

UNWRAPPING PRESENCE:
CREATING SOCIAL PRESENCE AND ENHANCING PERCEIVED QUALITY OF
COMPUTER-MEDIATED AD HOC TEAM DISCUSSIONS

A Master's Thesis

Presented to

The Faculty of the Jack J. Valenti School of Communication

University of Houston

In Partial Fulfillment

of the requirements for the degree of

Master of Arts

By

Keith K. Nickerson

May, 2012

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Abstract

The present study extends social presence research by exploring a practical technique to augment social presence and quality of interaction in computer-mediated ad hoc team communication. Undergraduate participants, $n=118$, were assigned to one of three experimental conditions designed to manipulate their feeling of “connectedness” with their communication partners. Participants had either face-to-face (FTF) social interaction prior to a computer-mediated communication (CMC)-based consensus-making task, CMC-based social interaction prior to the task, or no social interaction prior to the task. The study found that both FTF and CMC-based social interaction prior to a computer-mediated task significantly increased users’ perceptions of both social presence and quality of interaction relative to having no prior social interaction. The study also found strong correlation between social presence and quality of interaction. Highlighted by these findings is the practical recommendation that managers and educators provide opportunities, however brief and in either FTF or CMC-based settings, for group members to interact socially before engaging in task-oriented computer-mediated exchanges.

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CHAPTER I: INTRODUCTION

As computer-mediated communication (CMC) has proliferated in business and educational settings, so has research exploring its particular strengths and limitations compared to face-to-face (FTF) communication. In an early assessment of CMC, Kiesler, Siegel, and McGuire (1984) forecast that “computers could make communication easier, just as the canning of perishables and the development of can openers made food preparation easier, or they could have much more complex implications” (p. 1124). Time has shown Kiesler et al.’s prediction not to be an “either/or” proposition; computers have clearly facilitated communication across time and distance, but they have also altered the processes of human communication so fundamentally that many theories of communication that were developed in the context of FTF communication have been revisited to examine if and how they apply to CMC. Among the theories and concepts reexamined vis à vis CMC are social information processing (Walther, 1992), social identity (Postmes & Spears, 1998; Reicher, Spears, & Postmes, 1995), social penetration (Yum & Hara, 2005), spiral of silence (Ho & McLeod, 2008; McDevitt, Kioussis, & Wahl-Jorgensen, 2003), and—the focus of the current study—social presence (Biocca, Harms, & Burgoon, 2003; Rogers & Lea, 2005; Rourke, Anderson, Garrison, & Archer, 1999).

Much initial research into CMC revolved around a particular characteristic of the medium: its reduced capacity to convey the social information that is associated with FTF communication (Daft & Lengel, 1986; Kiesler et al., 1984; Rice, 1984; Sproull & Kiesler, 1986). Bordia (1997) noted that “not only can the absence of [social] cues hamper communication efficiency, but it seems to create a semblance of anonymity and lack of awareness of the social context” (p. 100). Many researchers have moved beyond a

medium-centric analysis of CMC, however, to a more relational perspective that incorporates both technological and socio-psychological considerations (Biocca et al., 2003; Shen, Yu, & Khalifa, 2010; Spears & Lea, 1992; Walther & Parks, 2002). As Biocca et al. (2003) pointed out, “A great deal of networked communication can be described essentially as a person using a medium to be with another” (p. 456). It is this “sense of being with another”—or social presence—in CMC that researchers point to as essential in understanding and encouraging effective and efficient computer-mediated communication (Biocca et al., 2003, p. 456) and why social presence demands further investigation.

Statement of the Problem

The theory of social presence, which was first articulated by Short, Williams, and Christie (1976), was not developed in the context of CMC, but rather in the context of telecommunication. Short et al. (1976) regarded social presence as a quality of the communication medium: “Although we would expect it to affect the way individuals perceive their discussions, and their relationships to the persons with whom they are communicating, it is important to emphasize that we are defining social presence as a quality of the medium itself” (p. 65). Continuing in this medium-centric vein, Daft and Lengel (1986) classified CMC as a “lean” medium owing to its reduced capacity to convey social information, particularly nonverbal and visual cues, compared to FTF. In his introductory discussion, Walther (1992) recognized experimental research that indicated several effects of CMC on social aspects of communication that “seem to support” the lean media perspective, including greater impersonality and negative affect (p. 58). However, Walther’s (1995) ensuing field research found that CMC users do develop a sense of

community and affective connections even via this lean medium, suggesting the appropriateness of a more relational view of social presence. Further, the research of Gunawardena (1995) indicated that the level of perceived social presence could vary from one user to another in the same computer-mediated discussion.

More recently, several social presence researchers have also challenged the technologically deterministic, unidimensional definition of social presence (Biocca et al. 2003; Shen, 2007; Tu, 2002). While the added dimensions of these researchers' models of social presence vary, they all view social presence in terms of overall communication interaction or user experience, rather than simply in terms of the medium itself. Indeed, their research validates this view that social presence is a phenomenon that fluctuates in CMC based on socio-psychological, interaction-specific characteristics such as involvement, empathy, emotional connectedness, and immediacy (Biocca et al. 2003; Shen, 2007; Tu, 2002). As Kehrwald (2008) succinctly summarized, "Among the notable implications of this shift to relational views of social presence is that relational aspects of communication are dependent upon the participants in the communicative exchange rather than (or in addition to) the medium. Therefore, social presence is quite dynamic" (p. 91).

The challenge, then, for managers and educators who increasingly rely on CMC is how to create and enhance social presence in computer-mediated discussion to effect positive outcomes. While much research has explored the nature of social presence, research exploring practical methods or techniques for increasing social presence in organizational and educational settings is just beginning to emerge (e.g., Kehrwald, 2008; Kim, Kwon, & Cho, 2011). The challenge for researchers is to more closely examine the processes and factors that result in increased social presence in CMC as well as the

resultant outcomes. The current study proposes to narrow this research gap by exploring the development of social presence in ad hoc, mediated discussion teams by supplementing computer-mediated interaction with temporally separate social interaction.

Purpose, Background, and Significance

Purpose

The purpose of the present study is to extend social presence research by exploring a practical technique to augment social presence in computer-mediated ad hoc team communication and to assess its association with perceived quality of interaction. The ad hoc nature of the teams studied is a differentiating component of this experiment. Walther (1995) indicated that CMC participants develop increased levels of social presence over time through continued mediated interaction, and that because of this, CMC may be more appropriate for longitudinal interaction than for short-term meetings. However, it is not uncommon in contemporary organizations for managers to pull together ad hoc, short-term CMC-based work groups, often composed of members with zero or limited history. Likewise, in online and blended learning environments, particularly those of large class sizes, it is not uncommon for instructors to form ad hoc student groups, often composed of students who have not interacted previously, to examine an issue or work on a group assignment. In these practical situations where participants have limited opportunity to develop social presence, or a *sense* for the other participants, the question is then how to enhance social presence and quality of communication without the benefit of time. The current study examines the relative effects on perceived levels of social presence and discussion quality of augmenting group CMC with temporally separate social interaction, either online or in-person. The practical implications include whether it is useful for

managers and instructors to initiate ancillary social interaction to augment social presence and discussion quality in short-term, ad hoc team CMC settings.

The temporally separate nature of the supplementary FTF interaction is another differentiating component of this study. Previous research has examined the effects of concurrent FTF and CMC interaction (e.g., Sia, Tan, & Wei, 2002; Lowry, Roberts, Romano Jr., Cheney, and Hightower, 2006). However, practical situations where FTF and CMC are used simultaneously are rather specialized. The present study proposes to examine the more common situation in organizations and classrooms of the communication medium being either FTF or CMC for any given interaction.

Background

In their discussion of social presence, Biocca and Harms (2002) pointed out that much of what is referred to as social interaction in the current age of media technology is actually interaction with others who are not physically present, e.g., via telephone calls, email, or other computer interfaces. Biocca et al. (2003) expanded on this notion when they pointed out that social presence theory has its roots in symbolic interactionism: “Symbolic interactionism emphasized that symbolic representations were central to all social phenomena, that models of the other contributed to our conceptualizations of the social” (p. 460). It is important to recognize the socio-psychological tradition upon which Short and his colleagues constructed their theory of social presence to fully understand its meaning and appreciate its significance. Even though their conceptualization would later be questioned for its reliance on qualities of the specific medium—as was Daft and Lengel’s (1983) subsequent media richness theory—Short, et al. (1976) built upon a theoretical foundation that emphasized awareness of, as well as the representation of, the

“other.” Kehrwald’s (2008) statement that social presence “creates the illusion of reality (or direct experience) in participants’ perceptions of mediated situations” highlights the concept’s theoretical heritage (p. 91).

As the social presence conceptualizations of Short et al. (1976) and Daft and Lengel (1983) were questioned, many researchers offered revised definitions emphasizing the relational nature of the concept. Aragon (2003) summarized several of these definitions:

... “the feeling that others are involved in the communication process” (Whiteman, 2002, p. 6); “the degree to which a person feels ‘socially present’” (Leh, 2001, p. 110); “the degree of person-to-person awareness” (Tu, 2000, p. 1662); “the sense of being present in a social encounter with another person” (McLellan, 1999, p. 40), and “the degree to which participants are able to project themselves affectively within the medium” (Garrison, 1997, p. 6). However, Gunawardena and Zittle (1997) put it most simply when they say that social presence is “the degree to which a person is perceived as a ‘real person’ in mediated communication” (p. 9). (Aragon, 2003, p. 60)

This slew of definitions of social presence highlights the presently contested state of the concept (Kehrward, 2008). There is, however, a commonality to these variations. Note the reoccurrence of the words *sense* and *feeling*. These terms point to the focus on social presence as a variable *perception* of personal relations, rather than as an invariable characteristic of a medium. Biocca and Harms (2002) offered an even simpler definition of social presence as “a sense of being with another in a mediated environment” (p. 10). While this definition is quite broad, it is useful as a shorthand communication. Biocca and

Harms (2002) elaborated on their shorthand by explaining that “social presence is the moment-to-moment awareness of co-presence of a mediated body and the sense of accessibility of the other being’s psychological, emotional, and intentional states” (p.14). The literature review that follows will delve more deeply into the—also contested—constructs and causal aspects of social presence in CMC, but for now, suffice it to summarize that people feel varying degrees of social presence based on their awareness of others, others’ awareness of them, and their level of psychological connectedness with others.

Significance

But what is the practical significance of the research establishing the variable and relational nature of social presence? Why would managers and educators seek to increase social presence in CMC? Is more better? Short et al. (1976) held that social presence results in a medium being perceived as “warm, personal, sensitive and sociable” (p. 66). The intuitive deduction from this view is that, indeed, more social presence is better. Beyond intuition, though, while some research suggests that certain tasks such as those involving uncomfortable or novel subject matter may benefit from lower social presence (Tu, 2000; Walther, 2005), other social presence research generally indicates that increased social presence in CMC results in increased quality of communication (Gunawardena, 1995; Gunawardena & Zittle, 1997; Kim et al., 2011; Lowry et al., 2006; Richardson, 2003). Lowry et al. (2006) argued that lower social presence in CMC results in lower quality communication due to less interaction and reciprocity. Similarly, Aragon (2003) posited that participants view a communication context as impersonal if social presence is low, and in turn, they share less information with others. In other words, the less sense of

mutual awareness and psychological connection participants have, the less likely they are to interact, resulting in less productive and less satisfying communication.

Further, Gunawardena and Zittle (1997) and Richardson (2003) found social presence to be a strong predictor of participant satisfaction in computer-mediated learning environments. Also assessing the importance of social presence in learning environments, Rourke et al. (1999) noted that social presence supports both cognitive and affective objectives of learning:

Social presence supports cognitive objectives through its ability to instigate, sustain, and support critical thinking in a community of learners. It supports affective objectives by making the group interactions appealing, engaging, and thus intrinsically rewarding, leading to an increase in academic, social, and institutional integration and resulting in increased persistence and course completion. (p. 52)

Clearly, and especially considering the evolving and often contentious state of social presence research, further investigation into how to enrich CMC interactions with increased social presence is warranted.

Scope of the Study

The overarching research question of this study is: Can perceived social presence and interaction quality in CMC be positively manipulated? More specifically, does social presence that is developed through ancillary interpersonal interaction “carry over” to affect social presence in subsequent CMC interaction, and does that social presence have a positive correlation with the quality of the interaction? To explore these questions, this study defined three experimental conditions, in which groups of subjects either had no interaction prior to an asynchronous CMC discussion task, they had online social

interaction via asynchronous CMC prior to the task, or they had in-person social interaction prior to the task. After the online discussion task, all subjects answered a questionnaire adapted from existing survey instruments to assess their levels of perceived social presence and quality of the preceding online discussion. A between-groups analysis of the results examined the relative associations of the ancillary social interaction treatment conditions with perceived levels of social presence and discussion quality. The data was also analyzed to determine if there was a correlation between perceived social presence and quality.

Study participants were college students enrolled in either COMM 1332 Fundamentals of Public Speaking at the College of Liberal Arts & Social Sciences (CLASS) or HRMA 1101 Hospitality Technology at the Conrad N. Hilton College of Hotel and Restaurant Management at the University of Houston (UH). The study represents a convenience sample of $n=118$.

The following Chapter II reviews the literature related to social presence in CMC. Chapter III covers the research method of the present study. Chapter IV interprets the findings of the study, and Chapter V discusses the results.

CHAPTER II: LITERATURE REVIEW

The evolving state of social presence theory makes it a challenging field of research, but it also offers compelling insight into the academic research process of theory building. While early ideas of social presence were questioned as the theory evolved, many aspects of the early conceptualizations are relevant to current theoretical perspectives, and are thus important to a thorough understanding of the theory. The present chapter reviews the genealogy of social presence theory and examines more closely the current perspectives and research. This review organizes the evolution of social-presence-related research into three phases based upon the conceptual perspectives of the research (see Table 1). The present chapter also reviews research that seeks to operationalize, measure, and create social presence, as well as research that seeks to experimentally measure the perceived quality of computer-mediated discussion tasks.

Table 1
Phases of Social Presence Research

Phase	Time Period	Conceptual Perspective	Key Researchers
I	1970s–1980s	Cues-filtered-out perspectives	Short et al. Rutter et al. Sproull and Kiesler Daft and Lengel
II	1990s	Socio-psychological perspective (<i>conceptual shift from Phase I</i>)	Walther Spears and Lea
III	2000s–present	Multidimensional models (<i>building on Phase II</i>)	Lombard and Ditton Biocca et al. Tu Kim

Social Presence in Theory

The literature review that follows again illustrates that social presence has been conceptualized and defined differently by almost every scholar who has studied it. Perhaps, though, the seemingly most vague definition also strikes at the heart of the concept: social presence is the “sense of being with another” in a mediated interaction (Biocca et al., 2003, p. 456). Walther (1992) similarly described social presence as “the feeling that other actors are jointly involved in communicative interaction” (p. 54). While *physical presence* in mediated environments describes the sense of being located in a virtual space with another, *social presence* describes the sense of being together psychologically with another (Biocca et al., 2003). The evolution of this most fundamental definition of social presence is central to the ensuing review.

Phase I: Cues-filtered-out Perspectives

Citing the terminology of Culnan and Markus (1987), Walther (1992) collectively referred to early CMC research that focused on a medium’s reduced capacity to convey the visual and nonverbal cues of FTF interaction as the cues-filtered-out perspective. Significant research falling under the cues-filtered-out umbrella includes the original statement of social presence theory (Short, et al., 1976), the cuelessness model (Rutter, 1987), the reduced social cues approach (Kiesler, et al., 1984; Sproull & Kiesler, 1986), and media richness theory (Daft & Lengel, 1986).

Original statement of social presence theory. In initially defining social presence as a quality of the medium itself, Short et al. (1976) held that “the capacity to transmit information about facial expression, direction of looking, posture, dress and non-verbal vocal cues, all contribute to the Social Presence of a communications medium” (p.

65). Accordingly, Short and colleagues sought to offer insight into how individuals' evaluations of the social presence afforded by particular communication media affect the appropriate choice of medium. Their research, focused on organizational communication, suggested that an individual selects the most suitable medium for any particular communication task based upon his or her perception of the degree of social presence afforded by the medium. For example, they suggested that for a situation that requires a high level of social presence—such as one that involves conflict or one that requires sensitivity to the feelings of others—an individual will select a medium that is high in social presence, such as FTF interaction. As Walther (1994) noted, “the theory holds that as communication channels filter out these cues, there is less salience of the co-presence of other people” (p. 475).

While Short et al. focused on the capacity of the channel, they also acknowledged that the social presence afforded by a particular medium is partially dependent on the user's perception of the medium, or “mental set” towards the medium (Short et al, 1976, p. 65). In their experimental research, Short and his colleagues used semantic differential scales to examine how individuals perceived differences between communication contexts including speakerphones, audio-only, video, and FTF. Significantly, these bipolar scales—such as insensitive-sensitive, unsocial-social, and active-inactive—suggest a more subjective approach to social presence than that which Short et al. (1976) pursued in the context of their media appropriateness framework. As Walther (1992) would later point out, “These theorists (who dealt not with CMC but with audio and video tele-conferencing) suggested that users' perceptions of media may guide users' media selections, but they do not state that social presence is based in perception” (p. 55). Also emphasizing the

importance of individual perception as well as the awareness of others, Biocca et al. (2003) cited previous research by Dashiell (1935) and Wapner and Alper (1952) that indicated the mere *suggestion* of someone watching a person has an influence on their behavior (as cited in Biocca et al., 2003). This research suggested that social presence was not a matter of physical fact, but rather a psychological phenomenon, and lead Biocca et al. to assert that “the ‘perceived presence’ of another triggers significant psychological effects on behavior” (p. 462). Later research, including that of Walther (1992, 1994, 1995, 1996) and Biocca and associates (2002, 2003), would hone in on the connectedness of presence and perception, and will be examined in the following sections of this review.

Before leaving the work of Short et al. (1976), it is important to note two concepts from social psychology that the researchers cite in their conceptualization of social presence. The first concept is that of *intimacy*, as proposed by Argyle and Dean (1965), while the second concept is that of *immediacy*, as proposed by Wiener and Mehrabian (1968). Intimacy in an interaction is achieved through physical and nonverbal behaviors, such as varying physical proximity, eye-contact, smiling, and personal topics of conversation, while immediacy refers to the sense of psychological closeness of participants (Gunawardena & Zittle, 1997; Lombard & Ditton, 1997; Short et al., 1976). Both of these concepts are very relevant to social presence, since a medium that is high in social presence can evoke these psychological qualities during a mediated social interaction (Biocca et al., 2003). These concepts also appear in the theorizing of later social presence scholars.

Cuelessness model. Rutter et al. (1984) posed an experimental challenge to the work of Argyle and Dean (1965), whom they thought overemphasized the role of eye-

contact in assessing the level of intimacy of an interaction. Rutter et al. (1984) proposed that intimacy requires the accumulation of social cues from all of the senses combined, rather than eye-contact alone. A significant conclusion of their study related to social presence was that “the more cueless the encounter, the greater the psychological distance; and the greater the psychological distance, we find, the more task-oriented and depersonalized the content of what people say and, in turn, the less spontaneous their style of speech and the less likely a debate to end in compromise” (Rutter et al., 1984, p. 257-258). Cuelessness was assessed by Rutter et al. (1984) in largely quantitative terms as the number of social cues conveyed in an interaction. The more cues that a medium can convey, therefore, the less the psychological distance, and the higher the intimacy of that medium.

While Rutter et al. (1984) were not examining the concept of social presence per se, their work is relevant to this discussion because it touched upon two key underlying concepts of social presence—intimacy and immediacy. Indeed, Spears and Lea (1992) noted the similarity to social presence theory in Rutter et al.’s definition of psychological distance as a person’s feeling that their partner is “there” or “not there.” The model of cuelessness also emphasized the predominant theoretical focus at the time on a quantitative accounting of physical social cues to make conclusions regarding the ability of a particular medium to convey social presence. Rutter et al. (1984) did admit shortcomings with this quantitative focus, noting that some media, such as telephone hotlines, can be high in cuelessness but close in psychological distance, which their model failed to explain (Spears & Lea, 1992). Indeed, Spears and Lea (1992) referred to the cuelessness model as a “retrograde theoretical step” since it did not take into account the social context of

communication, such as was implied in the semantic differential perception scales of Short and associates (p. 36).

Reduced social cues approach. The literature reviewed above was not articulated in the context of then-nascent CMC, making extrapolation from those more general experimental studies to CMC a bit problematic (Spears & Lea, 1992). However, the reduced social cues (RSC) approach (Kiesler et al., 1984; Sproull & Kiesler, 1986) was developed specifically in the context of CMC. The theoretical foundation of this approach has much in common, though, with the preceding research. Social cues—specifically the absence or reduction thereof—are the focus of RSC in accounting for the socio-psychological effects associated with CMC. These effects include uninhibited behavior (as evidenced through the phenomenon of “flaming” or expressing oneself more strongly in CMC than in FTF settings) and extreme, risky, or polarized group decision-making (Kiesler et al., 1984). Further, RSC research indicated that “the lack of social context cues is also conducive to equalized participation. When such cues are absent, actors become disinhibited who would otherwise defer speaking turns to higher-status participants” (Walther, 1992, p. 56).

While later research would yield contradictory experimental results indicating that CMC can actually support highly affective and personal interactions in certain settings (Walther, 1994; Rourke et al., 1999), the research of Kiesler and her colleagues highlighted the sometimes polarizing and normative characteristics of CMC effects, which would become the focus of theorists offering a social-identity-based approach to understanding the socio-psychological effects of CMC (e.g., Spears & Lea, 1992; Postmes, Spears, & Lea, 1999). Significantly, though, Kiesler et al. (1984) predicted that “the conceptual

framework for studies of computer-mediated communication will develop mainly from studies of social process” (p. 1131).

Media richness theory. The media richness theory of Daft and Lengel (1983, 1986) had much in common with the original social presence theory of Short et al. (1976). Daft and Lengel, though, did not reference the work of Short and his colleagues (Lowenthal, 2010), and Rice (1993) suggested that Daft and Lengel were not aware of the earlier social presence research when they developed their theory. The two theories share the underlying principle that the inherent characteristics of a specific communication medium determine its capacity to convey social cues, which in turn determines its appropriateness and effectiveness for certain types of communication tasks. Media richness theory, though, extends social presence theory to include factors beyond a medium’s capacity to convey social cues—such as a medium’s capacity for immediate feedback, personalization, and language variety (Daft & Lengel, 1986)—to determine its richness. Daft and Lengel defined richness as “the potential information-carrying capacity of data” (Daft & Lengel, 1983, p. 196) and classified media—in order of decreasing richness—as face-to-face, telephone, personal documents, impersonal written documents, and numeric documents (Daft & Lengel, 1986). Daft and Lengel (1983) referred to media that is not “rich” as media that is “lean,” meaning that it has limited information-carrying capacity.

Computer-mediated communication, in the scheme of Daft and Lengel, is a very lean medium, because of the paucity of nonverbal cues. From this perspective, media richness theory prescribed the appropriateness of certain media for certain types of communication:

When messages are very simple or unequivocal, a lean medium such as CMC is sufficient for effective communication. Moreover, a lean medium is more efficient, because shadow functions and coordinated interaction efforts are unnecessary. For receivers to understand clearly more equivocal information, information that is ambiguous, emphatic, or emotional, however, a richer medium should be used. In this way immediate feedback from auditors—both verbal and nonverbal—is available to speakers in order to make their messages more clear and enhance auditors' understanding. From this perspective one may either match or mismatch messages and media, and organizational actors are advised to optimize their channel selections accordingly. (Walther, 1992, p. 57)

As with Short et al.'s social presence theory, media richness theory defined the capacity of a medium to convey rich information as a consistent and stable given, and advised the selection of communication media accordingly (Daft & Lengel, 1986). The next phase of social presence research marked a shift from these prescriptive, medium-centric perspectives to socio-psychologically driven perspectives that emphasized the variable nature of social presence in CMC.

Phase II: Socio-psychological Perspectives

While it is true that communication media differ in their capacities to convey nonverbal and vocal cues, researchers in the 1990s began to ask if there were other factors, particularly socio-psychological factors, that influence the degree of social presence experienced by users. In his experimental examination of media richness theory, Rice (1992) did find slight support for the theory, but also noted conceptual qualifications including the limitation of media richness research (including his own) resulting from

ignoring “all other potentially relevant variables in the interests of parsimony and clarity,” including social influences (p. 495). Rice (1992) concluded, “Although there is some consistency in rankings of media according to social presence and media richness, both social presence and media richness are perceptions dependent upon intrinsic characteristics of the medium, as well as upon particular communication contexts and the individuals’ experiences, attitudes and preferences” (p. 495). Much of the ensuing social presence research focused on the latter dependency—individuals’ experiences, attitudes, and preferences. For example, the experimental research of Walther (1992) indicated that users do experience rich and productive communication via lean media. As a result, social presence researchers became less interested in comparing the technological characteristics of media and more interested in exploring the socio-psychological dynamics through which users construct their perceptions of other users’ presence (Shin, 2002).

Social information processing theory. Walther (1992) provided a thorough and influential critique of previous experimental CMC research and offered an explanation for why previous laboratory results often appeared to support the cues-filtered-out or “undersocial” view. Walther pointed to several field studies that challenged the static view of the medium, including a study by Foulger (1990) in which users rated text-based media as richer than telephone and FTF conversations, and studies by Johansen et al. (1978) and Van Gelder (1985) showing personable relations and budding friendships (as cited in Walther, 1995).

To account for the disparity in results between laboratory and field research, Walther (1992, 1995) detailed methodological weaknesses in CMC laboratory research at the time, including weaknesses related to data gathering and chronometry. In regard to data

gathering, Walther (1992) expressed concern that previous cross-media research excluded nonverbal behavior of FTF groups from the data: “If the nonverbal as well as verbal messages of face-to-face groups were coded, then the overall ratio of socioemotional expressions to total messages may be no different in face-to-face than in CMC groups. It appears that the conclusion that CMC is less socioemotional or personal than face-to-face communication is based on incomplete measurement of the latter form, and it may not be true whatsoever, even in restricted laboratory settings” (p. 63).

In regard to chronometry, Walther (1992) considered previous experimental research that allowed equal amounts of time for FTF and CMC conditions to be problematic since FTF and CMC groups operate at different rates. For example, typing reduces the number of messages that can be communicated in a period of time relative to FTF, and communicating over a single linguistic channel results in less information—particularly social information—being transmitted in a given period of time (Walther, 1995). Primarily, Walther (1992, 1995) emphasized that relational communication develops over time and messages, which is central to his social information processing (SIP) theory of CMC.

While he noted that previous researchers had used the term differently (e.g., Salancik & Pfeffer, 1977, 1978; Fulk, et al., 1987), Walther (1995) defined social information processing as “the way in which communicators process social identity and relational cues (i.e., social information) using different media” (p. 190). Explaining SIP theory in the context of organizations, Walther (1995) contended that relational communication is key, since it is associated with cognitive, affective, and behavioral satisfaction, and communication satisfaction is a predictor of job satisfaction. SIP theory

posits that communicators in CMC, as in FTF, seek to develop social relations (Walther, 1996). In order for communicators to develop positive and meaningful relationships, they must be able to exchange social cues and information (Tanis & Postmes, 2003), from which they form impressions of others and proceed to test these impressions and assumptions over time by way of knowledge-generating strategies (Walther, 1996). However, Walther (1994) pointed out that social information is forced into a single verbal/linguistic channel in CMC, thereby requiring more “real time” to exchange the same number of messages as in FTF communication. Since social cues are transmitted and relationships are developed at a slower rate in CMC, SIP theory proposed that “given sufficient time and message exchanges for interpersonal impression formation and relational development to accrue” relational communication will be the same in CMC as in FTF contexts (Walther, 1992, p. 69). In contrast to cues-filtered-out theories, SIP theory “suggests that information accumulates via exchanges over a consistently narrow but potentially social bandwidth” (Walther, 1995, p. 190). Overall, Walther held that, given sufficient time, people will compensate for any cues that are filtered out of CMC (Kerhwald, 2010).

An initial experimental test of SIP theory conducted by Walther and Burgoon (1992) resulted in “mixed but generally supportive results” (Walther, 1995, p. 190). Walther (1995) made some methodological adjustments to the initial research and found that “none of the results clearly suggest the viability of a cues-filtered-out view: FTF was not more intimate and sociable than CMC over time” (p. 197). Demonstrating a phenomenon Walther (1996) would label as “hyperpersonal” communication, the results also indicated that CMC groups actually had more intimacy- and immediacy-related

indicators than did FTF groups, which again runs counter to the cues-filtered-out perspective. Walther (1996) criticized researchers, though, who summarily dismissed the cues-filtered-out research and focused on media choice without exploring the media effects that were observed in early experiments, accusing them of “throwing the empirical baby out with the theoretical bathwater” (p. 9).

In addition to the time component that he identified as a factor in such media effects, Walther (1994) found that the degree to which people anticipated future interaction also influenced the degree to which people interacted online, concluding that anticipation of future interaction significantly accounted for relational intimacy in both CMC and FTF conditions, and that the communication medium had little effect. The implication of these results is that CMC users who believe their interaction will be ongoing experience more interpersonally positive CMC exchanges. Walther (1994) concluded, “The use of CMC for ‘meetings,’ or ad hoc, one-shot groups—rather than ongoing ‘teams’ or ‘task forces’—runs some risk of greater impersonality” (p. 485).

In his discussion of this study, Walther (1994) also proposed to mitigate concerns about generalizing from results drawn from student participants. Firstly, he pointed out that most previous CMC research had used student participants, so using the same subpopulation increased the replication value of his study. Secondly, in addressing the potential concern that students may be very likely to experience extemporaneous future interaction and thus have high anticipation, Walther (1994) pointed out that “real world” CMC likewise provides opportunity for other forms of contact. In support of this statement, Walther cited a study by Finholt and Sproull (1990) that found an average of

19% of corporate email originated from within 100 yards of its destination, with another 13% originating from elsewhere in the same building (as cited in Walther, 1994).

Social identity model of deindividuation effects. About the same time that Walther put forth his SIP theory, Spears and Lea (1992) articulated their social identity model of deindividuation effects, or SIDE theory. Much like Walther (1992), Spears and Lea (1992) argued the insufficiency of the original social presence theory, the cluelessness model, the reduced social cues approach, and media richness theory to adequately explain the effects of computer mediation on communication. They considered those cues-filtered-out perspectives “profoundly flawed” and proceeded to argue that “paradoxically CMC may represent a more intrinsically ‘social’ medium of communication than the apparently ‘richer’ context of face-to-face interaction, and one that gives fuller rein to fundamentally social psychological factors” (Spears & Lea, 1992, p. 31).

Unlike SIP, SIDE focused on the outcomes of social influence processes in CMC, particularly group attitudes and decision-making, which are often evidenced through group polarization. Built upon social identity theory (Tajfel, 1978) and self-categorization theory (Turner, 1985), SIDE maintains that individuals have multiple layers of self, including personal as well as social identities, and that social identities provide information about the group, which includes behavioral norms. Further, at any given time, any of the identities may be the salient identity. For example, various characteristics are associated with groups such as work teams, sport teams, and religious or gender affiliations. SIDE theory emphasizes that the social context determines which social identity or personal identity will be most salient, and that an individual will act in accordance with the salient identity at the moment (Rogers & Lea, 2005). A key concept underpinning SIDE is that in a

context of limited interpersonal contact or individuating information, such as CMC, a person's social identity may become salient over their personal identity: "In this way, individuals need not be physically co-present or exchange interpersonal information in order to feel part of a group, or for the group to have real influence on the behavior of each individual" (Rogers & Lea, 2005, p. 153).

Much of the empirical support for SIDE comes from experimental research that explores the deindividuating effects of anonymity in CMC. SIDE maintains that in an anonymous communication context, individuals who lack individuating information about others will shift their awareness to the group or social identity. This emphasis on social identity results in individuals being more susceptible to social and group norms in the immediate social context (Postmes & Spears, 1998). For example, Spears et al. (1990) demonstrated that deindividuated subjects showed attitude polarization toward the norm, while individuated subjects—subjects whose personal identity was emphasized—showed attitude change away from the norm. Studies by Postmes, Spears, Sakhel, and de Groot (2001), Postmes, Spears, and Lea (2002), Lee (2006, 2007), and Haines and Mann (2011) likewise showed that deindividuation in CMC resulted in greater normative influence and conformity.

The implication of SIDE that the *reduced* social cues of deindividuation in CMC can result in *increased* social influence may appear somewhat at odds with the concept of social presence as considered thus far in the present paper. Of particular relevance to the current discussion, though, is the notion that CMC, whether via social presence or social identity, has the ability to convey significant social information. And while social presence research and social identity research have progressed largely in parallel, recent studies

show the two concepts being integrated in consideration of their effects in CMC. Rogers and Lea (2005), for example, discussed social identity as a contributor to social presence: “The SIDE model argues that in situations where the transfer of personal, or individuating information is limited, this can increase the salience of a relevant social identity. Factors such as the lack of cues within virtual environments can, therefore, reinforce group salience and thus social presence” (p. 153). Conversely, Shen, et al. (2010) found that social presence was a contributor to social identity: “In this research, we demonstrate that the driving forces for social identity are mainly affective social presence” (p. 345). Regardless of the direction of the relationship, however, the concepts of social identity and social presence are closely related in the current literature, again emphasizing the evolving state of CMC research.

Phase III: Multidimensional Models

With the variable and relational nature of social presence empirically established largely through the SIP- and SIDE-related studies, researchers began to explore a variety of factors other than time and anonymity that may affect the socio-psychological phenomena specific to CMC. These factors include communication context (Rourke, 2001), type of communication task (Tu, 2000), CMC-related skill levels of participants (Tu & McIsaac, 2002), and cultural dispositions (Gunawardena, 1998). Of particular interest to the present study are the efforts of several researchers to organize and distill all of the various factors into empirically useful definitions and models of social presence (e.g., Biocca et al., 2003; Lombard & Ditton, 1997; Kim, 2010; Shen & Khalifa, 2007; Tu, 2000, 2002).

The variety of conceptualizations of social presence evidenced in the proceeding literature review, combined with the fact that it is a key construct in a variety of disciplines

other than communications (e.g., psychology, computer science, cognitive science, and engineering), demonstrates the need that Lombard and Ditton (1997) saw for a structured, all-encompassing definition of social presence. These scholars reviewed extant “fragmentary and unsystematic” presence-related literature to identify six distinct conceptualizations: presence as social richness, presence as realism, presence as transportation, presence as immersion, presence as social actor within medium, and presence as medium as social actor (Lombard & Ditton, 1997, Introduction section). While acknowledging that the conceptualizations are varied, the authors offered a unified definition of presence based on what they identified as a shared central idea of all six conceptualizations: “the perceptual illusion of nonmediation,” in which the participant does not perceive or acknowledge the existence of the medium and behaves as if the medium were not there (Lombard & Ditton, 1997, Presence Explicated section). Lombard & Ditton pointed out that this illusion is not a psychological malfunction or psychosis in which individuals are confused about what is “real” or what is mediated. Somewhat entertainingly, but of no help in countering the stereotype of academicians as geeks, they cite the holodeck in a particular episode of “Star Trek: The Next Generation” as an exception.

While Lombard and Ditton (1997) acknowledged that presence research was in its infancy and offered their conceptual definition as a starting point for more systematic research going forward, their definition did not gain extensive adoption (Lowenthal, 2010). The multidimensional aspect of their conceptualization did, however, garner the interest of subsequent social presence researchers. For example, Tu (2000), working in the field of online learning, proposed three dimensions of social presence: social context, online

communication, and interactivity. Referencing the work of Walther (1992), Tu considered social context to include social processes, settings, and purposes, highlighting task type, topics, and social relationships as considerations in studying social presence. Tu (2000) defined online communication as “the attributes of the language used online and the application of online language” (p. 29), noting that a user’s familiarity and skill level with CMC affect his or her level of communication anxiety and overall comfort with the medium, which in turn impacts social presence. Regarding the dimension of interactivity, Tu pointed to the importance of feedback in contributing to the salience of the interaction, thereby increasing social presence. However, Shen and Khalifa (2008) would later be critical of Tu’s multidimensional structure for focusing on the factors contributing to social presence, rather than on factors inherent in social presence.

Biocca et al. (2003) also suggested a multidimensional model. They would echo the need that Lombard and Ditton (1997) identified for further work in conceptualizing social presence by calling for a broader, more robust statement of the theory: “a theory of social presence would need to specify the dimensions of the construct in a way that can guide multidimensional measurement of it” (p. 473). From their review of existing research, Biocca and associates identified three dimensions around which social presence had been conceptualized in the literature: copresence, psychological involvement, and behavioral engagement. Biocca et al. (2003) cited the work of Goffman (1959, 1963) as the basis for the dimension of copresence in mediated communication. Copresence, the researchers explained, comprises two facets: sensory awareness of the embodied other and mutual awareness. “In this sense,” they summarized, “two users are aware of each other in a virtual space, and that mutual awareness is the essence of social presence” (Biocca et al.,

2003, p. 463). Determining that awareness alone, however, does not fully capture the meaning of social presence, the researchers defined the second dimension of social presence research as psychological involvement. This dimension included intimacy, immediacy, and salience of the interpersonal relationship—all aspects of psychological involvement in CMC suggested by Short et al. (1976) in their original definition of social presence. The third dimension identified by Biocca et al.—behavioral engagement—included behaviors such as eye contact, nonverbal mirroring, and turn-taking. This dimension, the researchers explained, came about largely as the result of more recent investigation into social presence in high-bandwidth media such as virtual reality and computer games.

Having established these three dimensions of existing social presence research, Biocca and associates proceeded to delineate the limitations of the existing research, which they argued were often the result of vague and nebulous conceptualizations that often confounded social presence per se with the *effects* of social presence (Biocca et al., 2003). While their purpose was not to propose a new statement of social presence theory, Biocca et al. did outline several criteria for consideration in developing such a statement. In addition to having explanatory power across the full range of mediated communication contexts, a theory of social presence, they contended, should seek a foundation in the epistemological question of how individuals come to “know the minds” of others, or more precisely, the representation of others, in CMC. In making this connection to philosophical and psychological concepts, Biocca et al. (2003) drew attention to the profound import of social presence, while also reinforcing the fact that social presence theory and supporting research is in a nascent state of flux and development.

Recently, Biocca et al.'s (2003) multidimensional model received a degree of empirical support from the work of Shen and Khalifa (2008). Adapting Biocca et al.'s conceptualization to apply more specifically to online communities—groups of people who interact via CMC over time with a shared interest or need—Shen and Khalifa (2008) defined the dimensions of social identity as awareness, affective social presence, and cognitive social presence. Referencing motivational theory (Deci & Ryan, 1985, as cited in Shen & Khalifa, 2008), Shen and Khalifa proposed that social presence would have a direct effect on participation. The analysis of results from an online survey of four online forums provided significant support for the independent effects of the dimensions of social presence defined by the researchers, leading them to conclude that “the empirical results strongly supported the necessity and appropriateness of multidimensional conceptualization of social presence” (Shen & Khalifa, 2008, p. 741).

Also providing a degree of empirical support to the multidimensional model of Biocca and associates was Hwang's (2007) study of social presence in instant messaging (IM) (as cited in Kim, 2010). Through factor analysis of data collected from IM users, Hwang identified five factors of social presence: mutual awareness, mutual understanding, attentional allocation, emotional connectedness, and awareness of co-location. With the exception of emotional connectedness, Hwang's factors overlap with those of Biocca et al. (Kim, 2010). Arguing the uniqueness of the emotional connectedness factor, Hwang contended that CMC users should be encouraged to develop this connectedness through use of emoticons and other paralanguage, as well as by sharing voice messages and pictures (Kim, 2010).

A variation of emotional connectedness—*affective connectedness*—would also figure into the multidimensional model of Kim (2010). Examining social presence in the context of distance education, Kim reviewed the community of inquiry (COI) model that had been used by previous researchers examining the role of social presence in learning (e.g., Rourke et al., 1999). The COI model considered social presence to be composed of three factors: affective expression, open communication, and group cohesion (Arbaugh et al., 2008; Garrison, Anderson & Archer, 2000; as cited in Kim, 2010). Synthesizing the extant research, including that of Biocca and Harms (2002), Hwang (2007), and Rourke et al. (1999), Kim proposed a five-factor model of social presence: affective connectedness, open communication, collectiveness, mutual attention and empathy, and interdependent support. Through extensive exploratory and confirmatory factor analysis of self-report survey research to examine these proposed factors, Kim concluded that a four-factor model of social presence was supported: affective connectedness, sense of community, open communication, and mutual attention and support. He defined affective connectedness as “the degree to which participants express intimacy and warmth” (Kim, 2010, p. 11), again harkening back to the concepts of Argyle and Dean (1965) and Wiener and Mehrabian (1968). Kim regarded the sense of community to include participants’ feeling of their usefulness within the interaction as well as their satisfaction with the interaction, while he considered open communication to include not only the interactive responses of participants, but also their perceived degrees of freedom to offer ideas and make critical comments (Kim, 2010). While the first three factors reflect the *social* side of social presence, the final factor—mutual attention and support—reflects the *presence* side of

social presence, in that it is dependent upon participants' perceptions of others as "being there," even though they are not physically present (Kim, 2010).

In validating his multidimensional model of social presence, Kim (2010) also developed and validated a survey instrument to measure social presence. The next section of the present paper will examine Kim's instrument, as well as review other instruments that were developed based on other conceptualizations of social presence.

Measuring Social Presence

As Biocca et al. (2003) pointed out, "Measures are born of the conceptualizations of social presence" (p. 465). Following the conceptualizations of social presence reviewed above, varied measures of social presence have been proposed. Just as there is currently no widely endorsed view of social presence, there is no widely endorsed operationalized measure of it (Biocca et al., 2003). A review of the various measures is nonetheless important to an understanding of the current state of social presence research.

Measures Related to Social Richness

Considering social presence to be an attribute of the medium itself, Short et al. (1976) sought to measure users' perception of the degree of presence afforded by the medium. To do so, they employed self-report semantic differential scales of personal-impersonal, warm-cold, sensitive-insensitive, and sociable-unsociable. Importantly, Short et al. were not asking users to judge their experience with others in the interaction, but to judge the medium itself, which Biocca et al. (2003) considered to be a limitation of this measurement approach. Further, Tu (2002) suggested that these four semantic differential items were too simplistic to capture the many variables that may contribute to social presence, such as task, social relationships, topics, and privacy. Since subsequent research

indicated that social presence was a variable and fluctuating phenomenon with socio-psychological dimensions as well as technical dimensions, Short et al.'s measures of fixed media properties were not wholly sufficient for the new multidimensional conceptualizations (Biocca et al., 2003). Interestingly, Biocca and associates (2003) suggested that the focus of Short and his colleagues on the specific media may have been the result of the source and purpose of their funding: the UK post office, Department of Transportation, General Electric, and other organizations that were interested in the effectiveness of various media channels for social communication.

Measures Related to Intimacy and Immediacy

Although Short et al. (1976) constructed their theory of social presence upon the interpersonal communication concepts of intimacy and immediacy, they did not explicitly measure them (Biocca et al., 2003). As conceptualizations of social presence emerged that *did* focus specifically on these concepts, instruments to measure these factors also emerged. Examining social presence in distance education, Gunawardena and Zittle (1997) expanded the four bipolar indicators of Short et al. (1976) to include two additional items : immediate-nonimmediate and interactive-noninteractive. They analyzed the correlations between the resulting six bipolar scales and the items on a self-report questionnaire they developed to measure social presence. Their questionnaire comprised fourteen Likert-scale questions that embodied the concept of immediacy, such as “I felt comfortable interacting with other participants...” and “I was able to form distinct individual impressions of some...participants even though we communicated via a text-based medium” (Gunawardena & Zittle, 1997, p. 15). Finding strong positive correlations, they concluded

that their social presence instrument attained construct validity. Further, they found that social presence was a significant predictor of learner satisfaction.

Tu (2002), however, would later criticize Gunawardena and Zittle's instrument for containing items that were specific to the student groups and for omitting three variables that he considered necessary for a full accounting of social presence: privacy, recipients, and topics. To account for the other factors, Tu (2002) proposed his own social presence measurement instrument—the Social Presence and Privacy Questionnaire (SPPQ). Composed of 59 Likert-scale items, the SPPQ was built around five dimensions of social presence: interactivity, system privacy, online communication, feeling of privacy, and social context. Analysis of correlations between these factors and social presence revealed that all of the correlations were significant, but that the correlation between online privacy and social presence was weak (Tu, 2002).

While also focused on CMC in educational contexts, Rourke et al. (1999) took a different approach to measuring social presence by employing content analysis to examine transcripts from two graduate-level CMC-based courses. Based on the COI model presented in their introduction, Rourke and his associates identified three categories for the analysis: affective responses, interactive responses, and cohesive responses. Within each category, they identified the indicators to code from within the transcripts. For example, indicators of affective responses included expressions of emotion and uses of humor; indicators of interactive responses included asking questions and expressing agreement; and indicators of cohesive responses included greetings and addressing others by name. Rourke et al. (1999) defined 12 indicators all together which coders identified using a thematic unit of analysis, defined as “a single thought unit or idea unit that conveys a

single item of information extracted from a segment of content” (Budd, Thorp, & Donohue, 1967, p. 34). To illustrate, the statements “I was thinking the same thing; You really hit the nail on the head,” would be coded as one unit expressing agreement, as opposed to two syntactical units. Rourke et al. weighted all 12 indicators equally in their analysis to determine the overall levels of social presence in each of the two groups. The authors were careful to state that the value of their study was in its explication of a method for measuring social presence, rather than in a detailed comparative analysis of the groups, and that further research may reveal how each of the indicators may influence social presence differently.

While Rourke et al. (1999) did recognize some intercoder reliability concerns in their study, they claimed high aggregate intercoder reliability. Even so, Kim (2010) criticized their content analysis approach for being sensitive to specifics of the learning program and to the coders themselves, resulting in reduced scale reliability. Kim also criticized Short et al. (1976) and Gunawardena (1995) for not attesting to the validity and reliability of their studies. Aspiring to avoid the limitations of previously developed measures of social presence, while also focusing in the area of CMC-based distance education, Kim developed and tested a scale to measure the four factors of social presence that he proposed in the same study, as discussed in the previous section of this paper. Kim’s matrix of 5-point Likert-scale items is reproduced in Appendix A. Through extensive analysis, Kim (2010) concluded that his instrument achieved content validity, face validity, and construct validity for measuring social presence in distance education settings. Further, his results showed positive correlation among social presence, perceived learning achievement, and learning satisfaction, which Kim (2010) determined to be

“consistent with many other studies” (p. 12), including Gunawardena and Zittle (1997), Picciano (2002), and Swan and Shih (2005).

Creating Social Presence

As evidenced by the literature review thus far, much social presence research over the past decade has focused on CMC in online learning or educational contexts (e.g., Gunawardena & Zittle, 1997; Kim, 2010; Rourke et al., 1999; Tu, 2000). While there are certainly characteristics of learning interactions that are specific to that context, such as instructor-student relationships, the fundamental characteristics of human social interaction, such as developing impressions of others and reducing uncertainty and anxiety, exist across interpersonal communication contexts. And as Biocca and his colleagues suggested, a robust theory of social presence should apply across all media and contexts (Biocca et al., 2003). The present section, therefore, will not investigate methods of creating social presence that are specific to learning environments, such as actions that can only be taken by instructors, but will review the portions of the literature related to creating social presence that may apply across communication tasks and contexts.

Aragon (2003), while also working from a distance learning perspective, proposed several strategies for creating social presence in CMC, grouping them into categories of strategies for course designers, instructors, and participants. One strategy for the design of the interaction that Aragon suggested was to include profiles of the participants, which may include short biographical information, such as class year, academic interests, and hobbies or activities. Suggested strategies common to instructors and participants included using humor and emoticons, addressing others by appropriate name or title, and “striking up conversation.” Aragon suggested allowing time for participants to chat privately before,

or even during, the CMC session. The goal of this informal interaction is to afford participants the opportunity to get to know more about each other on a social level (Aragon, 2003).

Working from a theoretical foundation of social information processing and group structure theories, Slagter van Tryon and Bishop (2009) also offered strategies to increase the “e-mmediacy” of CMC-based learning interactions. They defined e-mmediacy as the state of social cognition resulting from “feelings of social connectedness” that participants have with each other (Slagter van Tryon & Bishop, 2009, p. 293). The researchers predicated their recommendations on Garrison et al.’s (2001) claim that the social information processing mechanism is the same in CMC as in FTF interactions and that only the communication channel differs (as cited in Slagter van Tryon & Bishop, 2009). Therefore, participants both seek out and interject personality and “person characteristics” to facilitate their social information processing and to achieve status assessments, norm development, and role differentiation (Slagter van Tryon & Bishop, 2009). The researchers noted that for a participant to make status assessments, individuating social characteristics of the other participants—such as physical traits, place of origin, details of background, personal style, and hobbies—must be accessible. They further contended that this social information must be more extensive than cursory information such as name and contact information, and that it should be of the same quantity and quality available in FTF learning environments (Slagter van Tryon & Bishop, 2009). The key to facilitating both norm development and role differentiation in CMC, the researchers suggested, is to provide participants with opportunities to interact with each other in a variety of contexts, so that they may observe more dynamic social behaviors to use in their social information

processing (Slagter van Tryon & Bishop, 2009). In their concluding discussion, Slagter van Tryon and Bishop (2009) recommended that future research investigate the amount and quality of social information that must be supplied in order to facilitate CMC participants' sense of social connectedness, e-mmediacy, or presence.

Measuring Quality of CMC

The quality of CMC interactions has been operationalized and measured from a variety of perspectives. For example, McCarthy and Monk (1994) examined quantitative measures such as numbers of solutions reported, word counts of first and second person pronouns, and counts of explicit topic openings. Other researchers have proposed subjective ratings and questionnaire data (e.g., Gunawardena & Zittle, 1997; Swan & Shih, 2005; Tanis & Postmes, 2007). Of particular interest to the present study is the subjective measure of quality in CMC groups developed by Lowry, Romano Jr., Jenkins, and Guthrie (2009) in support of their CMC interactivity model (CMCIM). This model proposes that CMC interactivity positively impacts communication quality, which in turn positively impacts process satisfaction. Grounded in interpersonal and organizational communication theory, CMCIM focuses on *perceived* interactivity since it accounts only for the those features of CMC that actually lead to a participant's perception of interactivity (Lowry, et al., 2009). To explain, the researchers pointed out that users might perceive a highly interactive feature as annoying rather than interactive. As the previous literature review has indicated, interpersonal interaction is the foundation for building social presence, so it follows logically that the CMCIM may be extended to infer the impact of perceived social presence on communication quality.

Lowry, et al. (2009) defined communication quality in terms of communication openness, discussion efficiency, discussion effectiveness, and process satisfaction. Using these three “reliable and validated subconstructs and related measures,” they developed a measurement scale for communication quality that is reproduced in Appendix B (Lowry et al., 2009, p. 174). This scale includes items such as, “It was easy to communicate openly to all members of this group,” “The time spent in the group interaction was efficiently used,” and “The discussions were ineffective” (Lowry, et al., 2009, p. 194-195).

Hypotheses and Research Questions

The first research question and set of hypotheses seek to determine the association of social interaction with social presence and quality of CMC discussion tasks via an ancillary FTF social interaction opportunity. RQ1 is predicated on several findings of previous research. Walther (1995) stressed the importance of time in allowing CMC participants to develop interpersonal relationships. He also suggested that the anticipation of future interaction resulted in increased relational intimacy of CMC interactions (Walther, 1994). Aragon (2003) suggested that CMC participants be afforded opportunities to get to know each other on a social level in order to increase social presence of the interaction.

RQ1: Is initial FTF interpersonal interaction associated with perceived social presence and quality of subsequent CMC-based discussion?

H1a: Initial FTF interaction focused on exchanging social information will be associated with perceived level of social presence in a subsequent CMC task.

H1b: Initial FTF interaction focused on exchanging social information will be associated with perceived quality of a subsequent CMC task.

The second research question and set of hypotheses seek to determine the association of interpersonal interaction with social presence and quality of CMC discussion tasks via an ancillary CMC-based social interaction opportunity. The theoretical foundation for this research question is the same as for the first research question investigating FTF interaction, but this question seeks to confirm that social interaction via CMC also is associated with social presence and quality of subsequent CMC interaction. The research of Walther (1994; 1995; 1996), Spears and Lea (1992), and Rogers and Lea (2005) indicated that CMC does have the ability to convey significant social information.

RQ2: Is initial CMC-based interpersonal interaction associated with perceived social presence and quality of subsequent CMC-based discussion?

H2a: Initial CMC-based interaction focused on exchanging social information will be associated with perceived level of social presence in a subsequent CMC task.

H2b: Initial CMC-based interaction focused on exchanging social information will be associated with perceived quality of a subsequent CMC task.

The third research question and set of hypotheses seek to assess the relative effects of CMC-based and FTF interpersonal interaction on the levels of social presence and quality of subsequent CMC interaction. Media richness theory holds that FTF communication allows for more exchange of social information than CMC. Slagter van Tryon and Bishop (2009) suggested that participants be given opportunities to interact in a variety of contexts, so they may gather more information to use in their social information processing.

RQ3: Do initial FTF and CMC-based interpersonal interactions differ in the strength of their associations with perceived social presence and quality of subsequent CMC-based discussion?

H3a: Initial FTF interaction focused on exchanging social information will have a stronger association with perceived level of social presence in a subsequent CMC task than a prior CMC-based interaction.

H3b: Initial FTF interaction focused on exchanging social information will have a stronger association with perceived quality of a subsequent CMC task than a prior CMC-based interaction.

The fourth research question and hypothesis seek to assess the association between social presence and quality of discussion. Social presence research indicates that increased social presence in CMC results in increased quality of communication (Gunawardena, 1995; Gunawardena & Zittle, 1997; Kim et al., 2011; Lowry et al., 2006; Lowry et al., 2009; Richardson, 2003).

RQ4: Is social presence associated with quality of CMC-based discussion?

H4: Perceived social presence will be associated with perceived quality of CMC-based discussion.

CHAPTER III: METHODS

Participants

Study participants were college students enrolled in either COMM 1332 Fundamentals of Public Speaking at the College of Liberal Arts & Social Sciences (CLASS) or HRMA 1101 Hospitality Technology at the Conrad N. Hilton College of Hotel and Restaurant Management at the University of Houston (UH). The study represents a convenience sample of $n=118$.

Procedures

The researcher obtained approval from the Committees for the Protection of Human Subjects of UH and the instructors-of-record for COMM 1332 and HRMA 1101. To reduce the threat of cross-condition contamination, participants for the CMC and FTF conditions were recruited from COMM 1332, and participants for the control condition were recruited from HRMA 1101.

The COMM 1332 course consists of a weekly mass lecture (Mondays) for all enrolled students and nine lab sections of 20 to 30 students each that meet twice weekly (Wednesdays and Fridays). In the last five minutes of a mass lecture session, the researcher introduced himself and the purpose of the study and also distributed consent forms to interested students. Potential participants were advised that they should be prepared to commit approximately 45 to 60 minutes—at their convenience and not necessarily at one time—over the course of the next two weeks, and that participants who completed the study would receive extra credit as determined appropriate by the instructor-of-record. The researcher stressed that participation in the study was voluntary, and that a decision to participate or not or to withdraw participation would have no effect on any participant's

standing in any course in which he or she was enrolled. Participants were advised of their right to withdraw from the research at any time and refuse to answer any particular question that made them uncomfortable.

The researcher collected the consent forms of those students who volunteered for the study. Referencing the course roster, the researcher collated the consent forms by the lab section in which each participant was enrolled. For each of the nine lab sections, nine students in the particular lab section were randomly assigned to three groups of three members each (designated as the FTF groups), resulting in 27 FTF-condition groups. From all of the remaining consent forms from COMM 1332 (for all lab sections recombined), three students each were randomly assigned to 34 groups (designated as the CMC groups).

The number of students assigned to each group was determined by a pilot study of the consensus-making task conducted with volunteers from another Communication course, COMM 1302 Introduction to Communication Theory. In the pilot study, participants were assigned to groups of five members each. Responses to the follow-up survey from the pilot study revealed that several participants had difficulty following the discussion threads posted by five individuals. The group size was thus reduced to three members for the experiment.

Student participants were recruited for the control condition from HRMA 1101 following the same procedure used for COMM 1332 to introduce the study and distribute the consent forms. The 42 volunteers from HRMA 1101 were randomly assigned to 14 control-condition groups of three participants each.

Experiment Part I

The first part of the experiment consisted of the social interaction treatments, in which participants exchanged social information either in-person or online. Participants recruited from COMM 1332 (the CMC and FTF groups) were directed to access the Blackboard discussion board for their group to obtain their specific instructions.

Instructions for CMC groups. Participants assigned to CMC-condition groups were instructed to participate in the “get-acquainted” discussion by posting to the discussion board over the course of the next five days:

Since you will be stranded at sea together in next week’s survival task, you should get to know each other better! Over the course of this week, please REPLY to this post and to each other, discussing the following:

1. What are your major and class year (freshman, junior, etc.)?
2. What one CD would you want to have with you if you were shipwrecked?
3. What do you think about Cougar Red Fridays? Do you wear red?
Why or why not?
4. Whatever else you care to talk about!

To be eligible for your extra credit, you must post at least one reply each day to this “get-acquainted” discussion. That means at least one post each day Tuesday through Friday of this week.

Instructions for FTF groups. Participants assigned to FTF-condition groups were instructed to meet in-person with their group members at the end of a lab session, and were given the same discussion prompts as the CMC groups:

This Wednesday, your lab instructor will give you 10 minutes to meet with your teammates. Use this time to talk about:

1. Your major and class year (freshman, junior, etc.)?
2. What one CD would you want to have with you if you were shipwrecked?
3. What do you think about Cougar Red Fridays? Do you wear red?
Why or why not?
4. Whatever else you care to talk about!

To be eligible for your extra credit, you must participate in this 10-minute face-to-face discussion with your teammates.

Experiment Part II

The following week, participants in all three conditions were instructed to access Blackboard to obtain instructions for the consensus-making task and to begin posting to the discussion. The task, adapted from Gordon (2003), presented a stranded-at-sea scenario in which participants were asked to agree on the five items (from a list of 15) that were most important to their survival. (See Appendix C for the complete consensus-making task posting.) All participants were instructed to access the Blackboard discussion board at their convenience over the course of the next five days to attempt to reach consensus on the task. No minimum or maximum amount of time for posting to Blackboard was designated, and the participants were instructed to make their best effort to reach consensus. They were also reminded that they must participate in the discussion to receive the extra credit for the study.

The five-day duration of the task was determined by the pilot study conducted with volunteers from COMM 1302 Introduction to Communication Theory. The pilot task had a duration of seven days. Observation of the discussion boards revealed that most posts occurred within the final three days of the task, and that those participants who contributed from the start of the task expressed anxiety about their “missing” members in the initial days of the task. The consensus-making task was thus reduced to five days in duration for the experiment.

Experiment Part III

At the conclusion of the consensus-making task, the URL for the web-based survey instrument (hosted by Survey Monkey) was posted to each discussion board. Participants were instructed to complete the survey within seven days, and they were reminded that they must complete the survey to receive extra credit. Three unique URLs—one for each experimental condition—were created in Survey Monkey and were directed to three separate but identical surveys (see Appendix D). The participants received the URL for their respective condition so that the data sets could be later identified by condition for analysis.

Measures

Dependent Variables

Perceived quality of computer-mediated interaction. The first dependent variable of this study is the quality of the computer-mediated discussion tasks as perceived by the participants. This variable is measured by a survey instrument (see Appendix D) adapted from Lowry et al. (2009), who developed their survey using validated and reliable scales and measures. The eight items adapted from Lowry et al. (2009) represent four

aspects of communication quality identified by the researchers: discussion efficiency, task discussion effectiveness, process satisfaction, and openness. The survey items use a five-point Likert-scale anchored on “strongly disagree/strongly agree.” The mean score of these items was used in the data analysis.

Perceived social presence of computer-mediated interaction. The second dependent variable of this study is the degree of social presence of the computer-mediated discussion tasks as perceived by the participants. This variable is measured by a survey instrument (see Appendix D) adapted from a survey developed and validated by Kim (2010). The eight items adapted from Kim (2010) represent the four factors of social presence confirmed by the researcher: mutual attention and support, affective connectedness, sense of community, and open communication. The survey items use a five-point Likert-scale anchored on “strongly disagree/strongly agree.” The mean score of these items was used in the data analysis.

Independent Variable

Ancillary interpersonal interaction. The independent variable—interpersonal interaction outside of the computer-mediated discussion tasks—was manipulated by affording different communication contexts for socially-oriented interpersonal interaction in the three experimental conditions: CMC-based interaction between the discussion tasks, FTF interaction between the discussion tasks, or no interaction between the discussion tasks. To encourage subjects to participate in the ancillary interactions, subjects were instructed that the more they participated and the more information they shared, the better their group’s performance might be on the experiment task. Also, groups were consistently

referred to as “teams” in hope of encouraging a motivational competitive spirit, even though the groups would not actually be competing.

Data Analysis

The data collected from participants via the online survey was imported into IBM SPSS Statistics Package 20 for analysis. The data was reviewed to identify obvious response patterns, such as from those participants who responded, “strongly agree” to every survey item. Three sets of patterned responses were excluded from analysis. To track eligibility for extra credit, respondents were instructed to either enter their name on the last screen of the survey or to enter “no credit.” Before removing the identifying names from the data for analysis, each respondent name was checked against the Blackboard discussion boards to verify participation in the task. Four sets of responses were removed because the respondents had not participated in the discussion task.

For data analysis, the 5-item Likert-scale responses (strongly agree, agree, neutral, disagree, strongly disagree) were assigned integer values from +2 to -2. The online survey (hosted by Survey Monkey) was configured to randomize the presentation order of the response scales, per respondent. All survey items related to the measure of *presence* were coded so that a positive value indicated a more positive perception of presence than a negative value. Likewise, all survey items related to the measure of *quality* were coded so that a positive value indicated a more positive perception of quality than a negative value.

Scale Validity and Reliability

To test the validity of the measurement scales for presence and quality, factor analysis was conducted on the 16-item instrument. As shown in Table 2, the principal component analysis revealed three components: the first component comprising items 5

through 16, the second component comprising items 1 and 2, and the third component comprising items 3 and 4.

Table 2
Principal Component Analysis for Measurement Scales

Survey Items	Component			Item-Total Correlation
	1	2	3	
Presence				
1. I respected the others' opinions in making decisions.	.448	.683	.041	.492
2. I felt the other participants respected my opinion in making decisions.	.489	.698	-.143	.493
3. I was influenced by the other participants' moods.	.256	.031	.815	.193
4. I got to learn a great deal about the other participants.	.427	.060	.556	.411
5. I worked with the other participants to complete the task.	.734	.163	.060	.645
6. Even though we did not discuss the survival task face-to-face, I still felt I was part of a group.	.756	-.067	-.202	.560
7. I felt the other participants acknowledged my point of view.	.743	.211	-.211	.638
8. I enjoyed engaging in exchange of ideas with the other participants.	.715	.177	-.066	.655
Quality				
9. The time spent in the online group interaction was efficiently used.	.704	-.158	-.252	.643
10. Issues raised in the online group interaction were discussed thoroughly.	.636	-.201	.168	.597
11. The online discussion was effective.	.787	-.167	.025	.742
12. Participation in the online discussion was evenly distributed.	.655	-.500	-.076	.661
13. Our group discussion process was efficient.	.862	-.073	.145	.813
14. Our group discussion process was satisfying.	.840	-.093	-.039	.793
15. When people communicated to each other in this group, there was a great deal of understanding.	.833	-.094	-.034	.789
16. It was easy to communicate openly to all members of this group.	.700	-.166	-.065	.655

The conceptual overlap between the presence and quality scales revealed by the factor analysis will be discussed in Chapter 5. For the present study, the first component (comprising items 5 through 16) was used as the quality scale, and the second factor (comprising items 1 and 2) was used as the presence scale. The third component (comprising items 3 and 4) was discarded from the data analysis, as the notably low item-total correlations for these items indicated weak reliability (see Table 2).

To test for reliability of the revised scales, Cronbach's alpha was calculated for both presence and quality scales. Based on the resulting $\alpha=0.711$ for the revised presence scale and $\alpha=0.931$ for the revised quality scale, both scales were determined to be reliable at $\alpha>0.700$.

Statistical Analyses

To determine if H1a, H1b, H2a, H2b, H3a, and H3b were supported, one-way ANOVA was conducted to examine the mean differences among the FTF groups, the CMC groups, and the control groups.

Finally, to determine if H4 was supported, two-way ANOVA was conducted to determine if the effects of presence on quality were significant and if they were moderated by experimental condition.

CHAPTER IV: RESULTS

By providing the participants opportunities to interact socially—either in-person or online—prior to a CMC-based consensus-making task, the present study sought to determine if and to what extent the ancillary social interaction would affect the perceived levels of social presence and quality in the subsequent task. Additionally, the present study investigated the relationship between perceived social presence and quality of CMC-based interactions.

Participants

The total number of participants included in the data analysis is $n=118$. The number of participants in the FTF condition is $n=38$; the number of participants in the CMC condition is $n=57$; and the number of participants in the control condition is $n=23$. One hundred and seven students who submitted consent forms subsequently opted out by either not participating in the discussion task or not submitting the follow-up survey.

The gender composition of the total sample is 33.9% ($n=40$) male and 66.1% ($n=78$) female. Students reporting sophomore classification comprise the largest representation (42.4%, $n=50$), followed by juniors (25.4%, $n=30$), freshman (23.7%, $n=28$), and seniors (8.5%, $n=10$). These statistics are summarized in Table 3. Demographic statistics of gender and classification for respective experimental conditions are summarized in Table 4.

Table 3
Gender and Classification Frequencies for Total Sample

Gender	Frequency	Percent
Male	40	33.9
Female	78	66.1
Total	118	100

Classification		
Freshman	28	23.7
Sophomore	50	42.4
Junior	30	25.4
Senior	10	8.5
Total	118	100

Table 4
Gender and Classification Frequencies by Experimental Condition

Gender	CMC		FTF		Control	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	21	36.8	12	31.6	7	30.4
Female	36	63.2	26	68.4	16	69.6
Total	57	100	38	100	23	100

Classification						
Freshman	14	24.6	8	21.1	6	26.1
Sophomore	24	42.1	15	39.5	11	47.8
Junior	13	22.8	12	31.6	5	21.7
Senior	6	10.5	3	7.9	1	4.3
Total	57	100	38	100	23	100

Descriptive Statistics

The means and standard deviations for each survey item of the revised scales are summarized in Table 5.

Table 5
Means and Standard Deviations by Survey Item and Condition

Survey Item	CMC		FTF		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Presence						
I respected the others' opinions in making decisions.	1.4211	.73064	1.4211	.59872	1.0870	.66831
I felt the other participants respected my opinion in making decisions.	1.2456	.91184	1.2895	.76786	.7391	.91539
Quality						
I worked with the other participants to complete the task.	1.0351	.75510	.9474	.86828	.4348	.78775
Even though we did not discuss the survival task face-to-face, I still felt I was part of a group.	.8772	.84664	.7632	.91339	.4348	.94514
I felt the other participants acknowledged my point of view.	1.0526	.69233	1.0789	.88169	.4783	.66535
I enjoyed engaging in exchange of ideas with the other participants.	1.1228	.78080	.8158	.83359	.5652	.84348
The time spent in the online group interaction was efficiently used.	.6667	.89310	.7895	.93456	.2609	1.00983
Issues raised in the online group interaction were discussed thoroughly.	.2982	.90564	.4737	1.00638	.0870	.73318
The online discussion was effective.	.4561	1.03631	.3684	1.12517	.0870	.94931
Participation in the online discussion was evenly distributed.	.2281	1.03540	.2895	1.03735	-.4348	1.12112
Our group discussion process was efficient.	.4737	1.07080	.5000	1.05907	.0435	1.06508
Our group discussion process was satisfying.	.5088	.92819	.6053	1.00107	-.0870	1.04067
When people communicated to each other in this group, there was a great deal of understanding.	.7018	.84441	.8158	.92577	.3478	.88465
It was easy to communicate openly to all members of this group.	.7193	.92107	.9474	.86828	.3043	1.14554

The means and standard deviations for the groups of survey items relating to each variable (presence and quality) are summarized in Table 6.

Table 6
Means and Standard Deviations by Dependent Variable and Condition

Dependent Variable	CMC		FTF		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Presence	.9189	.47861	.8397	.58697	.5000	.54225
Quality	.5066	.72750	.6310	.83486	.0761	.73444

Hypothesis Testing

ANOVA Post Hoc Tests

Presence. To test the hypotheses related to the dependent variable of presence, ANOVA post hoc tests were conducted using the Bonferroni technique to compare the experimental conditions (see Table 7).

Table 7
ANOVA Post Hoc Comparison of Mean Differences (Presence) among Experimental Conditions

Dependent Variable	(I) Condition	(J) Condition	Mean Difference (I-J)	Standard Error	Significance
Presence	Control	CMC	-.42029*	.16762	.041
		FTF	-.44222*	.17926	.045
	CMC	Control	.42029*	.16762	.041
		FTF	-.02193	.14210	1.000
	FTF	Control	.44222*	.17926	.045
		CMC	.02193	.14210	1.000

* The mean difference is significant at the 0.05 level.

Hypothesis H1a predicted that initial FTF interaction focused on exchanging social information would be associated with perceived level of social presence in a subsequent CMC task. ANOVA post hoc tests comparing the social presence measures of the FTF groups and the control groups indicated that H1a was supported at the 0.05 level.

Hypothesis H2a predicted that initial CMC interaction focused on exchanging social information would be associated with perceived level of social presence in a subsequent CMC task. ANOVA post hoc tests comparing the social presence measures of the CMC groups and the control groups indicated that H2a was supported at the 0.05 level.

Hypothesis H3a predicted that initial FTF interaction focused on exchanging social information would have a stronger association with perceived level of social presence in a subsequent CMC task than a prior CMC-based interaction. ANOVA post hoc tests comparing the social presence measures of the CMC groups and the FTF groups indicated that H3a was not supported at the 0.05 level.

Quality. To test the hypotheses related to the dependent variable of quality, ANOVA post hoc tests were conducted using the Bonferroni technique to compare the experimental conditions (see Table 8).

Hypothesis H1b predicted that initial FTF interaction focused on exchanging social information would be associated with perceived level of quality in a subsequent CMC task. ANOVA post hoc tests comparing the quality measures of the FTF groups and the control groups indicated that H1b was supported at the 0.05 level.

Hypothesis H2b predicted that initial CMC interaction focused on exchanging social information would be associated with perceived level of quality in a subsequent

Table 8
ANOVA Post Hoc Comparison of Mean Differences (Quality) among Experimental Conditions

Dependent Variable	(I) Condition	(J) Condition	Mean Difference (I-J)	Standard Error	Significance
Quality	Control	CMC	-.46822*	.17010	.021
		FTF	-.48942*	.18191	.025
	CMC	Control	.46822*	.17010	.021
		FTF	-.02120	.14421	1.000
	FTF	Control	.48942*	.18191	.025
		CMC	.02120	.14421	1.000

* The mean difference is significant at the 0.05 level.

CMC task. ANOVA post hoc tests comparing the quality measures of the CMC groups and the control groups indicated that H2b was supported at the 0.05 level.

Hypothesis H3b predicted that initial FTF interaction focused on exchanging social information would have a stronger association with perceived level of quality in a subsequent CMC task than a prior CMC-based interaction. ANOVA post hoc tests comparing the quality measures of the CMC groups and the FTF groups indicated that H3b was not supported at the 0.05 level.

Two-Way ANOVA

Hypothesis H4 predicted that perceived social presence would be associated with perceived quality of CMC-based discussion. To determine if H4 was supported, two-way ANOVA was conducted to determine if the effects of presence on quality were significant and if they were moderated by experimental condition. The analyses revealed that the significant effects of presence on quality were not moderated by experimental condition, thus supporting H4 (see Table 9).

Table 9

Two-Way ANOVA of Effects of Presence on Quality by Condition

Source	Mean Square	F	Significance
Condition	2.132	5.137	.007
Presence	6.318	15.225	.000
Condition*Presence	.443	1.067	.347

Dependent Variable: Quality

CHAPTER V: DISCUSSION

The present study sought to determine if social interaction, via either CMC or FTF, prior to a computer-mediated discussion task has an impact on the levels of social presence and quality perceived by participants in the task. Consistent with Aragon (2003) and Walther (1995), the results indicate that participants who interacted socially prior to the task, via either CMC or FTF, perceived the task to be significantly higher in social presence and quality than participants who were not afforded the opportunity to interact socially prior to the task. The findings of this study augment existing social presence research by suggesting that social presence “carries over” from one communication context to another, and it is thus not determined by the characteristics of the immediate context—FTF or CMC—of a specific interaction. In other words, once communicators have established a sense of social connectedness with their communication partners, whether in person or online, they maintain this sense of social presence throughout subsequent CMC interactions. This suggestion is consistent with socio-psychological research in social presence (e.g., Spears & Lea, 1992; Walther, 1995) that indicates social presence is not determined exclusively by the capacity of media to convey social information.

The *resiliency* of social presence suggested by the present study is also consistent with the SIP perspective (Walther, 1992, 1995, 1996) that CMC communicators develop relationships over time and messages. Social presence should thus not be viewed as a characteristic of a specific CMC interaction that exists at a given point in time, but rather as an ongoing process of relationship development. I suggest that this distinction may account for much of the difficulty of social presence research to operationalize or even define social presence. Future social presence research may be advanced by regarding the

concept as a developmental process and as a descriptive quality of communication, rather than a quantifiable factor of specific CMC interactions. This recommendation is supported by the finding of the present study that socially focused FTF interaction significantly affected perceptions of social presence and quality of subsequent CMC-based interactions. The social presence of a CMC interaction may not be determined solely within the context of the interaction itself, but may rather be impacted by the relational state of the communicators both within and without the mediated context. Based on the findings of the present study, future research should explore the implications of longitudinal mixed-mode interactions on social presence.

Theoretical Implications

Contrary to expectations guided by the both cues-filtered-out and SIP perspectives, the present study did not find that prior FTF interaction resulted in significantly higher perceptions of social presence or quality than did prior CMC-based interaction. The cues-filter-out perspective (e.g., Daft & Lengel, 1984; Kiesler et al., 1984; Rutter et al., 1984;) considers FTF interaction to be the “gold standard” in the exchange of social information. The SIP perspective (e.g., Walther, 1992, 1995) holds that CMC users require more time and messages to exchange social information than FTF communicators. Ensuring that communicators in the FTF and CMC conditions of this study had equal opportunity for social interaction is admittedly problematic, given the fundamental differences between the synchronous FTF context and the asynchronous CMC context. Accepting the intent of the procedure to equate ten minutes of FTF interaction with the exchange of at least four online messages over the course of five days, the present study expected communicators in the FTF condition to report higher levels of connectedness and quality of interaction than

participants in the CMC condition. CMC participants did not have access to the visual and nonverbal cues that were available to the FTF participants, nor did they take advantage of the five-day duration of the online social-orientation discussion to exchange additional messages or social information. This level of participation in the online discussion was anticipated from the pilot study, and it was taken into account when proposing the chronometric equivalency of the CMC and FTF interactions.

The ability of the CMC participants to establish a level of social presence that is statistically comparable to the FTF participants may be explained, I propose, by considering the process of impression formation that is suggested by the hyperpersonal model of CMC. Working primarily from the foundation of SIP, Walther (2007) articulated the hyperpersonal model, in which he also recognized elements of the cognitive processes identified by SIDE. Specifically, the hyperpersonal model shares with SIDE the assumption that CMC users tend to form stereotyped—or hyperpersonal—impressions from the limited social information available to them through the medium. The hyperpersonal model goes beyond SIDE, though, in describing additional interpersonal and social mechanisms of communication that may operate over time in CMC (Hancock & Dunham, 2001). Moreover, communicators are presumed by Walther (1996, 1997, 2007) to strategically take advantage of these mechanisms to engage in what he termed *selective self-presentation*.

To explain these mechanisms and how they impact impression formation and management, Walther (2007) identified four characteristics of CMC that facilitate self-presentation. The first characteristic is edit-ability of messages. In contrast to FTF interaction, CMC interaction allows a user to modify a message before transmitting it, and

even to scrap an unsent message entirely and start over. Relatedly, the second characteristic identified by Walther (2007) is the affordance of more time in which to construct and refine a message prior to transmitting it. CMC also reduces the social awkwardness of FTF wherein messages can only be amended after the message is uttered. The third characteristic of CMC is the masking of involuntary cues, since the communicators are physically isolated from one another: “That is, senders do not exude their natural physical features and non-deliberate actions into the receiver’s realm of perception” (Walther, 2007, p. 2541). CMC users take advantage of this characteristic of CMC to suppress undesirable affect or attitude and to selectively accentuate the information that they do wish to convey. The fourth affordance of CMC that Walther (2007) identified is the reallocation of cognitive resources. In FTF contexts, significant cognitive resources are devoted to scanning the environment and managing nonverbal communication. In CMC, those resources are freed, and they are reallocated to message production and reception. Taken together, these four characteristics of CMC and the socio-communicative processes they facilitate may result in more intense (i.e., hyperpersonal) interpersonal impressions (Hancock & Dunham, 2001).

The finding of the present study that participants in the CMC social-orientation condition felt just as connected to their communication partners as participants in the FTF condition may thus be explained by the hyperpersonal model of CMC. The CMC users, through cognitive “over-attributions” regarding others and deliberately edited messages, may have formed very strong interpersonal impressions of their teammates, even in a very limited exchange of messages. These CMC-enhanced interpersonal impressions may have rivaled the impressions formed by FTF participants in effect, resulting in similar

perceptions of connectedness with their communication partners.

I further propose a context-matching component to account for the CMC users' perception of presence in the subsequent online task. According to the hyperpersonal perspective, CMC users strategically manage their self-presentation, and they form impressions of their partners based on their partners' strategic self-presentation. For the participants in the CMC social-orientation condition, the basis of the relationships in the subsequent CMC task was *consistent* was the impressions formed in the prior CMC social-orientation discussion. Self-presentation and impression formation processes are different in FTF interaction (Hancock & Dunham, 2001; Walther, 2007), so those participants who met face-to-face for social interaction may have had to recalibrate their impressions of others in the subsequent CMC task, thus moderating the potentially presence-enhancing effects of the nonverbal social cues they gained via their prior FTF socialization.

Limitations of the Present Study

A potential limitation of the present study is that—even though survey respondents were instructed to answer the questions in relation *only* to the CMC consensus-making task—the CMC-condition participants may not have distinguished between the initial CMC social-orientation discussion and the subsequent CMC consensus-making task in their responses. Such a cognitive confluence of the parts of the experiment may have affected the perceptions of presence and quality reported by these participants.

Other potential limitations of the present study are the small sample size and the limited number of messages that participants exchanged over the duration of the consensus-making task. The number of participants who followed through with the experiment by participating in the tasks and submitting the survey ultimately determined

the sample size. The attrition rate was 52%, with 225 potential participants volunteering for the experiment by submitting consent forms and 118 participants completing the experiment. While participants were encouraged to post frequently to the discussion over the five-day task, the mean number of posts per participant was $M=3.39$, which was lower than the instructed minimum of four posts required to receive extra credit for participating. This low level of participation may have affected the results. Future experimental research should ensure that subjects are sufficiently motivated to participate in the task.

Future research should also control for familiarity of the participants with the communication technology. The pilot study revealed that, even though Blackboard is the officially sanctioned tool for course-related communication at UH, many students were unfamiliar with the process of posting and replying to message threads. To assist participants in the ensuing experiment, specific directions and “tips” for posting to Blackboard were included in the task instructions. However, it is possible that the participants who interacted via Blackboard for the social-orientation phase of the experiment became more familiarized with the technical aspects of the tool than the participants who interacted FTF for the social-orientation phase. Increased familiarity with the technology may have affected their perceived levels of social presence and interaction quality. Also, student participants are aware that instructors have access to the discussion boards on Blackboard, which may have inhibited their social interactions.

Also, factor analysis revealed significant overlap in the instruments used in this study to measure presence (based on Kim, 2010) and quality (based on Lowry, et al., 2009). For example, both of the conceptualizations adopted in this study include measures for “openness of communication” as one of each of their four dimensions. The survey

instrument included two questions each (for a total of four unique questions) related to openness intended to assess presence and quality. While the positive correlations between social presence and quality found in the present study are consistent with the findings of other research (e.g., Gunawardena, 1995; Gunawardena & Zittle, 1997; Kim et al., 2011; Lowry et al., 2006; Richardson, 2003), the question remains for future research whether the operationalization of social presence used here (based on Kim, 2010), is sufficiently distinct from other concepts and qualities of computer-mediated interactions.

Practical Implications

The practical implications of the present study for managers and educators are clear. Affording employees and students opportunities to interact socially prior to participating in task-oriented CMC significantly increases the perception of both the quality of the interaction as well as the connectedness among communication partners. The present study also indicates that relatively little time for social interaction is required for participants to report significantly improved levels of quality and social presence in subsequent task-based interaction. In the FTF condition, participants interacted socially for 10 minutes prior to the task-based interaction. In the CMC condition, participants were instructed to post four times to the social-orientation discussion board over the course of five days. The significant differences found between participants who interacted previously and participants who did not suggest that even a *little* prior social interaction goes a long way in increasing perceptions of the quality of subsequent online tasks.

The findings of the present study may be leveraged to improve the quality of computer-mediated interpersonal interactions across a broad range of learning and business contexts. The instructor of a distance education course, for example, would be well advised

to provide opportunities for students to interact with each other socially at the start of the course, before any team-based coursework is initiated. Assigning small groups of students to separate discussion boards for this interaction would not only enhance their perception of psychological connection to their peers, but their familiarity with the technological tool would also be enhanced. If the students subsequently perceive that their online interactions are of higher quality, they may rate the course and instructor more positively in the course evaluation, and the thoughtful instructor may be rewarded appropriately in his or her compensation review.

Practical implications also abound for business and industry. The thoughtful hotel manager, for example, may provide opportunities for staff in different functions to interact socially. In a large hotel, staff serving in front-of-house functions, such as front desk clerks and reservation agents, may interact with staff serving in back-of-house functions, such as accounting, human resources, and housekeeping management, primarily via CMC in the course of a typical work day. By providing brief opportunities for informal social interaction, such as monthly coffee-and-donut get-togethers in an unused meeting room, the hotel manager may find that staff members perceive their subsequent CMC interactions to be more personable and of higher quality.

Not all CMC interactions are candidates for improvement via social interaction, though. A customer service chat session is one example of such an interaction. When a customer signs on to an online chat session to lodge a complaint or resolve a problem, he or she is seeking quick and efficient redress of their issue, not an informal social chat with the representative. The present study has shown the potential for informal social interaction to improve the quality of computer-mediated discussion, but it may not be appropriate for

all contexts, particularly for one-shot chat sessions focused on immediate problem resolution.

While the present study reinforces the need for continued research in social presence—from the standpoints of both conceptualization and operationalization—it also clearly indicates that social interaction, however brief and whether in-person or online, results in enhanced perceptions of both social connectedness and quality of CMC-based interactions. In practice, managers and educators who assemble teams with zero or limited history should unwrap this beneficial tool by providing opportunities for group members to interact on a social level—even briefly, and in-person or online—before diving into a CMC-based team task.

APPENDIX A

Pattern Matrix of Social Presence Scale (Kim, 2010)

<i>Factor</i>	<i>Item</i>	<i>Factor loading</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Mutual attention and support	I respected the others' opinions in making decisions	0.895	-0.048	0.074	0.028
	I felt the other participants respected my opinion in making decisions	0.727	0.077	0.128	0.131
	What the others did affected what I did	0.577	0.076	-0.175	-0.097
	I tried to concentrate on our discussion	0.527	-0.049	-0.123	0.023
	I paid close attention to the other participants	0.451	0.129	-0.155	0.037
	Online group activities helped me learn efficiently	0.446	0.064	-0.102	0.115
Affective connectedness	I was able to be personally close to other participants in the class	-0.079	0.807	-0.169	-0.040
	I enjoyed sharing personal stories with the other participants	-0.016	0.796	0.104	0.078
	I got to learn a great deal about the other participants in the class	-0.015	0.652	-0.242	0.029
	I was influenced by the other participants' moods	0.103	0.563	0.077	0.036
	I called the other participants by their names	0.039	0.538	0.010	0.007
Sense of community	Even though we were not physically together in a traditional classroom, I still felt I was part of a group	0.103	0.085	-0.775	-0.035
	I was able to form a sense of community	0.118	0.088	-0.639	0.082
	I felt the other participants tried to form a sense of community	-0.001	0.024	-0.638	0.107
	I worked with the other participants to complete the task	0.088	-0.043	-0.592	0.242
Open communication	I felt the other participants acknowledged my point of view	0.043	0.016	-0.011	0.770
	My opinions were clear to the other participants	-0.043	-0.045	-0.030	0.759
	I enjoyed engaging in exchange of ideas with the other participants	0.082	0.178	-0.112	0.527
	I easily understood how the other participants reacted to my comments	0.071	0.101	-0.029	0.522

APPENDIX B

Measures Used in Lowry, et al. (2009)

<i>Latent variable (type)</i>	<i>Items</i>
Interactivity (second-order)	<p><i>Subconstruct: control (reflective):</i></p> <p>Ctnl1: I felt that I had a great deal of control over my communication in this group.</p> <p>Ctnl2: While I was involved in this group, I could choose freely what I wanted to hear/read and say/contribute.</p> <p>Ctnl3: While involved in this group, I had absolutely no control over my communication.*</p> <p>Ctnl4: While involved in this group, my actions determined the kind of experiences I had.</p> <p><i>Subconstruct: two-way communication (reflective):</i></p> <p>Two1: The facilitator effectively gathered group members' feedback.</p> <p>Two2: The group environment facilitated two-way communication between group members and the facilitator.</p> <p>Two3: It was difficult to offer feedback to the facilitator.*</p> <p>Two4: The facilitator made me feel he or she wanted to listen to the group members.</p> <p>Two5: The facilitator did not at all encourage group members to communicate.*</p> <p>Two6: The group environment gave group members the opportunity to communicate.</p> <p><i>Subconstruct: synchronicity (reflective):</i></p> <p>Synch1: The facilitator processed my input very quickly.</p> <p>Synch 2: Getting information from the facilitator was very fast.</p> <p>Synch 3: In the group environment, I was able to obtain the information I wanted without any delay.</p> <p>Synch4: When I communicated with the facilitator, I felt I received instantaneous information.</p> <p>Synch 5: The facilitator was very slow in responding to my requests.* (dropped) *</p>
Discussion efficiency (reflective)	<p>Eff1: To what extent would you agree that this group interaction was result oriented?</p> <p>Eff2: The time spent in the group interaction was efficiently used.</p> <p>Eff3: Issues raised in the group interaction were discussed thoroughly.</p>
Task discussion effectiveness (formative)	<p>Taskd1: The discussions were ineffective.*</p> <p>Taskd2: The context of the discussions was carelessly developed.*</p> <p>Taskd3: Issues were examined effectively.</p> <p>Taskd4: Participation in the discussions was unevenly distributed.*</p> <p>Taskd5: Ideas in the discussions were uncritically examined.*</p> <p>Taskd6: The amount of information exchanged was sufficient.</p>

<i>Latent variable (type)</i>	<i>Items</i>
Process satisfaction (formative)	<p>Satp1: Our group discussion process was efficient.</p> <p>Satp2: Our group discussion process was uncoordinated.* <i>continues</i></p> <p>Satp3: Our group discussion process was unfair.*</p> <p>Satp4: Our group discussion process was understandable.</p> <p>Satp5: Our group discussion process was satisfying.</p>
Openness (reflective)	<p>Open1: It was easy to communicate openly to all members of this group.</p> <p>Open2: Communication in this group was very open.</p> <p>Open3: When people communicated to each other in this group, there was a great deal of understanding.</p> <p>Open4: It was easy to ask advice from any member of this group.</p> <p>Open5: We needed to adapt our style of communication to effectively communicate.*</p>
Status effects (reflective)	<p>Stat1: Some group members tried to intimidate others, e.g., by talking loudly, using aggressive gestures, making threats, etc.</p> <p>Stat2: Some group members tried to use their influence, status, or power so as to force issues on the other group members.</p> <p>Stat3: I felt inhibited from participating in the interaction because of the behavior of other group members.</p> <p>Stat4: I experienced pressure, either to conform to a particular viewpoint or to not contradict others.</p>
<p><i>Notes:</i> All items use a seven-point Likert-type scale anchored on “strongly disagree/strongly agree.”</p> <p>* = reverse coded.</p>	

APPENDIX C

Survival Equipment Consensus-Making Task

Ahoy! Welcome to this exercise in group decision-making, and thank you for your participation. In this exercise, your team is to reach consensus (agreement) on what the FIVE most important items to your survival are, and to put them in rank order from most important to less important. The scenario and the items to rank are presented in the message entitled "Ready, Set, Survive!"

Consensus is difficult to reach. Therefore, the decision on what items are most important may not meet with everyone's complete approval. As a team, try to make a decision with which all members can at least partially agree.

This Blackboard discussion thread will be open through Friday 2/24 at 5pm. Please limit your discussion of this task to Blackboard (i.e., do not meet to discuss it in person). Please make your best effort to check and post to the discussion daily, and help your team survive being stranded at sea!

Important info to receive credit!

By the end of the discussion on Friday at 5pm, post your team's five most important items—in rank order from 1 (most important) to 5 (less important)— with "FINAL ANSWER" as the subject line.

In the event that your team has not been able to reach consensus after making your best effort over the course of the week, create a message posting with "FINAL ANSWER" as the subject and type "not able to reach consensus" in the body of the posting.

Your team must post a “FINAL ANSWER” in order to receive credit for participating in this exercise. Only one person on your team needs to post the FINAL ANSWER.

As an individual, you should contribute at least one post every day (Tuesday thru Friday) to receive credit for participating.

You must enter your name in the online survey at the end of the experiment to receive credit for participating. Your name will not be associated with your responses in the data analysis; it will be used for the sole purpose of assigning you credit for participating.

There may be a couple of teams in which members have opted not to participate for their extra credit, in which case it may seem that you are “talking to yourself.” Please continue to post, as that is also useful data for the study. You will receive credit for your individual participation.

Ready, Set, Survive!!!

You are adrift on a private yacht in the South Pacific. As a consequence of a fire of unknown origin, much of the yacht and its contents have been destroyed. The yacht is now slowly sinking. Your location is unclear because of the destruction of critical navigational equipment and because you and the crew were distracted trying to bring the fire under control. Your best estimate is that you are approximately one thousand miles south-southwest of the nearest land. Following is a list of fifteen items that are intact and undamaged after the fire. In addition to these articles, you have a serviceable, rubber life raft with oars. The raft is large enough to carry you, the crew, and all the items in the

following list. The total contents of all survivors' pockets are a package of cigarettes, several books of matches, and five one-dollar bills.

As a team, your task is to agree on the FIVE most important items in terms of your survival, and put them in rank order, from 1 (most important) to 5 (less important).

- _____ Sextant
- _____ Shaving mirror
- _____ Five-gallon can of water
- _____ Mosquito netting
- _____ One case of U.S. Army C rations
- _____ Maps of the Pacific Ocean
- _____ Seat cushion (flotation device approved by the Coast Guard)
- _____ Two-gallon can of oil-gas mixture
- _____ Small transistor radio
- _____ Shark repellent
- _____ Twenty square feet of opaque plastic
- _____ One quart of 160-proof Puerto Rican rum
- _____ Fifteen feet of nylon rope
- _____ Two boxes of chocolate bars
- _____ Fishing kit

Begin your discussion NOW by "replying" to this message! What do YOU think you need most to survive? Continue your discussion by replying to your teammates' posts.

Remember to post your FINAL ANSWER by Friday at 5pm. Refer to the "Read Me First" post for complete requirements to receive your extra credit.

TIPS: Click the "Expand All" button at the top left of the Blackboard discussion box to easily follow along with all of your teams' postings. Click the "Reply" button to post to the discussion.

There is no “right or wrong” answer for the purpose of this exercise. What's important is that you reach consensus as a team. After your task is completed, the published “expert” opinion of what the most important items are and why will be posted, so that you can compare your team’s answer.

After this task closes on Friday, I will post the URL for the short online survey that you must submit by the following Friday, March 2 at 5pm to be eligible to receive your extra credit.

Answer and rational sheet.

(Posted at the completion of the survival task.)

According to the “experts,” the basic supplies needed when a person is stranded in mid-ocean are articles to attract attention and articles to aid survival until rescuers arrive. Articles for navigation are of little importance: Even if a small life raft were capable of reaching land, it would be impossible to store enough food and water to subsist during that period of time. Therefore, of primary importance are the shaving mirror and the two-gallon can of oil-gas mixture. These items could be used for signaling air-sea rescue. Of secondary importance are items such as water and food, e.g., the case of Army C rations.

A brief rationale is provided for the ranking of each item. These brief explanations obviously do not represent all of the potential uses for the specified items but, rather, the primary importance of each.

1. Shaving mirror: Critical for signaling air-sea rescue.
2. Two-gallon can of oil-gas mixture: Critical for signaling—the oil-gas mixture will float on the water and could be ignited with a dollar bill and a match (obviously, outside the raft).
3. Five-gallon can of water: Necessary to replenish loss from perspiring, etc.
4. One case of U.S. Army C rations: Provides basic food intake.
5. Twenty square feet of opaque plastic: Utilized to collect rain water, provide shelter from the elements.
6. Two boxes of chocolate bars: A reserve food supply.
7. Fishing kit: Ranked lower than the candy bars because “one bird in the hand is worth two in the bush.” There is no assurance that you will catch any fish.
8. Fifteen feet of nylon rope: May be used to lash equipment together to prevent it from falling overboard.
9. Floating seat cushion: If someone fell overboard, it could function as a life preserver.
10. Shark repellent: Obvious.
11. One quart of 160-proof Puerto Rican rum: Contains 80 percent alcohol—enough to use as a potential antiseptic for any injuries incurred; of little value otherwise; will cause dehydration if ingested.
12. Small transistor radio: Of little value because there is no transmitter (unfortunately, you are out of range of your favorite radio stations).

13. Maps of the Pacific Ocean: Worthless without additional navigational equipment—it does not really matter where you are but where the rescuers are.

14. Mosquito netting: There are no mosquitoes in the mid-Pacific Ocean.

15. Sextant: Without tables and a chronometer, relatively useless.

The basic rationale for ranking signaling devices above life-sustaining items (food and water) is that without signaling devices there is almost no chance of being spotted and rescued. Furthermore, most rescues occur during the first thirty-six hours, and one can survive without food and water during this period.

APPENDIX D**Survey Instrument**

My classification is: freshman sophomore junior senior

I am: female male

(All items use a five-point Likert-scale anchored on ‘strongly disagree/strongly agree.’)

Social Presence (adapted from Kim, 2010)

1. I respected the others’ opinions in making decisions.
2. I felt the other participants respected my opinion in making decisions.
3. I was influenced by the other participants’ moods.
4. I got to learn a great deal about the other participants.
5. I worked with the other participants to complete the task.
6. Even though we did not discuss the survival task face-to-face, I still felt I was part of a group.
7. I felt the other participants acknowledged my point of view.
8. I enjoyed engaging in exchange of ideas with the other participants.

Discussion Quality (adapted from Lowry et al., 2009)

9. The time spent in the online group interaction was efficiently used.
10. Issues raised in the online group interaction were discussed thoroughly.
11. The online discussion was effective.
12. Participation in the online discussion was evenly distributed.
13. Our group discussion process was efficient.
14. Our group discussion process was satisfying.
15. When people communicated to each other in this group, there was a great deal of understanding.
16. It was easy to communicate openly to all members of this group.

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