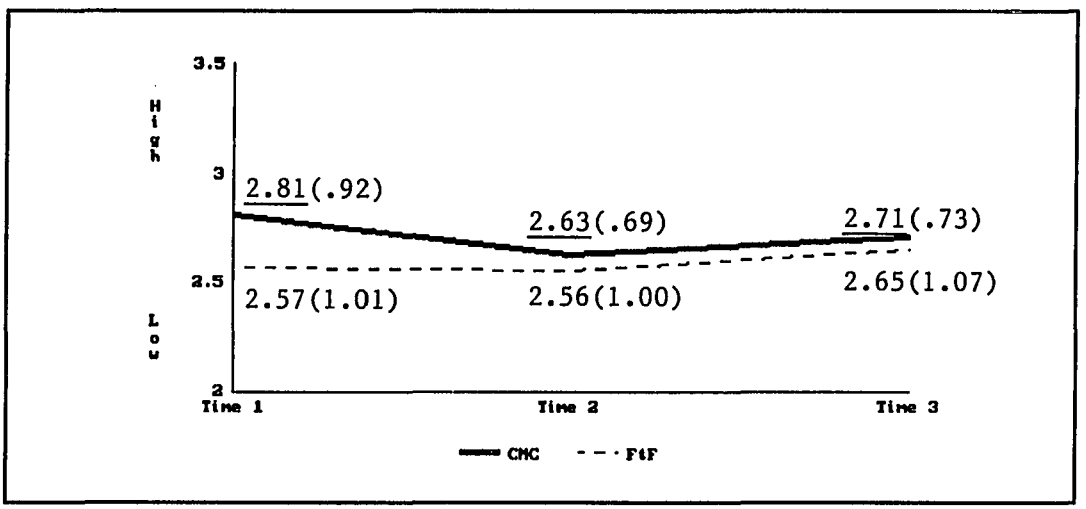

Figure 16. Observed dominance by condition and time.

A main effect for CMC/FtF condition approached significance from observers' ratings of dominance, $F(1,30) = 5.53$, $p = .025$, $\eta^2 = .16$. Speculatively, it seems that the condition effect may be due primarily to the time one CMC/FtF contrast. The means at times two and three appear to be very similar between conditions (although they do not "cross over"). Overall, the observers' ratings support only one aspect of the hypotheses clearly, that CMC was more dominant in initial interactions than was FtF, although it appears that there may have been some convergence between the groups in later sessions, as was anticipated.

Attempted Influence. Although participants' scores showed an unhypothesized trend toward increased attempted influence over time and a significant time main effect, the patterns of the means from observers suggested no previously-tested patterns. There were no main or interaction effects on observed attempted influence. The means suggest a moderate level of influence attempt in both conditions across times (see Figure 17).

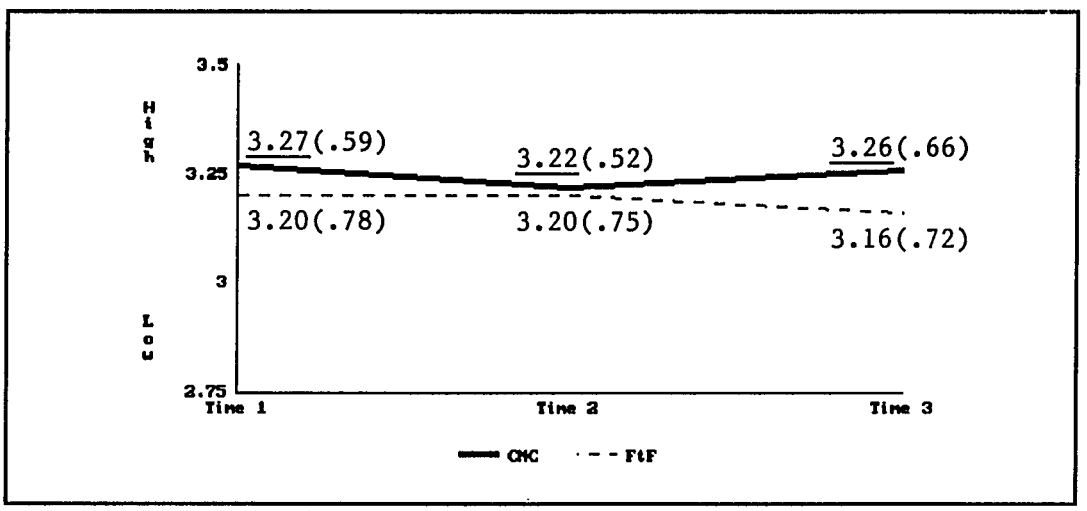

Figure 17. Observed attempted influence by condition and time.

Equality. A contrast test failed to show a time one/time three difference in equality within CMC, $t(60) = .40$, $p > .05$. Observed equality scores were influenced by a near-significant effect for time, $F(2,60) = 3.67$, $p < .05$, $\eta^2 = .04$. A second contrast test determined that, like the Ss' scores, FtF groups may have exhibited marginally greater equality at time one than did CMC groups, $t(30) = 1.92$, $p < .05$ (but not significant at the Bonferroni adjusted alpha). The two conditions seemed to approach convergence in equality at time two (see Figure 18).

The pattern of the means does not conform to the earlier dominance/inequality hypotheses otherwise. Indeed, where equality was expected to be lowest (time two), equality was rated highest within CMC by observers. While main effects tests from the participants' scores yielded the same results as from observers', the observer data show a stronger convergence between conditions at time two.

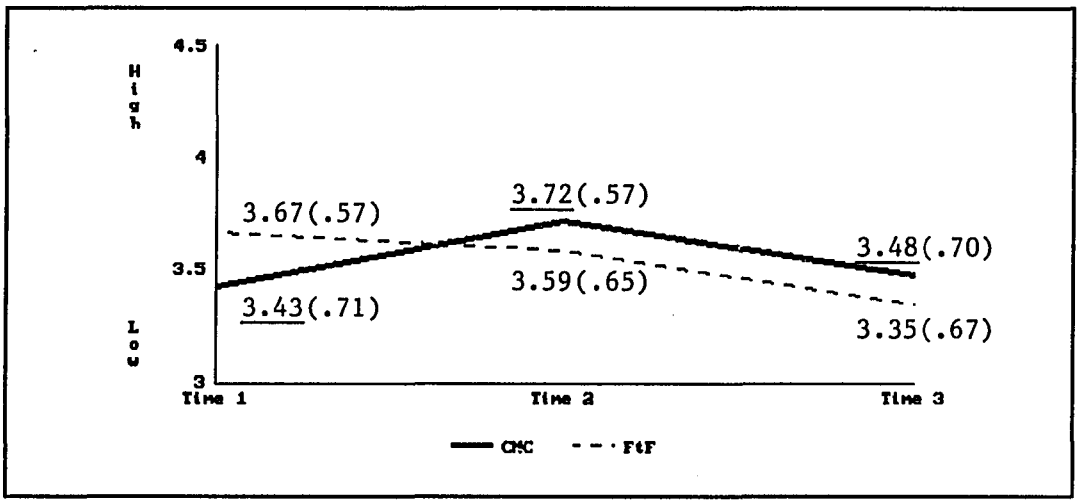

Figure 18. Observed equality by condition and time.

Receptivity/Trust

As the Ss' data also showed, observers' ratings of FtF groups were not significantly higher in receptivity/trust than were CMC groups at time one, $t(30) = .73$. In both conditions, time three scores were lower than previous scores (see Figure 19), so the trend toward greater receptivity/trust which was confirmed by the Ss was not apparent to the observers.

Observers' ratings of receptivity/trust produced a near-significant effect for time, $F(2,60) = 2.60$, $p = .06$, $\eta^2 = .03$; no other effects obtained. Overall, the observers' ratings of receptivity/trust did not support hypotheses 15 and 16, except to the extent that the two conditions were similar over time.

Task-Social Orientation

Contradicting the hypothesis but consistent with participants' ratings, FtF was more task oriented than was CMC at time one; indeed, FtF was rated more task oriented across all times, especially at time two (see Figure 20). CMC, on the other hand, was most socially oriented at time two. Observers' ratings of task-social orientation produced an ordinal condition by time interaction, $F(2,60) = 5.99$, $p = .004$, $\eta^2 = .166$, as well as a main effect for condition, $F(1,30) = 12.79$, $p = .001$, $\eta^2 = .299$.

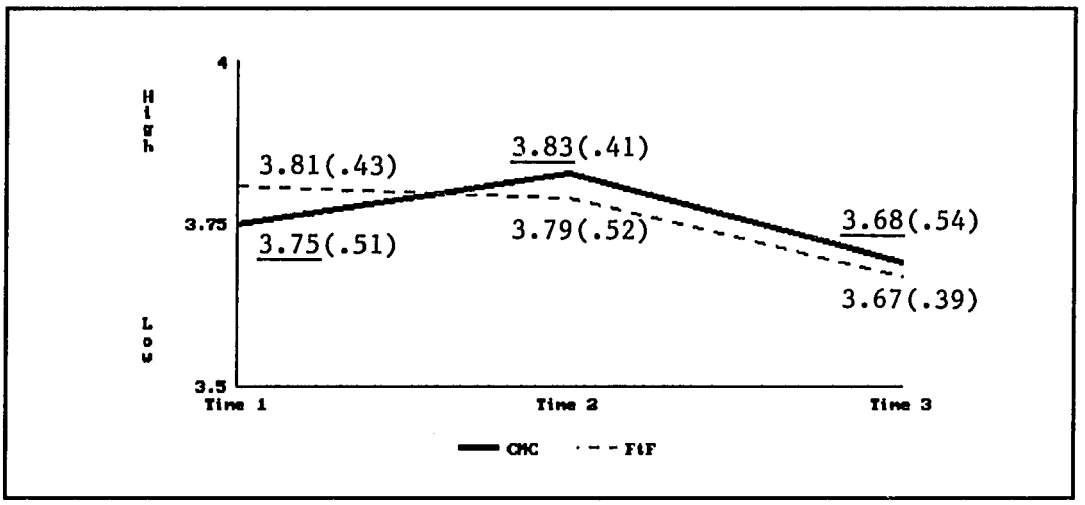

Figure 19. Observed receptivity/trust by condition and time.

Planned comparisons for the simultaneous trends were inapplicable. H17, that CMC is more socially oriented at time three than at time one, was tested with a 1 df contrast test. This direct test showed a significant but minor difference between times one and three in CMC, $t(60) = 1.80$, $p < .05$, $\eta^2 = .02$.

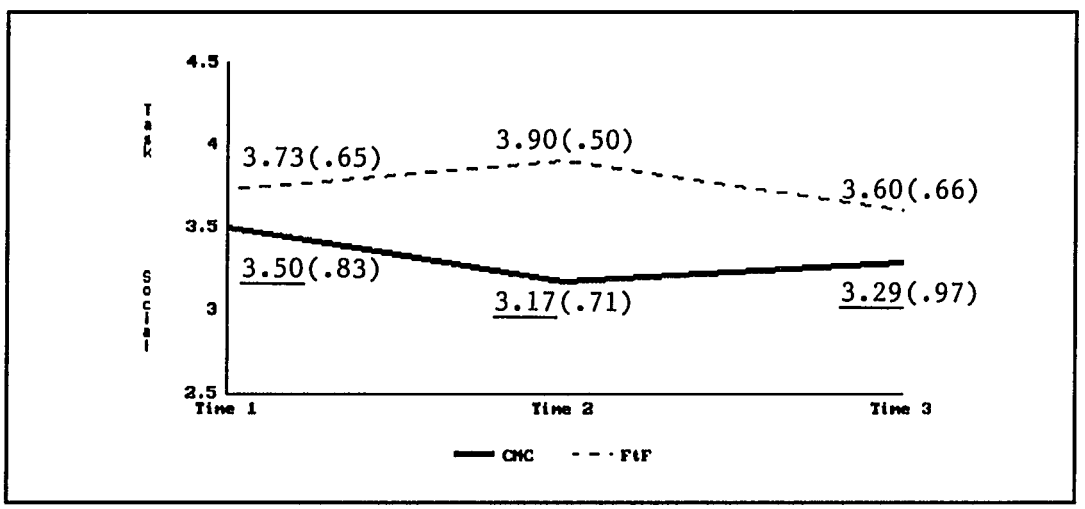

Figure 20. Observed task-social orientation by condition and time.

As has been indicated, observers' and participants' data often showed different results. The degree to which participants and coders in each condition agreed in their assessments was measured using Pearson product-moment correlations. Results are presented in Table 5. Correlations between Ss' and coders' scores were more frequently greater for the CMC

condition than for FtF, but only in the case of formality was there a significant difference between conditions in the strengths of the correlations.

Table 5

Participant-Observer Averaged Correlations on Relational Communication Dimensions.

		Time 1	Time 2	Time 3
IMMEDIACY/AFFECTION	CMC	.55***	.48***	.55***
	FtF	.42**	.43***	.23ns
SIMILARITY/DEPTH	CMC	.51***	.41**	.32*
	FtF	.44***	.24*	.31*
COMPOSURE/RELAXATION	CMC	.29*	.44***	.51***
	FtF	.33*	.36**	.21ns
FORMALITY	CMC	.34**	.38**	.68***
	FtF	.37**	.26*	-.003ns
DOMINANCE	CMC	.65***	.39**	.40**
	FtF	.54***	.53***	.53***
ATTEMPTED INFLUENCE	CMC	.48***	.20ns	.23ns
	FtF	.25*	.35**	.20ns
EQUALITY	CMC	.38**	.33**	.40**
	FtF	.35**	.20ns	.23ns
RECEPTIVITY/TRUST	CMC	.28*	.37**	.32*
	FtF	.28*	.06ns	.21ns
TASK-SOCIAL ORIENTATION	CMC	.53***	.55***	.56***
	FtF	.26*	.31*	.23ns

*** ≤.001, **≤.01, *<.05, ns = nonsignificant, n=48; underlining indicates significantly different, p<.05, two-tailed.

CHAPTER 4

DISCUSSION

Overview

The purpose of this investigation was to explore the effects of computer-mediated communication and time on groups' impression development, message personalization, and dimensions of relational communication. Most previous studies in this area endorsed the "cues-filtered-out" perspective: that CMC filters out nonverbal cues, and in doing so, prohibits normal relational communication processes within the medium. Many of such studies constrained opportunities for the effects of time to affect user behavior, and concluded--perhaps falsely--that observed differences in relational aspects between CMC and FtF communication were inherent aspects of the new communication medium. Such an approach neglects potentially potent influences of group relationship development over time as well as relational information processing through verbal and textual behaviors.

In order to explore the effects of time and medium in this study, subjects within zero-history CMC and FtF groups of three interacted over a period of six weeks. Hypotheses predicted both the evolution of CMC and FtF groups' development on each outcome measure and communication condition by time interactions on these trends. In general, it was expected that the two conditions would converge on each dimension over time. The results are summarized in Appendix 12.

While the results generally offered mixed support, there was sufficient support to challenge the dominant views on the static effects of the medium. It was found that CMC groups do develop and evolve relationally in many of the predicted directions. The current study suggests that cues-filtered-out predictions of greater task orientation, self-absorption, arousal, and impersonality do not obtain in extended-time, asynchronous interactions in CMC. When such groups are allowed to continue over time and accumulate numerous messages, this continuity has significant, positive impact on groups' relational communication.

In order to draw a clearer picture of the implications of the results, the following discussion will first examine time, then condition effects, as this parallels the ordering of all pairs of hypotheses in this study. Second, the contributions of these effects are contrasted. Differences between actors' and observers' ratings are discussed next. Then a general interpretation is offered incorporating the above findings. Limitations of the current research and suggestions for future work follow.

Effect of Time

In many cases the effects of message accumulation over time had a strong influence on the development and expression of relational qualities in groups. Counter to what might be expected from the cues-filtered-out perspective, time effects were most apparent in CMC. CMC participants' communication was generally consistent with the social penetration-based hypotheses: Communication became more positive relationally.

Several dimensions reflected change over time. As rated by CMC participants, similarity/depth, composure/relaxation, informality, receptivity/trust and social-orientation (versus task-orientation) increased; dominance decreased. The predicted increase in message personalization was not supported among CMC groups.

While these time effects followed predicted directions in CMC, the effect of time on FtF groups was not as clear cut. It had been predicted that FtF groups, by virtue of having both nonverbal and verbal information exchanges, would develop in the same way along these dimensions but often more quickly. However, FtF groups did not appear to exhibit significant change from their initial levels in impression development and receptivity/trust. FtF groups did exhibit the predicted trends in lesser formality and greater similarity/depth, composure/relaxation, and social orientation, as well as the curvilinear trend on dominance. For similarity/depth, FtF groups did increase but later than predicted, in the third task.

The potency of the time factor was especially apparent when combining results across both conditions. Every outcome either showed a time effect or an interaction with time. Time

produced a significant omnibus main effect on participants' ratings of impression development and most of the relational dimensions, except immediacy/affection (where the disordinal time by condition interaction approached significance), message personalization (where no effects obtained), similarity/depth (where the trend analysis showed temporal effects nevertheless), and equality (where the time effect would be significant at an unadjusted .05 alpha). Again, much of the variability contributing to these main effects was a result of the CMC groups. Clearly, time affected groups' relational communication, especially that of CMC groups. Thus time, which has been overlooked in many CMC studies, and was recently named in a call for research (Williams et al., 1988), proved an indispensable factor in describing CMC group behavior when included in the design.

Effect of Conditions

Results showed that CMC groups did not differ uniformly from FtF groups in their interpersonal behavior. At the completion of the first of three tasks, only impression development was significantly lower and observed dominance was significantly higher among CMC groups than among FtF groups. However, in both cases these time one differences were followed by considerable movement in CMC toward FtF levels in subsequent interactions. It had been expected that such time one differences would occur in several other dimensions, as well; this expected pattern was based on the cues-filtered-out perspective as applied to initial interactions among unacquainted partners. In most cases, however, CMC was not significantly different than FtF even after an initial exchange. The cues-filtered-out presumptions about the relational tone differences between CMC and FtF are called into question by these time one failures.

As groups interacted more, relational equivalency between conditions became more apparent. It was hypothesized that groups in each condition should reach similar levels on each relational communication dimension over time. Many of the analyses showed convergence (using contrast analysis weights that reflected equal levels in time three). While these tests do

not conclusively demonstrate equality in time three, and statistical tests cannot conclusively demonstrate the absence of difference, there is additional, descriptive support for convergence effects as well.

The patterns of means were such that CMC and FtF scores clearly overlapped at time two or time three in several relational communication dimensions. For example, while FtF groups rated their partners higher in receptivity/trust at time one ($\underline{M}$ =3.90) than did CMC groups ($\underline{M}$ =3.76), time two scores showed that the two conditions met (CMC $\underline{M}$ =3.93, FtF $\underline{M}$ =3.88). Similar convergences occurred in participants' ratings of immediacy/affection, formality, and attempted influence. Dominance ratings overlapped between times two and three. Observers' reports showed similar effects in formality, receptivity, and equality. The means within some other dimensions, perceived composure and equality, came very close to one another but did not overlap; one cannot confidently conclude that they converged in these cases. But where the patterns overlapped, it seems that some convergence between conditions in the levels of those relational dimensions took place.

In other cases, between-condition effects were maintained across times. Impression development, for example, did not develop as much in CMC as it did in FtF; apparently the amount of interaction CMC groups shared in this study was not enough to equalize this. The trend which did occur suggests CMC groups might eventually catch up, however, since impression development in CMC increased linearly toward the stable FtF level in an ordinal condition by time interaction. Outside coders also rated the conditions as different in immediacy/affection, similarity/depth, composure/relaxation, and task-social orientation, and participants' ratings of task-social orientation also created a between-condition difference. The surprising aspect of these differences was that they portrayed the CMC groups as more positive in these interpersonal behaviors than FtF groups were. Especially in the case of task-orientation, which is the old standard of the cues-filtered-out research, participants and observers agreed that CMC was more socially oriented.

It had been hypothesized that time interacts with communication condition in the prediction of relational effects, yet seldom did such statistical interactions obtain. In some cases, significant ordinal interactions obtained, with time and/or condition effects persisting. The failure to obtain other significant disordinal interactions may have resulted from the similarity of CMC/FtF means at time one where they had been predicted to differ but mostly did not. There was not enough of a change in the patterns of means to create a statistically significant interaction term. In most cases time did not affect the two conditions much differently, so no meaningful disordinal effects existed. It appears that the medium may provide so little difference that given enough time, minor differences in some relational dimensions after initial interactions become inconsequential across episodes.

Comparison of Effects

An examination of the effect sizes from the time, condition, and between-group differences adds credence to a limited-effects view of CMC/FtF channel differences. Of the effect sizes associated with significant findings (as estimated by η^2), communication condition was associated with a substantial effect only in two cases. On impression development (η^2 = .22), FtF was more developed, but a significant interaction obtained and the trends toward convergence yielded a significant .26 effect. Task-social orientation also showed a main effect for condition (η^2 = .26), but CMC was more social than FtF.[8] While the effect sizes for time were not particularly large--.06 on impression development, .10 on composure, .06 on formality, .06 on dominance, .10 on attempted influence, .04 on equality, .10 on receptivity/trust, and .05 on task-social orientation--these time effects were more persistent than the between-conditions effects. These results stand in sharp contrast to the implications of the cues-filtered-out

[8]Main effects for condition based on observers' data were somewhat more frequent than in Ss' scores. They included effects on immediacy/affection (η^2 = .05), similarity/depth (η^2 = .10), composure/relaxation (η^2 = .10), and dominance (η^2 = .007). In each of these cases, though, it was CMC, not FtF, which was rated more favorably (i.e. higher, except less dominance).

perspective, that the communication channels and the number of cues available in each should be the primary--or sole--determinant of relational tone.

While the case for the importance of time effects should not be understated, in most cases the differences between times and conditions were minute compared to the variation between groups within conditions. Significant group within condition effect sizes ranged from .46 to .66; group by time interactions ranged from .40 to .46 in effect size. In contrast, even where the time by condition interaction was significant it accounted for only a .03 effect. While some critics have called for CMC study to take time factors into account, it is apparently another factor--the differences between groups themselves--which may provide an even greater effect in the analysis of group behavior in CMC or elsewhere. Even when between-group effects are not a variable of theoretical interest, their inclusion as a factor in the analysis of group behavior--and in future CMC research--adds an important component in partialling variance. Clearly, in examining how people relate in mediated or live settings, communication condition alone does not deserve pre-eminence among the factors which influence relational communication.

Participant-Observer Differences

In comparing the results of the participants' scores with the observers', there are a number of differences. In several cases significant effects from one set of data did not appear in the other. Although no predictions about the directions of these differences were offered, the differences are neither altogether unexpected. As was acknowledged, J. Burgoon and Newton (in press) found differences between actors' and videotape observers' assessments of the same stimulus conversations on intimacy, composure/relaxation, and equality; conversational participants rated their partners more favorably than did the coders. Street, Mulac, and Wiemann (1988) found a similar effect. Actors rated their partners' conversation higher in communication satisfaction, competence, and aesthetic quality than did audio or audio-video tape observers, who in turn made higher ratings than transcript readers.

Street et al. caution researchers that the more cues available to coders, the greater the similarity with observed and experienced ratings. One might expect, then, that coders for the CMC groups would differ from their participants more than FtF coders from theirs, and that CMC conversations--coded from transcripts--would be rated lower on these dimensions than they were. In the case of this study, however, it was the audio-video coders (for the FtF groups) who had less cues available to observe than did the in actu participants. This is because all the communicative cues (save for the computer terminals) from the CMC conversation--the texts themselves--were reproduced for coding. FtF coders, on the other hand, did not experience the compresence, gaze, and other effects that their participants did. As J. Burgoon and Newton (in press, p. 10) point out,

> By virtue of their role, observers are not exposed to the same levels of stimuli that cause cognitive or affective reactions in subjects. They are therefore less inclined to scan the environment for cues to interpret situations or behavior. As a result, observers often lack situational cues or contextual information necessary to make "accurate" judgments or behavioral interpretations.

CMC coders' stimuli, however, were almost isomorphic with the respective participants'. Accordingly, an analysis of correlations between coders' and actors' ratings showed more frequent significant correlations for the CMC than FtF condition (although the CMC and FtF actor-observer correlations were significantly different only in one case; see Table 4, above).

If one has to choose, the participants should have the final word in judging what it is like to work in CMC for it is among the participants that other effects may accrue. Most previous channel comparisons have employed outside coders' content analysis in support of cues-filtered-out claims. In this and other investigations, when participants' data were used, between-condition effects diminished in magnitude (see, for example, Adkins' [1989] work on perception of self-absorption). However, the results of the coders' work in this study again adds further merit to a temporal approach to CMC study.

Interpretation

The more positive between-conditions ratings for CMC on several dimensions, and the tendency for CMC to improve over time relative to FtF, invite speculation. Especially in the case of task orientation, why did CMC participants act more sociably than their FtF counterparts? Several reasons seem possible.

The first has to do with the nature of the asynchronous environment and interpersonal epistemology development. Participants in asynchronous conferencing used the system at their convenience. They had time to send and probe for interpersonal effects aside from devotion to task completion. They could afford to ask, "What do you think of the Hoopcats last night? Think we'll make the playoffs this year?", as some CMC participants exchanged during this project. On the other hand, FtF communicators who detract from the task may be deviants; they would keep the other members from finishing their obligatory meeting and leave sooner. While FtF participants in this study were prevented from engaging in social chit-chat while they waited for the third member to arrive (for the sake of experimental control), CMC subjects were similarly prevented from engaging in extra-experimental interaction. Yet no groups were prohibited from engaging in off-task interaction during their respective "meetings," and off-task interaction seemed to occur much more frequently in the CMC conferences.

In addition to probing for interpersonal information, asynchronous CMC provided a further opportunity for users, that of enhancing selective self-presentation. Among zero-history CMC participants particularly, one was not bound by the cues to personality others infer from physical appearance or vocalic attributes. They were better able to plan, and had increased opportunity to self-censor. With more time for message construction and less stress of ongoing interaction, users may have taken the opportunity for objective self-awareness, reflection, selection and transmission of preferable cues. If impression management is "putting on one's best face," how much easier when one's less-than-best face need not show?

Another explanation pertains to the potential effect of FtF nonverbal behavior. The possible expression of negative nonverbal relational cues may have lowered FtF ratings. If FtF members do make their meetings more impersonal, this may be conveyed in their nonverbal behavior which, as was pointed out in chapter one, has not been recorded in past studies of CMC/FtF. Again, past studies recorded and transcribed FtF conversations for analysis, and these FtF transcripts were generally rated more relationally positive than CMC transcripts. There is no reason to suspect that FtF participants in the present study were any less verbally positive than those in previous research. But if participants' nonverbal behaviors were less positive than their verbal ones, the effect may have been to transmit mixed messages, and receivers tend to rely inordinately on visual cues in deciphering the affective and relational meanings of mixed messages (see J. Burgoon et al., 1989).

While the visual cue primacy effect may be just as likely to highlight negative or positive cues, there is an additional effect which may pertain: there is a general negativity effect, such that negative information disproportionately influences our first impressions of others (Kellermann, 1984). This latter effect further suggests that if FtF subjects did display negative nonverbal cues, then this information not only detracted from positive assessments, but actually tipped the scale in the opposite direction. As the negativity effect pertains to initial impression formation, it was more likely to affect observers' judgments than participants'. Since observers watched only one meeting, all their impressions were first impressions, while participants got to know each other over time. The presence of these cues in the videotapes observers rated may have led to the lower relational scores for FtF groups. The actor-observer differences in judgments about FtF relational communication are consistent with these explanations. Given that nonverbal behaviors are less closely monitored by senders than is verbal behavior, and that nonverbal expressions are difficult to edit once formed (in contrast to asynchronous CMC messages), negative nonverbal FtF communication may have made a critical difference in the ratings of these groups. More research is needed on the kinds of impressions communicators

form in CMC, and whether negativity abates over time among coders as well as among participants.

Another influence on the unexpected directions of some between conditions effects may have to do with the uncertainty experienced by CMC participants. Given that impressions were formed much more quickly and more strongly among the FtF groups, CMC subjects had little to go on as they undertook their conferencing. This uncertainty about the identity and character of their partners was coupled with a clear anticipation of future interaction. Berger and Roloff (1982) describe several studies in which anticipated future interaction with others caused greater devotion of material and attentional resources in gaining personal information about others. CMC participants may therefore have imbued their messages with more positive relational cues, and sought such cues from their partners.

All things considered, it is possible that CMC members attempted to reduce this uncertainty by overcompensating in the direction of playfulness, affection, and depth. Indeed, one CMC member signed all her messages, "Love, Cara." Another group developed nicknames for each other, and members embellished their "redundant signatures" with large, typed-out graphics. These behaviors became consistent over time, and part of a "relational culture" among CMC participants. As such exaggerations became normative in an otherwise anomic environment among participants, they remained more evident to "fresh" observers, which may explain why observers saw more between-condition differences than did Ss.

This uncertainty reduction explanation is also supported by the patterns for composure. As uncertainty is posited to be arousing, composure should be lower when uncertainty is high. Indeed, the participant data showed a significant increase in composure/relaxation over time, but the means showed that this movement occurred between times one and two. During initial stages of impression management CMC members may have acted composed--influencing observer assessments in that direction--but their own data showed a plateau of composure after the second task. FtF did not resort to such compensations, rating each other moderately

composed all along but most composed at the closure of their participation. This increase in composure/relaxation over time is consistent with the Kiesler et al. (1985) study employing physiological arousal measures, which found decreased arousal after time in CMC.

That CMC exhibited social penetration-type relational patterns may be the result of the over-time effects of uncertainty reduction and selective self-presentation in an asynchronous environment. Uncertainty reduction needs and anticipated future interaction, combined with a convenient time and channel for the presentation of self, allowed participants to approximate the stereotypic ideal of what interpersonal interaction and groups "should" be. In several dimensions, the CMC groups believed that their partners acted in accordance with what "good groups" should do--they increased attempted influence but with less domination, became more immediate, less formal, more receptive and trusting, and more similar and deeper with each other. Ironically, FtF groups were not as "well-behaved" on as many dimensions as did those in CMC. This interpretation is consistent with Lim and Facciola's (1988) finding that participants rated each other as more attractive and credible in the CMC environment than they rated their FtF interactions.

In this research, FtF communication was synchronous and CMC was asynchronous. As this discussion suggests, there are other possible differences between synchronous and asynchronous interactions above and beyond the alternative media which facilitate them. In FtF/synchronous conversation, participants experience "heightened levels of psychic, sensory, and emotional involvement and arousal, increased cognitive load, competing conversational and relational demands, differential salience of context cues, and greater investment in outcomes," according to J. Burgoon and Walther (in press). The nature of asynchronous communication may offer the communicator less stressful conversational demands, allowing increased opportunity and flexibility. In this mode one may plan, contemplate, and edit one's comments more easily than in the more spontaneous, simultaneous mode. As such, asynchronous communication may allow users to be more mindful and deliberative in their message

construction. They may more easily express those ideas and sentiments they truly wish to convey through language. The more they use such systems, the more this may become apparent.

While asynchronous FtF communication is inconceivable, other written or electronically-transmitted communication may be synchronous or asynchronous, and previous research has employed both forms. While CMC research efforts have clearly described the systems they have used, they have not explicitly confined their conclusions to the effects of synchrony versus asynchrony. This issue deserves further attention.

Limitations of the Current Investigation

Several aspects of this experiment raise concerns. The first pertains to the generalizability of student subjects and the tasks employed. It is unclear how the behaviors and evaluations of the participants in this experiment might compare to those who use CMC systems or FtF meetings in other contexts. Much (but not all) of the previous CMC research to which this investigation draws comparisons employed student subjects. The analysis of the groups-within-condition as a random factor also allows generalization of the current findings to other groups from a similar population (see Rosenthal & Rosnow, 1984). In the sense of replication and boundary-specification, then, the nature of the present subject population is of minimal concern. It cannot be said with certainty that the present results transcend the student population, however. In regard to whether the decision tasks employed here generated behavior which might be seen in other CMC environments, a note on the variety of CMC applications is in order. Many organizations' and networks' CMC systems host a variety of discussion types, from job directives to hobbyists' conferences, and CMC is used for leisure as well as work. In this light, the data from the current framework most likely generalize to at least some CMC activities, maybe many. Finally, to the extent that patterns of relational development in groups may transcend this population and task context, the observed patterns should recur elsewhere.

Second, the asynchronous conferencing system used in this study may have affected users differently than would a synchronous CMC facility. Much of the previous research has employed systems in which participants were logged on together, exchanging messages in "real time." Synchronous systems may resemble FtF meetings more than asynchronous CMC. At the same time, the asynchronous system may more closely resemble what real-world users employ. Except for specialized conferencing tools such as Group Decision Support Systems (GDSS), common uses of CMC such as mail, distribution lists, and conferences are asynchronous. Future research may explore whether the patterns found here replicate in the repeated, synchronous environment, if such systems gain broader use.

Finally, message personalization variable deserves comment. This variable showed no predicted effects despite high alpha reliability. This measure was initially developed based on data from spouses, friends, and strangers. In hindsight, it seems that the scale items may have connoted a greater degree of intimacy than should be expected from casually acquainted partners. The failure of the hypotheses might then be a result of a restricted range in the measurement items. A less extreme measure of message personalization might yet demonstrate the predicted effects.

Directions for Future Research

Aside from the employment of synchronous CMC, there are several follow up studies suggested by the results of the current investigation. First, more detailed analysis of how CMC and FtF participants express relational cues in their respective environments should be addressed. By transcribing the existing FtF conversations and rating the transcripts on the relational communication measures, it is possible to partial out the effects of linguistic cues on the respective dimensions. Nonverbal cues may be rated separately, and the net effects of each channel on the changes in relational communication can be determined. This will allow a more detailed analysis of the verbal and nonverbal mechanisms of relational communication in general. The data from these measures may be associated with variations in the relational

dimension levels in such a way that patterns of equivalent messages--verbal from CMC and nonverbal from FtF--can be determined. It will also more definitively address the contention that coding FtF transcripts alone "filters out" more cues than CMC systems do.

On a more practical level, such research may have implications for how to train users to achieve more satisfying relational effects in CMC groups. Whereas much of our day-to-day interactions are habituated and mindless, the position of learning to use a CMC system may be a novel experience. It may be possible that one can un-learn old group communication habits in favor of new, useful ones when one learns CMC. The cognitive transfer of such skills from CMC to FtF contexts is not impossible.

A second area of investigation would explore the effects of anticipated future interaction on relational aspects of CMC. This potentially potent variable was rendered constant in this study. A one-shot study of unacquainted actors in a 2 (condition) by 2 (anticipation/no anticipation) by n (groups within conditions) design may be employed. Significant differences for the anticipation factor might further account for interpersonal effects in mediated and unmediated group discussion.

The relationships of various relational communication effects on several other functional outcomes should be addressed. Inasmuch as decision quality has been a frequent outcome measure of CMC usefulness, this factor may be examined. The existing transcripts and videotapes contain the groups' decisions on all three tasks they addressed, so reanalysis would be hindered only by good criteria for assessing decision quality. How relational dimensions correspond with effective group decision making should be a worthy study. CMC is often described as advantageous because it makes participants more task-oriented and less distracted by socioemotional matters (DeSanctis & Gallupe, 1987; Dennis et al., 1988). That such task orientation occurs is now questionable. Whether it is preferential awaits further testing.

The relational/decisional links may also be explored under conditions where computer-based interventions are used. For instance, a common feature in GDSS is that messages are

anonymous. In the ICOSY system, users' names were automatically attached to their messages. In GDSS such is often not the case. Anonymity may mitigate feelings of personal risk, and this factor has been cited as the mediating effect which leads to significant participation equalization in synchronous conferencing (as compared to face-to-face; Hiltz & Turoff, 1978; see also Kiesler et al., 1984). Anonymity may deter the development of interpersonal impressions and relational development in group CMC by masking just who said what. It is possible that anonymity may hinder uncertainty reduction, especially in larger groups. If so, might participants who anticipate continued interaction strive even harder to get along well and overcompensate further, or might the initial, less personal relational levels persist? Again, how might one or the other effect decisions?

The presence of other decision tools may impact variables of interest. Software programs are in use which guide users through the Delphi Method or Nominal Group Technique, decision trees, summary and analysis of voting distributions and concordances, and other applications, via computer terminals (see Dennis et al., 1988). What might be the effect of the presence of such tools on relational communication? It is possible that when communicators interact through such tools, their cognizance of one another is further diminished by the salience of the technology. Thus where a strong GDSS tool is present, relational communication may vary in as yet unknown ways.

Another outcome worthy of exploration is satisfaction. Satisfaction is a potent predictor of continued use of CMC systems (Kerr & Hiltz, 1982; Rockart & DeLong, 1988), and according to Melone (1990), satisfaction ratings often suffice as the sole measure of computer system effectiveness. How do relational communication variations affect satisfaction? Newton (1988) found that in FtF dyads greater immediacy, similarity, equality, informality, and receptivity were all strongly associated with communication satisfaction. Yet in CMC, it is uncertain whether these effects would be the same. Kiesler et al. (1984) found that as face-to-face communication is replaced by CMC, communication satisfaction (and overall job satisfaction) declines. A recent

study in group conferencing found an inverse relationship between satisfaction and decision quality (Connolly et al., 1990). Whether there is some kind of causal path among relational messages, satisfaction, and decision quality is an interesting issue.

Finally, future research should explore a nonverbal code which has been ignored in relation to CMC. While cues-filtered-out researchers claim that there are no nonverbal cues in CMC, and while this study has made much of the effects of time, nowhere has the nonverbal code known as chronemics been mentioned. Chronemics, according to Burgoon and Saine (1978, p. 99), involves "how we perceive, structure, and react to time and . . . the messages we interpret from such usage." Although this paper has claimed that time may operate differently in CMC than we usually conceive of it, time messages may be the single nonverbal code system operant in CMC.

This ignorance of chronemics in CMC research may be somewhat a result of the sociology of the field. Short, Williams, and Christie's The Social Psychology of Telecommunications (1976) has been the bedrock upon which much CMC-related explanations have been based. In that text, a variety of nonverbal cue systems are reviewed, and findings about their effects are discussed in great detail. Short et al. did not, however, take into account the chronemic code. This omission is unfortunate, since time aspects are also present in other forms of telecommunication (e.g., midnight phone calls). The failure to recognize chronemics by subsequent CMC researchers--perhaps less aware of nonverbal communication research--and the generalization that there are no nonverbal cues in CMC, may be a byproduct of this initial oversight.

There are a variety of ways in which chronemic cues may function as relational messages in CMC, especially in asynchronous conferencing. The slowness or rapidness with which one responds to another's messages, for example, or the frequency and duration (length) of one's entries may be powerful relational cues of receptivity, formality, immediacy, etc. To find that a message was written at one a.m. may connote a different sense of affection or urgency

than a business-hours message, depending on other aspects of the content; in most CMC systems, the time a message was sent is automatically attached to that message, as was the case in ICOSY. How people use their time may be another aspect of chronemics; when one CMC participant in this project stated that he had just called his fiancee to postpone dinner in order to log on right away, it seems that he sent a message to his group about their esteem and his involvement with them.

Chronemics provides a malleable and often not-so-subtle nonverbal code system which is not filtered out from CMC, contrary to claims by social presence and lack of social context cues theorists. If we are to consider the effects of time in understanding CMC behavior, as we apparently must, than future research should attend to the systematic usage and interpretation of time-bound cues in addition to time's mere passing.

Conclusion

The contribution of the current research is that it provides important parameters to accepted maxims about the effects of the new medium and. The theoretical underpinnings used in predicting the trends and relationships among groups were admittedly an amalgam of several treatises in interpersonal communication; no alternative grand theory of CMC was proposed or tested. In the absence of such a grand theory, these various perspectives offered a useful approach to testing the boundaries of the dominant theoretical position regarding CMC effects--the cues-filtered-out perspective. Propositions from uncertainty reduction, interpersonal epistemology, and social penetration theories, and precepts from the study of impression formation and relational communication--each offered challenges to the static view of interpersonal interaction suggested by previous CMC research. This approach did account for significant variation in group behavior beyond the effects of the communication channel. All things considered, the effects of the medium alone were negligible in light of effects of group membership, time, and the interactions of these factors.

APPENDIX 1. RECRUITING ANNOUNCEMENTS FOR SUBJECTS, MIS CLASSES

A valuable opportunity to learn about communication with and without new technology is being pursued this semester, with your participation. The project should be interesting and enjoyable, and will contribute to knowledge about the effects of computer applications.

As partial satisfaction of the requirements for this course, you will be participating outside of class, in small groups of 3, for discussions on topics related to the course. You will be randomly assigned to meet through one of two discussion formats: face-to-face or via computer conference.

Those of you meeting face-to-face will attend three meetings of up to two hours each, in a location to be announced. After each meeting you will complete several questionnaires.

Computer conferencing groups will be trained in the use of the conferencing system, then each member will enter the conference individually to address the same discussion topics as the face-to-face groups will address over a period of nine weeks. After each topic is concluded, you will be sent questionnaires to fill out and return. Since conferencing participants may work at their convenience and for shorter periods at a time, they are expected to spend more time on the projects--at least several entries each week.

Since the nature of group work depends on the participation and commitment of several people, you are encouraged to participate actively in these groups. Absenteeism from face-to-face meetings, or lack of participation in conferencing groups, will be monitored and will affect your evaluation in this course. The quality, as well as quantity, of your participation, will be graded; the decisions your group reaches on each of the discussion problems will be a part of your grade in this class.

Every effort is being made to accommodate students' scheduling needs. In order to do this, please furnish all information needed on the accompanying sheet.

APPENDIX 2. RECRUITING ANNOUNCEMENTS FOR SUBJECTS, COMM CLASSES

A valuable opportunity to learn about communication with and without new technology is being pursued this semester, with your participation. An opportunity is available for Communication 103 students to take part in a special project with students from other majors a way to fulfill the group project requirement for this course.

As partial satisfaction of the requirements for this course, you will be participating outside of class, in small groups of 3, for discussions on topics related to the course. You will be randomly assigned to meet through one of two discussion formats: face-to-face or via computer conference.

Those of you meeting face-to-face will attend three meetings of up to two hours each, in a location to be announced. After each meeting you will complete several questionnaires. At the end of all sessions, these participants will participate in one additional meeting using a simple group meeting computer system. Your class group will then write a response paper discussing your experiences.

Computer conferencing groups will be trained in the use of the conferencing system, then each member will enter the conference individually to address the same discussion topics as the face-to-face groups will address over a period of nine weeks. After each topic is concluded, you will be sent questionnaires to fill out and return. Since conferencing participants may work at their convenience and for shorter periods at a time, they are expected to spend more time on the projects--at least several entries each week. At the end of the project period, your class group will write a response paper discussing your experience.

This project is not for just anyone. We are looking for highly motivated students with initiative and persistence, who will commit to this project for six to eight weeks.

Since the nature of group work depends on the participation and commitment of several people, you are encouraged to participate actively in these groups. Absenteeism from face-to-face meetings, or lack of participation in conferencing groups, will be monitored and will affect your evaluation in this course. The quality, as well as quantity, of your participation, will be graded; the decisions your group reaches on each of the discussion problems will be a part of your grade in this class. Should you be assigned to the computer conference, be advised that NO PREVIOUS EXPERIENCE WITH COMPUTERS OF ANY KIND IS REQUIRED FOR SUCCESSFUL PARTICIPATION IN THIS PROJECT. The conferencing system is not difficult to learn, and assistance will be available as the project continues.

Every effort is being made to accommodate students' scheduling needs. If you wish to participate, please furnish all information needed on the accompanying sheet.

APPENDIX 3. INTRODUCTORY ICOSY NOTICE

Welcome to ICoSy, and thank you for your help in this project. Before we go any further, please note the following information: During the course of this project, you will be given three tasks on which to work, for two weeks apiece. Each will be a group decision making exercise. You will get more information about each of these activities at appropriate times.

At the end of each task, you are to signify within the conference that you have reached your final decision, and what that decision is. Prior to completing the tasks, you will be given a survey packet to open and complete at the time the tasks are done, to turn in during the next class meeting. These responses will be confidential, and not part of the conference record.

You will receive notification, ELECTRONICALLY, about all the aforementioned events. It is therefore vital that you "log on" quite regularly.

You have been assigned to groups with 2 other people whom you do not know. You are expected NOT to try to contact them. Avoid discussing the conference matters with these people should you make their acquaintance. You should expect that you will NOT meet these people face-to-face, and you must not attempt to do so.

It is important that we abide by the ground rules that have been established for these conferences. In consideration of our being allowed to conduct this project, we have been asked not to use the system for any purpose other than the conferences we've established. It is extremely important that you do not stray from the features you will have been trained to use. Violations of this imperative will be investigated, and violators will be removed from the conference and face a loss of class credit for project participation.

At the end of the project, all ICoSy records will be downloaded into transcript form for analysis and comparison between computer groups, face-to-face groups, and prior findings. Any preliminary findings will be discussed in class as time permits. NOTICE: All comments you make in the ICoSy system are subject to storage, retrieval, and analysis for purposes of research.

APPENDIX 4. ICOSY REMINDER NOTICE

Notice

Your deadline for the TOPIC1 decision is February 15, 11:59 pm. After your last interaction on that task, you are to open the survey packet and complete the enclosed questionnaire. Bring the completed survey packet to your next class meeting.

Your second task is ready. It is located under a separate topic, the name of which is TASK2. After you JOIN C--, type TASK2 to read and enter messages for the second discussion. Please be careful about which topic you are in; if you leave messages in INSTRUCTIONS or TOPIC1, your colleagues may not find them. If you find yourself in the wrong topic area, simply type JOIN and your conference number again, and you will be prompted to select the topic you want.

During the course of your second task, another survey packet will be delivered to you in your class. Please keep it until your group finishes TASK2. At that time, open it, complete it, and return it to class. For some of you, several of the questions may be similar; please answer all questions at that time, regardless. The second deadline and discussion topic will be announced in TASK2.

APPENDIX 5. ICOSY INSTRUCTIONS AND TASKS

Instructions

You will be addressing several tasks over the next few weeks. Each task will be located in this conference, under different "topics." When you enter your account and attempt to join this conference, you will be asked to choose which topic you wish to address. Type in the name of the topic you are working on, and then proceed to read and write messages. If you do not select the appropriate topic/task, your messages may be stored in the wrong topic area, where your colleagues may not look for them.

Please begin topicA now. (You may need to repeat the JOIN command in order to access the next topic.)

APPENDIX 5, continued.

Task 1

Low cost computing and information technologies are becoming common and widely-used features in industry, the professions, and in education. To date, several major universities have required that all incoming students own or acquire their own personal computers, regardless of their academic major or level. These computers are able to link them into the university's main systems, to facilitate registration, library information, course materials, communication, design drafting packages, word-processing, and other on-line services.

The University of Arizona does not currently require individual computer ownership, although more and more of its systems and functions are becoming computerized. Some in the University community have called for student adoption of the personal computer requirement for students. Others oppose such a requirement, acknowledging that computer literacy is advantageous, but an individual decision. Middle-ground arguments include requiring that only students in certain majors be made to follow this demand.

Your task is to develop and present a recommendation to the faculty senate regarding the personal computer requirement. Consider all possible advantages and disadvantages, who will be affected, and time frames, if appropriate. Your final answer should take the form of approximately a one-page policy proposal giving your position on adoption, positive and negative impacts of your decision, and justification for your choice.

FINAL ANSWER must be a group decision, and must be clearly indicated in the conference as your group's final decision.

DEADLINE: FEBRUARY 15, 11:59 p.m.

When you finish your task, please open the survey packet and fill out the enclosed questionnaire right away. Bring the completed questionnaire to your next class meeting, where it will be collected. You must bring the survey to the next class meeting to receive full credit.

APPENDIX 5, continued.

Task 2

One persistent problem in hiring and evaluating university faculty is finding candidates adept in research, instructional skills, and with enough real-world business experience to impart to their students. In many cases an individual excels in one area, but falls short in another. One remedial strategy is for a department to hire a variety of faculty members whose strengths are complementary to one another. However, this approach may be a mediocre compromise which also creates a fragmented faculty. Alternatively, a department could hire all its faculty from within a single category of expertise, creating a strong specialty and reputation for the one thing it does best. This approach, too, may be flawed; students' breadth of exposure may be limited in such a place.

You have been asked to serve as student delegates to a university committee on hiring for the 1990s. Considering the University of Arizona's strong research mission, its ties to Arizona business, and the continued call for emphasis on quality education, what practical strategies should the university adopt in recruiting and hiring new faculty? Your final answer should take the form of approximately a one-page policy proposal giving your position and recommendations.

FINAL ANSWER must be a group decision, and must be clearly indicated in the conference as your group's final decision.

DEADLINE: FEBRUARY 15, 11:59 p.m.

When you finish your task, please open the survey packet and fill out the enclosed questionnaire right away. Bring the completed questionnaire to your next class meeting, where it will be collected. You must bring the survey to the next class meeting to receive full credit.

APPENDIX 5, continued.

Task 3

New personal computer software programs have become available to help users in their writing. More than advanced word-processors, some programs not only provide on-line thesaurus and spelling checkers, but also guide writers in sentence and paragraph construction. Some will indicate when writers have used poor grammar, ambiguous or less direct verbal constructions, or other writing problems. The programs offer alternate constructions which can automatically be plugged in to the writer's text. These programs do not necessarily TEACH better writing; they are simply electronic checkers.

While such programs could assist in the preparation of students' compositions, they may simultaneously inhibit the development of students' own writing skills. That is, students may become dependent upon such programs, and never learn the rules of effective writing for themselves. The University Composition Board and other educators are concerned about such "de-skilling." Others argue that if the technology exists, it should be used. Since people can use these systems in their real-world jobs, why shouldn't they use them as they prepare for their professions? Some have even said that students should be allowed to use computers with such programs when they take their writing proficiency examinations.

One faction would like a policy that defines use of such systems in student writing as plagiarism, and to prohibit the use of these programs on University computers. Others want the University to invest heavily in these programs, and to install them on all University computers as quickly as possible. Your task is to evaluate all possible advantages and disadvantages of both positions, and to recommend an effective policy on writing- assistance software on campus.

Your final answer should take the form of approximately a one- page policy proposal giving your position and recommendations.
FINAL ANSWER must be a group decision, and must be clearly indicated in the conference as your group's final decision.

DEADLINE: FEBRUARY 15, 11:59 p.m.

When you finish your task, please open the survey packet and fill out the enclosed questionnaire right away. Bring the completed questionnaire to your next class meeting, where it will be collected. You must bring the survey to the next class meeting to receive full credit.

You will be graded based on the FREQUENCY of your participation and the QUALITY of your group's answer.

APPENDIX 6. INSTRUCTIONS TO UNITIZING CODERS

Unitizing

Definition

Message unit: A phrase which contains a complete thought or action. The phrase includes a subject-predicate combination, i.e., "So what do you guys think about this hurricane deal?," or, "It's really great to be meeting you all, whoever you are."

Punctuation may be misleading; one "sentence" (which starts with a capital and ends with a period) may contain within it more than one message unit, e.g. "Although our assignment is to list these things in order of importance, I would only do the first option; that is fill up my car with gas and drive as far away as possible." Phrases which are separated by punctuation but do not convey a complete thought (as was shown in the previous example) should be included in the preceding message unit. If a concise message unit is contained in a single word it will be considered a message unit (for example, "Hi").

Instructions: Coding is done for one subject per session.

Video: The position the subject is in should be circled on the coding sheet. The minutes marked on the form are to be used as a guideline for the counting of message units. You may find it easy to make "chicken scratches" as you go, then sum them and write them as a numeral later. You made need to rewind the tapes often to count the message units.

Transcripts: When using the transcripts you are to unitize only one participant's messages at one sitting. Code line by line, counting the units (you may mark on the transcripts). Write the total on the coding form along with message number.

APPENDIX 7. IMPRESSION DEVELOPMENT MEASURE

Following are a number of statements about the interchange which you just completed. You are to rate only "Person A," the one person who matches this description:

_____

Please evaluate this member of your group on the qualities listed below. Be as honest as possible; no one else in your group will ever see this form. For each member, on each characteristic, circle a 1 if you STRONGLY AGREE that the characteristic describes that person; circle a 2 if you AGREE SOMEWHAT; circle a 3 if you DISAGREE SOMEWHAT, or circle a 1 if you STRONGLY DISAGREE that the quality describes that person; or you may circle DK to indicate that you DON'T KNOW.

This person is...	STRONGLY AGREE	AGREE SOMEWHAT	DISAGREE SOMEWHAT	STRONGLY DISAGREE	DON'T KNOW
Honest	1	2	3	4	DK
Unintelligent	1	2	3	4	DK
Lazy	1	2	3	4	DK
Sociable	1	2	3	4	DK
Interesting	1	2	3	4	DK
Unpersuasive	1	2	3	4	DK
Unfriendly	1	2	3	4	DK
Aggressive	1	2	3	4	DK
Romantic	1	2	3	4	DK
Conservative	1	2	3	4	DK
Easygoing	1	2	3	4	DK
Serious Minded	1	2	3	4	DK
Compulsive	1	2	3	4	DK
Religious	1	2	3	4	DK

APPENDIX 8. MESSAGE PERSONALIZATION INSTRUMENT

The following statements pertain to your impressions of the entire group of three. Using the same 1 to 5, **STRONGLY AGREE** to **STRONGLY DISAGREE** scale, circle the number which best reflects your level of agreement with each item, below.

	SD	D	N	A	SA
1. We tell each other personal things about ourselves--things we don't tell most people.	1	2	3	4	5
2. We share secrets with one another.	1	2	3	4	5
3. We could communicate the same ideas with facial expressions or gestures instead of words.	1	2	3	4	5
4. We can tell each other when we like or do not like the way the other has behaved.	1	2	3	4	5
5. We communicate our pleasure and displeasure with each other in many different ways.	1	2	3	4	5
6. We can tell when one another is upset or frustrated without being told.	1	2	3	4	5
7. We use words which have "special meanings" to just the three of us.	1	2	3	4	5
8. We share with each other important feelings we have.	1	2	3	4	5

APPENDIX 9. RELATIONAL COMMUNICATION QUESTIONNAIRE

For each item below, use a 1 to 5 scale to indicate whether you agree with the statement or not. That is, you will answer 1, 2, 3, 4, or 5. A 5 means you **STRONGLY AGREE**, a 4 means you **AGREE**, a 3 means you are **NEUTRAL** or unsure, a 2 means you **DISAGREE**, and a 1 means you **STRONGLY DISAGREE**. You are still describing the same person, "Person A."

		SD	D	N	A	SA
1.	Person A was intensely involved in the conversation.	1	2	3	4	5
2.	A was attracted to the other participants.	1	2	3	4	5
3.	A was interested in talking with the other participants.	1	2	3	4	5
4.	A seemed to find the conversation with the other participants stimulating.	1	2	3	4	5
5.	A was detached during the conversation with the other participants.	1	2	3	4	5
6.	A communicated coldness rather than warmth.	1	2	3	4	5
7.	A acted bored by the conversation.	1	2	3	4	5
8.	A created a sense of distance between him/herself and the other participants.	1	2	3	4	5
9.	A showed enthusiasm while talking with the other participants.	1	2	3	4	5
10.	A was slow to respond to the other participants' comments.	1	2	3	4	5
11.	The other participants were probably distracted by A's behavior.	1	2	3	4	5
12.	A disliked the other participants.	1	2	3	4	5
13.	A showed affection for the other participants.	1	2	3	4	5
14.	A was interested in what the other participants had to say.	1	2	3	4	5
15.	A didn't care what the other participants think.	1	2	3	4	5
16.	A was trying to establish common ground with the other participants.	1	2	3	4	5
17.	A wanted to keep the relationship at an impersonal level.	1	2	3	4	5
18.	A made the other participants feel they were similar.	1	2	3	4	5
19.	A made the conversation seem superficial.	1	2	3	4	5
20.	A seemed to desire further communication with the other participants.	1	2	3	4	5
21.	A tried to move the conversation to a deeper level.	1	2	3	4	5
22.	A seemed to care if the other participants liked him/her.	1	2	3	4	5
23.	A indicated no desire for further conversation with the other participants.	1	2	3	4	5
24.	A's behavior indicated A wants a closer relationship with the other participants.	1	2	3	4	5

APPENDIX 9, continued

25.	A acted like all the participants are good friends.	1	2	3	4	5
26.	A wanted the other participants to trust him/her.	1	2	3	4	5
27.	A seemed willing to listen to the other participants.	1	2	3	4	5
28.	A was sincere in communicating with the other participants.	1	2	3	4	5
29.	A tried to establish rapport with the other participants.	1	2	3	4	5
30.	A wanted to appear reasonable to the other participants.	1	2	3	4	5
31.	A seemed open to the other participants' questions.	1	2	3	4	5
32.	A seemed honest in communicating with the other participants.	1	2	3	4	5
33.	A was unwilling to listen to the other participants.	1	2	3	4	5
34.	A was calm and poised with the other participants.	1	2	3	4	5
35.	A appeared comfortable interacting with the other participants.	1	2	3	4	5
36.	A seemed very tense talking to the other participants.	1	2	3	4	5
37.	A felt very relaxed talking with the other participants.	1	2	3	4	5
38.	A seemed irritated with the other participants.	1	2	3	4	5
39.	A seemed nervous in the other participants' presence.	1	2	3	4	5
40.	A was frustrated with the other participants.	1	2	3	4	5
41.	A was very reserved with the other participants.	1	2	3	4	5
42.	A made the interaction very formal.	1	2	3	4	5
43.	A was taking a casual approach to the conversation.	1	2	3	4	5
44.	A wanted the discussion to be informal.	1	2	3	4	5
45.	A wanted to keep the conversation very businesslike.	1	2	3	4	5
46.	A tried to make the conversation informal.	1	2	3	4	5
47.	A was dominating the conversation.	1	2	3	4	5
48.	A didn't attempt to influence the other participants.	1	2	3	4	5
49.	A had the upper hand in the conversation.	1	2	3	4	5
50.	A tried to control the interaction.	1	2	3	4	5
51.	A didn't try to win the other participants' favor.	1	2	3	4	5
52.	A was assertive with the other participants.	1	2	3	4	5
53.	A attempted to persuade the other participants.	1	2	3	4	5
54.	A tried to gain the other participants' approval.	1	2	3	4	5
55.	A acted like A is more powerful than the other participants.	1	2	3	4	5

APPENDIX 9, continued

56.	A seemed to have higher status than the other participants.	1	2	3	4	5
57.	A is in control of the relationship.	1	2	3	4	5
58.	A didn't treat the other participants as an equal.	1	2	3	4	5
59.	A wanted to cooperate with the other participants.	1	2	3	4	5
60.	A considered the other participants his/her equal.	1	2	3	4	5
61.	A wanted to stick to the main purpose of the interaction.	1	2	3	4	5
62.	A was more interested in a social conversation than the task at hand.	1	2	3	4	5
63.	A was very work-oriented.	1	2	3	4	5
64.	A was more interested in the task than having a social conversation.	1	2	3	4	5

APPENDIX 10. ROTATED FACTOR STRUCTURE, MEANS, STANDARD DEVIATIONS, AND FACTOR LOADINGS FOR RELATIONAL COMMUNICATION ITEMS

Factors and Items	Mean*	SD	I	II	III	IV	V	VI	VII
*based on a scale from 1 (strongly agree) to 5 (strongly disagree).									
I. IMMEDIACY/AFFECTION and SIMILARITY/DEPTH									
A acted bored by the conversation.	3.45645	1.14339	.74213	.10677	.12862	.24409	.06947	.16534	.23913
A communicated coldness rather than warmth.	3.58681	1.10405	.68474	-.02978	.17974	.26943	-.17924	.08928	.12932
A was interested in talking with the other participants.	3.50000	1.10432	.64999	.18702	.28917	.26961	.01392	.01449	.20150
A created a sense of distance between him/herself and the other participants.	3.30556	1.21991	.64856	.02919	.13435	.30608	-.11301	.01009	.24265
A indicated no desire for further conversation with the other participants.	2.87153	1.12965	-.64594	-.10925	-.19469	-.02857	.11868	.13279	-.08931
A seemed to desire further communication with the other participants.	2.77083	1.16103	.64569	.20319	.21530	-.04272	-.16775	-.14235	.01145
A seemed to find the conversation with the other participants stimulating.	3.04514	1.10497	.60968	.20802	.22083	.22966	.08684	-.08818	.23729
A showed enthusiasm while talking with the other participants.	3.10764	1.18889	.59139	.27081	.13091	.22543	-.09353	-.08155	.31453
A was detached during the conversation with the other participants.	3.37063	1.225	.57704	.10355	-.00736	.41350	.00501	.12235	.22552
A didn't care what the other participants think.	3.79167	.98331	.57496	-.08090	.43997	.17798	.07666	.11459	.02780
A was interested in what the other participants had to say.	3.60764	.96030	.54631	.06481	.47331	.23817	.06277	.13255	.11681

APPENDIX 10, continued.

A's behavior indicated A wants a closer relationship with the other participants.	2.34843	.85775	.54255	.17301	.18887	-.07166	-.01775	-.45288	.01744
Person A was intensely involved in the conversation.	3.18118	1.34421	.51536	.44497	.18059	.21988	.04606	.20468	.31295
A wanted to keep the relationship at an impersonal level.	2.89236	1.03200	.51375	.10282	.17397	.05460	-.22179	-.19537	-.14802
A disliked the other participants.	3.93728	.82401	.48868	-.15431	.22959	.40765	-.09273	-.00441	-.06499
A acted like all the participants are good friends.	2.64808	1.05503	.48732	.18999	.17300	.16094	-.18478	-.43434	.08578
A tried to move the conversation to a deeper level.	2.40278	1.06787	.47116	.40842	.22899	-.05280	.06031	-.13065	.17136
A made the conversation seem superficial.	3.53125	.98015	.46888	-.02693	.20973	.11911	-.14232	.37202	.02029
A was slow to respond to the other participants' comments.	3.21603	1.22774	.46597	.35659	.20512	.34369	-.00556	.09752	.19863
A seemed to care if the other participants liked him/her.	2.83333	1.00867	.46557	.01491	.30234	-.08172	-.01987	-.43646	.21682
A considered the other participants his/her equal.	3.57491	.89548	.43774	-.18037	.37735	.34221	-.15237	-.05941	.02224
A was attracted to the other participants.	2.87762	.95311	.42337	.22596	.19534	.18618	.11520	-.26547	.13881
A was trying to establish common ground with the other participants.	3.37282	1.07410	.40604	.11855	.40071	.15214	-.13533	-.07931	.28960
II. DOMINANCE									
A is in control of the relationship.	2.21951	1.00377	.09537	.82840	-.00916	.04768	-.03460	.01854	.04993

APPENDIX 10, continued.

A had the upper hand in the conversation.	2.24739	1.07138	.18449	.80703	.03804	.12437	.02909	.03057	.08446
A acted like A is more powerful than the other participants.	2.15679	1.06569	-.03044	.80364	-.26285	-.01187	.14054	.03116	.10544
A seemed to have higher status than the other participants.	2.23693	1.07860	.05500	.79949	-.06279	.05362	.03819	.06924	.03668
A was dominating the conversation.	2.22300	1.14723	.20990	.79279	.03465	.14984	.00197	.01677	.09003
A tried to control the interaction.	2.24825	1.03151	.12425	.76388	-.04746	-.02049	.08100	.00826	.22377
A was assertive with the other participants.	2.90526	1.12067	.19581	.56631	.11319	.15313	.12989	.20027	.32626
III. RECEPTIVITY/TRUST									
A seemed willing to listen to the other participants.	3.92334	.81003	.27966	-.14978	.69491	-.00263	-.09881	.11947	-.08753
A wanted to appear reasonable to the other participants.	3.80208	.77801	.14235	.02192	.63224	.09636	.11137	-.03894	.28211
A was sincere in communicating with the other participants.	3.75347	.88246	.29297	.16169	.59609	.20162	-.05453	.09514	.08462
A wanted to cooperate with the other participants.	3.89860	.83491	.25637	-.22836	.58192	.09591	-.07128	.08891	.18277
A seemed open to the other participants' questions.	3.65157	.90519	.28872	-.05376	.56968	.26320	-.05632	.01848	.12441
A seemed honest in communicating with the other participants.	3.96528	.71239	.07702	.08974	.51139	.21352	-.09967	.05226	-.00397
A tried to establish rapport with the other participants.	3.26736	1.0128	.42561	.19400	.50317	.19564	-.11613	-.14631	.19770
A wanted the other participants to trust him/her.	3.39583	.81978	.31057	.16380	.45991	.07109	-.02926	-.16365	.27477

APPENDIX 10, continued.

A was unwilling to listen to the other participants.	3.90625	.95631	.12609	-.17601	.42700	.18092	-.14318	.12116	-.04710
A didn't treat the other participants as equals.	3.74216	.93503	.40705	-.29337	.41832	.26938	-.13988	.04542	-.17761
A made the other participants feel they were similar.	3.15972	.97110	.25543	.05829	.37088	.15892	-.17042	-.18238	.23501
The other participants were probably distracted by A's behavior.	3.76389	1.07869	.29979	-.18647	.34643	.27727	.16954	.31291	-.07723
IV. COMPOSURE/AROUSAL									
A seemed very tense talking to the other participants.	3.65157	1.07418	.21782	.13517	.20285	.77778	-.08916	-.06620	.09918
A felt very relaxed talking with the other participants.	3.40625	1.07792	.28816	.18563	.11534	.74897	-.14739	-.15080	.15243
A seemed nervous in the other participants' presence.	3.58188	1.08172	.25854	.21221	.10289	.74432	-.05728	-.03864	.16718
A appeared comfortable interacting with the other participants.	3.56597	1.01684	.26061	.26783	.20959	.73878	-.09262	-.07701	.16677
A was calm and poised with the other participants.	3.67832	.86835	-.05636	.16048	.25614	.56532	-.02723	.07543	.00787
A was frustrated with the other participants.	3.85764	.93549	.21286	-.29397	.14365	.55919	-.14097	.06552	-.06407
A seemed irritated with the other participants.	3.84375	.92199	.20359	-.28455	.31244	.51872	-.16140	.05253	-.02577
V. FORMALITY									
A wanted the discussion to be informal.	2.65263	.97818	-.01707	.02155	-.08748	-.07663	.79463	.15155	-.03484
A made the interaction very formal.	2.52083	1.07210	-.15520	.16373	-.01972	-.14002	.76676	.08809	-.04166

APPENDIX 10, continued.

A wanted to keep the conversation very businesslike.	2.57639	1.07606	-.16229	.21324	-.02995	-.07386	.76104	.11847	.10618
A tried to make the conversation informal.	2.77273	1.02278	-.08424	-.07359	-.11726	-.08101	.74608	.20965	-.18449
A was taking a casual approach to the conversation.	2.60764	1.01670	.01732	.00681	-.13877	-.10944	.71329	.12251	.01188
VI. TASK-SOCIAL ORIENTATION									
A was more interested in a social conversation than the task at hand.	3.79720	1.03970	-.08885	.10627	.12764	-.05429	.24202	.72162	-.00013
A was more interested in the task than having a social conversation.	3.43554	1.10519	.05247	.17741	.17546	-.07992	.19277	.69180	.04106
A wanted to stick to the main purpose of the interaction.	3.62718	.96472	-.03033	.15646	.05606	.04871	.36121	.64424	.09016
A was very work-oriented.	3.23693	1.07212	.10932	.36108	.19391	.01526	.34137	.58547	.19806
A showed affection for the other participants.	2.67014	.93269	.40717	.22243	.26523	.06180	.03305	-.46656	.10889
VII. ATTEMPTED INFLUENCE									
A didn't try to win the other participants' favor.	2.97213	1.03892	.19041	.12385	.08605	.10105	-.03947	-.01204	.67548
A attempted to persuade the other participants.	2.85366	1.13520	.17106	.40596	.15557	.10013	.05653	.14879	.66483
A didn't attempt to influence the other participants.	3.06316	1.16101	.18694	.29036	-.01598	.10385	-.03175	.26562	.64886
A tried to gain the other participants' approval.	3.21254	.98779	.16011	.09306	.34576	-.01319	-.02482	-.19124	.64722
A was very reserved with the other participants.	3.15278	1.12507	.25904	.14394	.00189	.31621	-.24161	-.09615	.36567
CUMULATIVE PERCENT OF VARIANCE ACCOUNTED FOR BY EACH FACTOR:			26.8	37.9	44.9	49.3	52.4	55.0	57.4

APPENDIX 11. CODER INSTRUCTIONS

Group ID: _____ Meeting #: 1 2 3 Task: 1 2 3

GROUP DISCUSSION QUESTIONNAIRE

INSTRUCTIONS:
You are about to observe some group interactions. For each of the persons you observe, there is a questionnaire about his/her behavior for you to complete. You will make three passes through the interaction data, in order to evaluate each of the three members.

Video: You are to watch and listen to the tape for a specified 10-minute interval. Your survey form will indicate which member you are to observe. Pay attention to that person's nonverbal behavior (body movement, voice, etc.) as well as to what that person says and the way they say things. When you have finished the observation, stop the video player and fill out the survey for person A. When you have completed the survey, rewind to the beginning point, then observe person B. Fill out the second survey after 10 minutes. Then repeat for person C.

Transcripts: You are to read the transcripts of the group's conversations. Your survey form will indicate which member you are to observe, and their comments are highlighted in the transcript. Pay attention to that person's comments, as well as to the way they say things. When you have finished reading the transcripts, fill out the survey for person A. When you have completed the survey, re-read the transcripts, paying attention to person B. Fill out the second survey after re-reading the transcripts. Then repeat for person C.

At the end, please fill out the credit slip so that you will receive class credit for your participation in this project.

Please respond to <u>all</u> items in the following questionnaires.
Thank you.

APPENDIX 12. RESULTS OF HYPOTHESIS TESTS

Impression Development	by Subjects	by Observers
H1: greater impression development at time 3 than at time 1 in CMC	supported	Not tested
H2: a condition by time interaction	supported; also time and condition main effects	
(H2a) time 1 impressions more developed in FtF than CMC	supported	
(H2b) plateau-type increase in impression development in FtF, linear increase in impression development in CMC to similar level	mixed: mutual trend significant, but post hocs revealed no change in FtF	
Message Personalization		
H3: greater message personalization at time 3 than at time 1 in CMC.	n.s.	Not tested
H4: condition by time interaction	n.s.	
(H4a) time 1 personalization greater among FtF than CMC groups	no	
(H4b) a linear trend in both conditions toward a similarly greater level of personalization	n.s.	
Immediacy/Affection		
H5: greater immediacy/affection at time 3 than time 1 in CMC.	n.s.	not apparent
H6: a condition by time interaction	$p = .025$ (n.s.)	main effects for condition and time
(H6a) time 1 immediacy/affection greater in FtF than in CMC	n.s.	no; CMC higher than FtF across times
(H6b) increase in immediacy/affection in both conditions to similar level	supported	no; both conditions were not higher at time 3
Similarity/Depth		
H7: greater similarity/depth at time 3 than time 1 in CMC	supported	not apparent condition main effect
H8: linear increase in both conditions to similar level	supported	no; CMC higher than FtF

APPENDIX 12, continued

Composure/Relaxation		
H9: greater composure/relaxation at time 3 than time 1 in CMC	supported	n.s.
H10: a condition by time interaction	n.s.; time main effect	supported; condition main effect
(H10a) time 1 composure/relaxation greater in FtF than in CMC	n.s.	no; CMC higher across times
(H10b) increase in composure/relaxation in both conditions to similar level	supported	a split occurred; CMC went up while FtF significantly declined
Formality		
H11: lower formality at time 3 than time 1 in CMC	n.s.	supported
H12: a condition by time interaction	n.s.; time main effect	$p = .053$ (n.s.)
(H12a) time 1 formality greater in CMC than FtF	n.s.	n.s.
(H12b) decrease in formality in both conditions to similar level	supported	no; split occurred, with CMC demonstrating trend but not FtF
Dominance		
H13: lower dominance at time 3 than time 1 in CMC	supported	n.s.
H14: a condition by time interaction	n.s.; time main effect	near-significant condition main effect
(H14a) time 1 dominance higher in CMC than FtF	n.s.	supported
(H14b) FtF has inverted-U trend; CMC declines and crosses FtF lower than time 1	supported; convergence at times 1 and 3	no trends but similar levels
Attempted Influence		
Not hypothesized	time main effect	no effects
	significant linear increase in both conditions over time	
Equality		
indirectly hypothesized as converse of dominance	time main effect	near-significant time main effect

APPENDIX 12, continued

Receptivity/Trust		
H15: greater receptivity/ trust at time 3 than time 1 in CMC	supported	not apparent
H16: a condition by time interaction	supported; time main effect	time main effect
(H16a) time 1 receptivity/ trust greater in FtF than in CMC	n.s.	n.s.
(H16b) increase in receptivity/trust in both conditions to similar level	supported	not apparent: scores declined
Task-Social Orientation		
H17: lower task orientation in time 3 than time 1 in CMC	supported	supported
H18: a condition by time interaction	n.s.; time main effect, condition main effect	ordinal interaction with condition main effect
(H18a) time 1 task orientation greater in CMC than FtF	no; overall, CMC less task oriented	no; overall, CMC less task oriented
(H18b) decrease in task orientation both conditions to similar level	trend supported but no convergence; overall parallel, decreasing scores	CMC showed significant decline

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