



ELSEVIER

Available online at www.sciencedirect.com

SCIENCE @ DIRECT®

Computers in Human Behavior 22 (2006) 518–544

Computers in
Human Behavior

www.elsevier.com/locate/comphumbeh

A self-awareness approach to computer-mediated communication

Mike Z. Yao *, Andrew J. Flanagin

Department of Communication, University of California – Santa Barbara, Santa Barbara, CA 93106, USA

Available online 18 December 2004

Abstract

Many explanations of both pro- and anti-social behaviors in computer-mediated communication (CMC) appear to hinge on changes in individual self-awareness. In spite of this, little research has been devoted to understanding the effects of self-awareness in CMC. To fill this void, this study examined the effects of individuals' public and private self-awareness in anonymous, time-restricted, and synchronous CMC. Two experiments were conducted. A pilot experiment tested and confirmed the effectiveness of using a Web camera combined with an alleged online audience to enhance users' public self-awareness. In the main study users' private and public self-awareness were manipulated in a crossed 2×2 factorial design. Pairs of participants completed a Desert Survival Problem via a synchronous, text-only chat program. After the task, they evaluated each other on intimacy, task/social orientation, formality, politeness, attraction, and group identification. The results suggest that a lack of private and public self-awareness does not automatically lead to impersonal tendencies in CMC as deindividuation perspectives of CMC would argue. Moreover, participants in this study were able to form favorable impressions in a completely anonymous environment based on brief interaction, which lends strong support to the idealization proposed by hyperpersonal theory. Findings are used to modify and extend current theoretical perspectives on CMC.

© 2004 Elsevier Ltd. All rights reserved.

Keywords: Computer-mediated communication; CMC, Self-awareness; Impression formation; Hyperpersonal theory

* Corresponding author. Tel.: +1 805 893 7892.

E-mail addresses: zyao00@umail.ucsb.edu (M.Z. Yao), flanagin@comm.ucsb.edu (A.J. Flanagin).

1. Introduction

Early perspectives on computer-mediated communication (CMC) suggested that the text-based and visually anonymous environment endemic to CMC lacked the capacity to deliver rich social information (see [Culnan & Markus, 1987](#) and [Walther, 1996](#) for reviews). Therefore, it was claimed that CMC inherently hindered interpersonal communication or even encouraged the development of uninhibited interpersonal interactions such as “flaming” ([Kiesler, Siegel, & McGuire, 1984](#); [Siegel, Dubrovsky, Kiesler, & McGuire, 1986](#); [Sproull & Kiesler, 1991](#)).

More recent research has challenged this deterministic view. For example, the Social Identity Model of Deindividuation Effects (SIDE) ([Postmes, Spears, & Lea, 2000, 2002](#); [Reicher, Spears, & Postmes, 1995](#)) proposes that the visually anonymous environment of CMC heightens one’s sensitivity to group and social identities, and how an individual acts in CMC depends on the salience of the individual’s group identity and the norms of the group in which the individual is communicating ([Postmes, Spears, & Lea, 1998](#); [Reicher et al., 1995](#); [Spears & Lea, 1992, 1994](#); see also [Lee & Nass, 2002](#)). In addition, [Walther \(1992\)](#) found that, over time, CMC users adapted to the computer-mediated environment and developed interpersonal relationships similar to relationships formed face-to-face, or that even exceeded their personalness in key ways ([Walther, 1996](#)). Finally, individual personality traits have been shown to influence group outcomes in computer-mediated teams ([Thatcher & De LaCour, 2003](#)). These perspectives represent a migration in CMC research away from technologically deterministic explanations premised thinly on the notion of deindividuation, and toward a more complete consideration of contextual, social, and cognitive factors that more fully explain individuals’ attitudes and behaviors in this context.

This evolution parallels social psychological research in the last few decades that has identified anonymity and the lack of self-awareness as two of the most important conditions that may lead to the state of deindividuation (e.g., [Diener, 1980](#); [Duval & Wicklund, 1972](#); [Zimbardo, 1969](#)). However, although extensive research has been devoted to understanding the effects of anonymity in CMC, very few empirical studies have examined the influence of self-awareness in this context. Thus, this study proposes individual self-awareness as a crucial variable serving to partially reconcile disparate perspectives on individual behaviors within CMC.

To do this, CMC theories are reviewed in relation to key concepts from the self-awareness perspective. Three dominant CMC theories are then discussed from the standpoint of self-awareness and are reconsidered with regard to how self-awareness can influence communicative behavior. Next, two experiments are reported that together test the effects of individuals’ private and public self-awareness in anonymous, time-restricted, synchronous CMC. Finally, results are interpreted within these theoretical contexts, and appropriate extensions and modifications are proposed.

1.1. Social and cognitive factors in CMC research

Walther's (1992, 1994, 1996, 1997) research has clearly shown that contextual factors such as communication duration (i.e., long-term vs. short-term) and the expectation of future interaction can dramatically alter the ways in which people act in CMC. Impersonal, task-oriented communication occurs mainly in short-term and time-limited CMC conditions (Walther, 1992, 1997). Moreover, numerous studies from the SIDE perspective (e.g., Postmes et al., 1998; Postmes, Spears, & Lea, 2002; Postmes, Spears, Sakhel, & de Groot, 2001; Reicher et al., 1995; Spears & Lea, 1992) provide evidence that anonymous CMC can actually enhance social influences, such as perceived situational group norms, if an individual has a salient group identity. Hence, the way in which users interact in CMC varies from situation to situation. Thus, the core concern of CMC research should no longer be a focus on the features of the medium. Instead, "the worthwhile challenge is to find how CMC properties interact with social and cognitive factors in predictable and potentially controllable ways, leading to variable behaviors and judgments" (Walther, 1997, p. 343).

Although recent CMC research has begun to recognize the importance of social and situational influences (e.g., time and identifiability) upon users' behavior (e.g., Postmes et al., 1998, 2002; Postmes et al., 2001; Walther, 1992, 1996, 1997), few studies have examined the influence of psychological factors. Nonetheless, many psychological and cognitive variables have been identified by a wide range of perspectives in social psychology as crucial mediating behavioral factors (Duval & Wicklund, 1972; Mead, 1934; Scheier & Carver, 1980, 1988). For example, *individual self-awareness* has been linked to self-evaluation (Duval & Wicklund, 1972), deindividuation (Festinger, Pepitone, & Newcomb, 1952; Singer, Brush, & Lublin, 1965; Zimbardo, 1969), conformity (Duval & Wicklund, 1972; Insko, Worchel, Songer, & Arnold, 1973; Scheier & Carver, 1980), and self-disclosure (Franzoi, Davis, & Markwiese, 1990; Joinson, 2001). These same phenomena have also been the focus of a great deal of CMC research.

Deindividuation, for example, is often seen as a key factor that may influence CMC (e.g., Kiesler et al., 1984; Reicher et al., 1995). According to the theory of deindividuation (Diener, 1980; Zimbardo, 1969), some social conditions, such as being in a large crowd or being anonymous, may cause individuals to decrease their self-awareness and cease to view themselves as distinct individuals (i.e., they are "deindividuated"). This lack of self-awareness and increased deindividuation may lead to a reduction of self-evaluation (Duval & Wicklund, 1972) which can cause anti-normative and uninhibited behavior (Festinger et al., 1952; Singer et al., 1965; Zimbardo, 1969). Some CMC researchers believe that reduced social cues within CMC may provide an environment in which individuals are deindividuated (Kiesler et al., 1984). Much of the debate in CMC research surrounds the question of when, under what conditions, and in what ways deindividuation may influence behaviors in CMC. Because self-awareness and deindividuation have been consistently linked (Diener, 1980; Zimbardo, 1969), changes in self-awareness have been proposed to account for both pro- and anti-social behaviors in CMC (Joinson, 2001).

Despite its relevance, however, few studies have carefully explicated, explicitly measured, or closely examined self-awareness in CMC (for exceptions see [Adrian-son, 2001](#); [Joinson, 2001](#); [Matheson & Zanna, 1988, 1989, 1990](#)). Moreover, at times the effects of self-awareness in CMC have been inferred, and researchers have dis- missed the effects of self-awareness in CMC altogether based on dubious measures.¹ To properly gauge the effects of self-awareness on individual behaviors in CMC, researchers must assess its influence directly, in relation to associated concepts, in an environment that minimizes spurious conclusions.

1.2. *Self-awareness*

The self-awareness perspective suggests that, at any given moment, an individual's attention can be directed either outward to the external environment toward things such as tasks, other people, or the social context, or directed inward to various as- pects of the self ([Duval & Wicklund, 1972](#)). The different features of the self can be categorized into two major parts: the private and public selves ([Buss, 2001](#)). The private self includes, for instance, personal beliefs, hidden inner feelings, thoughts, and memories that are covert to others including religious beliefs and childhood memories. The public self consists of overt displays ([Fenigstein, Scheier, & Buss, 1975](#)) such as physical appearance, table manners, and accent.

The concepts of private and public self-awareness are derived from, and closely related to the theory of objective self-awareness ([Duval & Wicklund, 1972](#)). [Duval and Wicklund \(1972\)](#) postulated that an individual's consciousness is directed either toward one's self or toward the external environment. They defined "objective self-awareness" as a state of consciousness in which an individual's attention is focused on the self, such as contemplation of one's own feelings, personal history, or body. An objectively self-aware person engages in a process of self-evaluation that consti- tutes a potential discrepancy between one's standards and actual behavior: the more negative the discrepancy, the more negative a person's self-evaluation becomes.

[Duval and Wicklund \(1972\)](#) further posited that any situational cues that remind people of themselves could potentially heighten their self-focusing attention. In a series of studies ([Duval & Wicklund, 1972](#); [Ickes, Wicklund, & Ferris, 1973](#)), objective self-awareness was induced in laboratories by the presence of a mirror, a television camera, or a tape-recording of one's own voice. However, these experimental manip- ulations of objective self-awareness yielded inconsistent findings. For example, sev- eral studies ([Duval & Wicklund, 1972](#); [Insko et al., 1973](#)) found that the presence of a camera caused participants to change their attitudes and agree more with posi- tions that they believed to be held by the majority. Yet, when [Scheier and Carver](#)

¹ For example, [Postmes et al. \(2000\)](#) inferred self-awareness based on the frequency of participants' use of "I" or "me" in their interactions and [Postmes et al. \(2001\)](#) measured self-awareness with two self- reported items. Even when measured more consistently with its conceptualization, self-awareness is often not experimentally manipulated ([Adrian-son, 2001](#); [Matheson & Zanna, 1988, 1990](#)).

(1980) used a small mirror to induce the objective self-awareness, they found a significant decrease in such attitude change.

Fenigstein et al. (1975) (see also Buss, 2001) argued that subcategories exist within the notion of self, with one part representing hidden inner feelings, thoughts, and memories inaccessible to others, and another part that is more socially constructed and overtly displayed to the external environment. They termed the more personal aspects the “private” self, and those socially constructed aspects the “public” self and noted that it is necessary to differentiate between the aspects of self—public or private—when studying the object of self-focused attention. They further argued that certain situational cues such as a mirror would heighten one’s private self-awareness, whereas other situational cues such as a camera would direct one’s self-focused attention toward the public self-aspects. Scheier and Carver (1980) used this observation to reconcile discrepancies in objective self-awareness research by arguing that the mirror caused the participants to be more aware of their previously held beliefs (i.e., who they are), whereas the presence of the television camera caused participants to be more aware of the appropriateness of their behavior according to perceived norms (i.e., who they should be).

Private and public self-awareness have been linked to a number of social and psychological phenomena. Public self-awareness has consistently been found to cause conformity toward perceived majority opinions (Duval & Wicklund, 1972; Froming, Walker, & Lopyan, 1982; Scheier & Carver, 1980; Wicklund & Duval, 1971). Private self-awareness, on the other hand, has been shown to cause individuals to be more aware of, and more responsive to, their emotions (Scheier, 1976; Scheier & Carver, 1977). In the presence of a small mirror, for example, individuals tend to make internal causal attributions in events with either negative or positive outcomes (Duval & Wicklund, 1972). Ickes, Layden, and Barnes (1978) found that privately self-aware individuals, when confronted with the question of “who am I?,” are more likely to disclose their personal interests and less likely to describe themselves in terms of abstract social categorizations. More recently, Joinson (2001) found that heightened private self-awareness, when combined with reduced public self-awareness, was associated with significantly higher levels of spontaneous self-disclosure in CMC. Overall, research suggests that heightened private self-awareness makes individuals more aware of their own inner feelings, attitudes, and beliefs. Consequently, their actions become more consistent with these thoughts. Public self-awareness, on the other hand, leads people to be more aware of who they should be, and prompts them to act according to how they should act, instead of how they may want to act, in social situations (Carver & Scheier, 1998, 1999).

1.3. Self-awareness and deindividuation effects

The psychological state of deindividuation (Diener, 1980; Zimbardo, 1969) refers to situations in which people lose the sense of being unique individuals. The application of deindividuation to CMC relies on the view that “computer-mediated communication seems to comprise some of the same conditions that

are important for deindividuation—“anonymity, reduced self-regulation, and reduced self-awareness” (Kiesler et al., 1984, p. 1126). More specifically, the reduction of social cues in CMC is believed to decrease users’ overall self-awareness, leading to a state of deindividuation, thereby fostering interactions that are more task-oriented, impersonal, and in some cases even uninhibited and anti-normative (Kiesler et al., 1984).

Although evidence suggests that it is overly deterministic to view CMC as an inherently impersonal medium that automatically reduces self-awareness (e.g., Lea, O’Shea, Fung, & Spears, 1992; O’Sullivan & Flanagin, 2003; Spears & Lea, 1994; Walther, 1992, 1994, 1996; Walther, Anderson, & Park, 1994), it is equally problematic to assume that changes in one’s self-awareness have no effect on CMC. In other words, although not all CMC contexts will lead to deindividuation, some CMC conditions may alter users’ self-awareness and subsequently influence their behavior. Therefore, if a reduction in self-awareness is the primary triggering factor for deindividuation in CMC, an increase in self-awareness should reduce the impersonal tendency that is commonly linked to deindividuation. Indeed, as discussed earlier, individuals with heightened private self-awareness should be more aware of their inner thoughts and emotions as compared to individuals without enhanced private self-awareness. Moreover, when one’s attention is focused inward towards the private self (i.e., privately self-aware), less attention should be paid to the external environment, such as a task at hand. Thus, it is expected that in anonymous, synchronous, and time-restricted CMC:

H1_{a-b}: individuals with heightened private self-awareness will display a greater level of: (a) intimacy and (b) social orientation (versus task orientation) than will individuals without heightened private self-awareness.

On the other hand, past research suggests that heightened public self-awareness will cause an individual to be more cognizant of, and act more consistently with, perceived social norms. In anonymous, synchronous, and time-restricted CMC, individuals with enhanced public self-awareness, should be more aware of the social norm that guides an initial conversation between strangers. Thus, it is expected that:

H1_{c-d}: individuals with heightened public self-awareness will display a greater level of: (c) formality and (d) politeness than will individuals without heightened public self-awareness.

Further, although privately self-aware individuals may have a tendency to display more affection and intimacy, an increase in public self-awareness should cause them to evaluate the social appropriateness of such actions in the given social context (i.e., anonymous CMC). Thus, an interaction effect can be expected such that:

H1_e: individuals with heightened private self-awareness, but without heightened public self-awareness, will exhibit the greatest levels of intimacy and social (versus task) orientation; individuals with neither heightened private self-awareness nor heightened public self-awareness will exhibit the lowest level

of intimacy and social orientation; and individuals with heightened public self-awareness will exhibit moderate levels of intimacy and social orientation, regardless of levels of private self-awareness.

1.4. *Self-awareness and hyperpersonal communication*

The hyperpersonal perspective (Walther, 1996, 1997) suggests that the visually anonymous environment of CMC creates an opportunity for users to achieve more favorable impressions and to develop greater intimacy than in face-to-face (FtF) situations. Walther argues that the visual anonymity of CMC enables users to mask physical or behavioral cues that are undesirable, and selectively self-disclose more favorable information. Asynchronous CMC in particular allows individuals to edit messages for more purposeful and desirable self-presentation. Thus, when communicating via computer-mediated means, receivers tend to idealize impressions of their communication partners (Walther, 1996, 1997). Additionally, individuals engage in a process of behavioral confirmation in order to actively seek cues from communication partners that are consistent with their idealized impression. Through these processes, communication partners develop more intimate social interactions than those occurring in typical FtF encounters over time.

The process of selective self-presentation is particularly relevant to the self-awareness perspective. In order for an individual to engage in selective presentation, two conditions must be met. First, individuals must be fully aware of their own physical appearance, behaviors, and personality traits. Second, individuals must make a judgment about which aspects of their selves are socially desirable and which are not. As noted earlier, the state of private self-awareness would make an individual more aware of their inner feelings, attitudes, and beliefs, whereas public self-awareness would lead to an awareness of how one should act, feel, and behave in the situation. Therefore, a privately *and* publicly self-aware individual would be more likely to engage in effective selective self-presentation. Although it is important to note that the actual development of a hyperpersonal relationship would require a long-term partnership (Walther, 1997), behavioral cues of a hyperpersonal tendency (i.e., selective self-presentation and idealization of others) could be detected during short-term interactions. Thus, it is expected that, in anonymous, synchronous, and time-restricted CMC:

H2_{a-b}: (a) individuals with heightened private self-awareness will be perceived to be more socially attractive than will individuals without heightened private self-awareness, and (b) individuals with heightened public self-awareness will be perceived to be more socially attractive than individuals without heightened public self-awareness.

1.5. *Self-awareness and social identity model of deindividuation effects (SIDE)*

Self-categorization theory (see Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) posits that there are three levels of abstraction of self-categorization

important in the social self-concept: personal identity (the self as an individual), social identity (the self as a member of social groups), and interspecies identity (the self as a human being). Different levels of self-categorization may be salient at different times, in different social contexts. The process of self-categorization at all levels follows the principle of meta-contrast; that is, within a given frame of reference, objects tend to be grouped together when the differences between them (intra-class differences) are less than the differences between these objects as a whole and other groups of objects (inter-class differences) (Turner et al., 1987). As such, one's self-categorization depends upon the outgroup norms to which the individual compares, and the relative position they hold within the ingroup. Thus, group behavior represents a shift of one's self-definition to a salient categorization (Abrams & Brown, 1989).

The SIDE model (Postmes et al., 1998; Spears & Lea, 1992, 1994) combines the notion of self-categorization with social identity theory's (Hogg & Abrams, 1988; Tajfel & Turner, 1979) emphasis on salient social identity (see Abrams, 1990) to propose that the visually anonymous environment of CMC heightens one's sensitivity to group and social identities. An individual's behavior in CMC depends on the salience of the individual's group identity and the norm of the group in which the individual is communicating (Postmes et al., 1998; Reicher et al., 1995; Spears & Lea, 1992, 1994). When group identity is salient, an individual is more susceptible to the influence of group norms, social attraction to group members, stereotypes, and in-group biases (Lea & Spears, 1995). In this manner, the SIDE model can provide insights into how contextual factors such as anonymity can influence the ways in which people communicate in CMC based on their salient group or individual identities.²

However, users of CMC often engage in extensive social interactions with other individuals in isolated private settings in the absence of the physical presence of the person with whom they interact. These environments have posed new challenges for intergroup theories. Specifically, the notion of self-categorization relies on the utilization of available social information to engage in inter- and intra-group comparisons. In the visually anonymous environment of CMC, many obvious group cues such as skin color, sex, and accent are not easily detected. Thus, although the SIDE model is useful to explain differences between anonymous and identified (non-anonymous) CMC conditions in which social identities are activated by experimental stimuli, it becomes inadequate in the absence of salient outgroups, or in truly anonymous situations where intergroup or intragroup comparisons are difficult due to the lack of social information.

² However, because salient group or individual identities are almost always induced through experimental manipulations in SIDE model studies (e.g., Postmes et al., 1998; Spears & Lea, 1992, 1994), it is unclear when, or under what conditions, an individual's group or individual identity will be salient. Thus, the reliance on the social identity approach to CMC may be inadequate in situations where it would be difficult to form salient identities, such as a short-term anonymous interaction.

Despite many differences between self-awareness theory and social identity-based perspectives, they share some basic assumptions that are widely held in social psychology (Turner et al., 1987). Specifically, both theories recognize self-concept as a part of the cognitive component of the self and both perspectives are used to explain the behavior of group members in terms of the impact of different aspects of the self (Abrams & Brown, 1989). The perspectives diverge in their analysis of when, and through what psychosocial process, the different self-aspects become relevant or salient. Whereas social identity-based theories rely on intergroup comparisons, self-awareness theory focuses on self-directed attention. It is thus plausible that when intergroup comparisons are difficult, as in anonymous CMC, self-awareness will become the primary self-regulating mechanism.

Moreover, as discussed earlier, research from the self-awareness perspective has shown that conformity to social and group norms is most often the result of public self-awareness (Froming et al., 1982; Scheier & Carver, 1980). In other words, when an individual's attention is focused on the public self, he or she will be more likely to conform to perceived group norms. Thus, we expect that, in anonymous, synchronous, and time-restricted CMC:

H3_{a-b}: (a) individuals with heightened public self-awareness will report greater group identification than will individuals without heightened public self-awareness, whereas (b) individuals with heightened private self-awareness will report less group identification than will individuals without heightened private self-awareness.

Two studies—a pilot study and the main experiment—were conducted to examine the effects of an individual's private and public self-awareness in CMC. The pilot study located an effective and ecologically valid manipulation of public self-awareness. The main experiment tested the proposed hypotheses.

2. Pilot study

Public self-awareness is effectively heightened by the presence of television cameras or audiences (Buss, 2001; Duval & Wicklund, 1972; Insko et al., 1973; Scheier & Carver, 1980). However, the use of such experimental manipulations poses a challenge to the ecological validity of self-awareness in the CMC environment. Consequently, the purpose of pilot study was to find a valid way to enhance public self-awareness in CMC.

3. Method

3.1. Participants, design, and procedure

Forty-three undergraduate students ($N = 43$) enrolled in upper division courses participated in the pilot study, and each received a free movie ticket (\$5.00

value) for their participation. There were three experimental conditions—a control group and two treatment groups—to which participants were randomly assigned. A conventional video camera was used to enhance public self-awareness in one treatment condition and a Web camera (Web Cam) was used in the other treatment condition. There was no camera in the control condition. In all three conditions, participants were instructed to read and solve a “Wilderness Survival Problem (WSP),” in which they were guided to imagine that they were trapped in an unknown forest covered by snow after a plane crash, and to rank 12 salvaged survival items in the order of their importance for survival. The stimulus story was presented via a Web site created by the researchers. After completing the WSP all participants responded to an online post-stimulus questionnaire.

3.2. *Experimental manipulations*

The perceived existence of a peer audience was used to enhance public self-awareness and was achieved by the use of either a Web Cam or a conventional Hi8 video camera. In the Web Cam condition ($n = 15$), a small Web camera was placed on top of the computer monitor. Upon arrival to the lab, participants in this condition were seated in front of the computer, upon which a small window showing real time images of the participants sitting in front of the computer station was displayed. A research assistant first told the participants that this image was being transmitted via the Internet, and that a group of undergraduate students was viewing this image at a different location as a part of a separate research project. The research assistant then closed the Web Cam window so that the participants could no longer see themselves on the computer monitor. At this point, the participants were left alone in the computer lab to solve the WSP.

In the video camera condition ($n = 15$), a Hi8 camcorder was placed on a tripod next to the computer station. The participants in this condition were told that they were being recorded for research purposes while solving the WSP and that the recorded images would be analyzed by a group of undergraduate students in a separate study.

In the control condition ($n = 13$), participants were given instructions only about the WSP. Neither the Web Cam nor the camcorder was used in this condition.

3.3. *Public self-awareness measures*

Nine 11-point Likert-type items taken from the Self Consciousness Scale (Buss, 2001; Fenigstein et al., 1975) were modified and used to measure public self-awareness (see Appendix A). Participants were instructed to think about their experience during the study, and indicate the degree to which they agreed or disagreed with each item on 11-point scales, where higher values indicated greater agreement. These items formed a highly reliable measure of self-reported public self-awareness ($\alpha = .90$).

4. Results

Two independent samples *t* tests were used to assess the effects of the two treatment conditions upon reported public self-awareness as compared to the control condition. Data from one participant in the control condition was excluded from all analyses due to the fact he failed to detect the two reverse-coded items in the scale and his average score of public self-awareness, 9.3, was five standard deviations above the sample mean of the control condition ($M = 3.47$, $SD = 1.09$).

As expected, the first independent samples *t* test revealed that the video camera group ($M = 5.06$, $SD = 2.22$) scored significantly higher on public self-awareness than did the control group ($M = 3.47$, $SD = 1.09$), $t(26) = -2.319$, $p < .05$ (two-tailed). Similarly, the Web Cam group ($M = 5.25$, $SD = 2.55$) also reported significantly more public self-awareness than the control group, $t(26) = -2.462$, $p < .05$ (two-tailed). Finally, there was no significant difference between the Web Cam group and the video camera group, $t(28) = -.294$, *ns*. The results of the pilot study suggested that the presence of a video camera and the use of a Web Cam, combined with a non-visible alleged audience, both heightened public self-awareness in CMC successfully. Because a Web Cam represents a significantly more naturalistic CMC environment than a conventional video camera, the Web Cam condition was chosen to manipulate public self-awareness in the main study.

5. Main study

5.1. Method

5.1.1. Design and experimental manipulations

This study employed a 2 (un-heightened vs. heightened private self-awareness) \times 2 (un-heightened vs. heightened public self-awareness) factorial design. This design created four experimental conditions: (1) un-heightened private self-awareness and un-heightened public self-awareness (control), (2) heightened private self-awareness only, (3) heightened public self-awareness only, and (4) heightened private self-awareness and heightened public self-awareness. Based on past research (Joinson, 2001), the level of private self-awareness in this study was heightened by a video feed of each participant's own image that was displayed in a small window on their computer monitor. Based on findings from the pilot study, public self-awareness was manipulated by the use of a Web Cam combined with the presence of an alleged online audience.

Thus, in the control condition ($n = 24$), no Web Cam was present and the participants were told that they would not be monitored in any way by anyone during the experiment. In the heightened private self-awareness condition ($n = 26$), a Web Cam was placed on top of the computer and an image of the

participant was displayed in a small window on the computer monitor. Participants in this condition saw themselves while typing on the computer and were assured that the image they saw was not recorded or monitored by anyone. In the heightened public self-awareness condition ($n = 24$), a Web Cam was also present; however, the participants in this condition could not see themselves. Instead, they were led to believe that the camera was on, and that a group of undergraduate students would be monitoring their actions in a separate location via the Internet. In the heightened public and heightened private self-awareness condition ($n = 26$), a Web Cam was present and participants both saw themselves, and were told that their image was being monitored by a group of undergraduate students.

In all conditions, no visual images were actually recorded or monitored. Participants in all conditions were also assured that they were not seen by their task partners at any time during the study. In addition, participants were not given any information about the conditions to which their partners may be assigned.

5.1.2. Participants and procedure

Two different flyers were used to recruit participants for each experimental location separately. Three individuals were recruited for each session at each lab, but only one person was randomly chosen to participate in the actual experiment. This recruitment procedure prevented participants from knowing the identities of their partners. By this procedure, a total of 124 undergraduate students enrolled in lower division courses initially participated in the main study in exchange for research participation credit for their classes. Due to technical errors, data collected from 16 participants were dropped. Eight additional participants were also excluded because they were paired with partners of the opposite sex (as explained below). As a result, a total of 100 participants ($N = 100$) remained in all phases of data analyses.

Two separate labs (A and B) located on different floors of the same building were used in the study. Labs resembled a single-occupant office and were similar in their size, lighting conditions, and furniture configurations. Procedures at both labs were identical: during each session, two participants, one in each lab, communicated via a custom-built online text-based chat program. To control for potential confounds created by sex differences, each participant in lab A was paired with a participant of the same sex in lab B, and both were assigned randomly to one of the four experimental conditions. Participants were not aware of the treatment groups to which their partner was assigned. The order of experimental conditions scheduled in each lab was counterbalanced so that participants in a particular condition were matched with equal numbers of people from different experimental conditions. All participants were given very specific instructions not to discuss anything with regard to their lab environment and experimental manipulations with their partners. To maintain anonymity, participants were instructed not to disclose their identities to their partners at

any time during the experiment. A review of transcripts of all interactions after the completion of the experiment confirmed that all participants adhered to this directive.

Upon arrival to a lab, all participants completed a paper and pencil pre-stimulus questionnaire about their computer/Internet use, experience, and other demographic information. After completing the questionnaire, participants who were selected for the study were led to the computer station from which they would perform the instructed task. After giving oral and written instructions to the participants, the research assistants left the labs.

All participants were told that they were participating in a software testing experiment, the goal of which was to test a beta version of an online chat program. Participants were instructed not to discuss the design and features of the computer program with their partners because their partners might be assigned to a different version of the program. The cover story prevented participants from assuming that their partners received the same experimental treatment, yet it was vague enough so that no concrete details about the experiment were disclosed. Participants began the experiment by reading a “Desert Survival Problem (DSP)” scenario on a Web site that was similar to the “Wilderness Survival Problem” in the pilot study. This version of the DSP asked participants to imagine that they were trapped in the hot desert after an automobile accident. The participants were asked to rank 12 salvaged survival items in terms of their importance for survival. Modified versions of DSP have been used in past research as tasks that both created good experimental control and approximated features of normal conversations (Burgoon et al., 2002). Participants were not able to interact with their task partners during this part of the study.

Three minutes after they were linked to the DSP page, each participant was automatically logged on to the online chat room to discuss their DSP solutions with their task partners. During this part of the study, participants were given a generic user name of either “User A” or “User B,” assigned randomly. There were two separate windows in this chat program. The window on the left side of the screen was the discussion window. Participants used this window to chat with their task partners and discuss the solution of the DSP in order to reach consensus. The window on the right was used to submit the final solutions for the DSP, and any information they wanted to formally submit to the researchers.

All participants were given 20 min to discuss the problem with their task partners and submit their answers together. Although they could submit the solution at any time within the 20-min time limit, they would be automatically logged off from the chat session once the time was expired. A warning message was displayed on the computer screen 2 min before the time limit was reached. Upon submission of the solutions, participants were logged off from the chat room and automatically linked to a final online questionnaire. Each participant then completed the questionnaire that included items assessing the variables in this study. Upon completion of this questionnaire, participants were instructed to exit the room, and were thanked and debriefed by the researcher.

5.1.3. Measures

5.1.3.1. Private and public self-awareness. As a manipulation check, five Likert-type items (Cronbach's $\alpha = .56$) that were selected and modified from Buss's (2001) Self Consciousness Scale were included in the final questionnaire to check the effectiveness of the *private self-awareness* manipulation. To assess the effectiveness of the *public self-awareness* manipulation, five items (Cronbach's $\alpha = .62$) were selected from the public self-awareness scale used in the pilot study and included in the final questionnaire.³

5.1.3.2. Intimacy, task vs. social orientation, formality, and politeness. Items selected and modified from the Relational Communication Questionnaire (Burgoon & Hale, 1987) were used to measure perceptions of communication partners' *intimacy*, *task vs. social orientation*, and *formality*. Each item was rated on a 7-point scale (1 = completely disagree, 7 = completely agree). *Intimacy* was measured by eight items (Cronbach's $\alpha = .65$). *Task vs. social orientation* was measured by four items (Cronbach's $\alpha = .65$). Two items measured *formality*. In addition, participants were also asked to rate their partners on their *politeness* with a single item.

5.1.3.3. Attraction. Thirteen items from McCroskey and McCain's (1974) interpersonal attraction scale were selected and modified to measure participants' *social attraction*, *task attraction*, and *idealized physical attraction* to their partners. Each item was rated on a 7-point Likert type scale (1 = completely disagree, 7 = completely agree). Together these 13 items formed a reliable overall attraction measure (Cronbach's $\alpha = .80$). More specifically, this scale included three distinctive dimensions: *social*, *task*, and *physical attraction*. Measures of *social attraction* included five items (Cronbach's $\alpha = .71$). Measures of *task attraction* included five items (Cronbach's $\alpha = .77$). Although participants in this study were not able to visually see their partners, previous research suggests that individuals may still form impressions about others' physical appearance in CMC based on idealization (see Walther, 1997 for details). Therefore, three items were included to measure participants' *physical attraction* (Cronbach's $\alpha = .85$).⁴

³ Several factors might have contributed to the low reliability of these measures. First, private self-awareness may not be a conscious process. Thus, a self-report measure of this concept may not be accurate. Second, participants' self-awareness state may influence the answer to these questions. For example, a high private self-aware person may provide an accurate report of how he or she might have felt during the study. But a low private self-aware person, by definition, should not be able to provide accurate and consistent answers to these questions. For public self-awareness, a decrease in reliability from the pilot study is likely caused by the fact that these items required participants to think back about their feelings during the experiment and give an accurate report. In the pilot study, the 10 public self-awareness items were the only items in the final questionnaire so that participants were able to provide consistent answers once they started to think about their experience during the study.

⁴ Although five items were included in the final questionnaire to measure physical attraction, two reversed items were dropped due to low reliability.

5.1.3.4. Group identification. Participants reported their group identification on a reliable 9-item scale (Cronbach's $\alpha = .86$) constructed by the researchers. Each item was rated on a 7-point Likert scale (1 = completely disagree, 7 = completely agree). An average of the scores from these nine items was used as the overall group identification measure. Appendix A lists all variable operations.

6. Results

6.1. Manipulation checks

To confirm the effectiveness of the experimental manipulations, two independent samples *t* tests were conducted on the private and public self-awareness measures. As expected, participants who saw their own images during the study ($n = 52$) reported higher levels of private self-awareness ($M = 3.68$, $SD = .99$) than those participants who did not get this treatment ($n = 48$, $M = 3.27$, $SE = 1.09$), $t(98) = -1.966$, $p \leq .05$. Individuals who received the public self-awareness heightening treatment ($n = 50$) reported significantly higher levels of public self-awareness ($M = 3.50$, $SD = .93$) than individuals who did not receive the treatment ($n = 50$, $M = 2.96$, $SD = 1.11$), $t(98) = -2.676$, $p < .01$.

6.2. Independence of observations

In order to ensure independence between conditions at different labs, experimental treatments scheduled for each location were counterbalanced so that participants in any cell were evaluated by individuals from all four experimental conditions. In addition, all participants were completely unaware of the treatments that their partners received, and identical procedures were used at both labs. To confirm that these procedures effectively guarded against any possible interdependence between conditions at different labs, a 2 (lab A, un-heightened/heightened private self-awareness) \times 2 (lab A, un-heightened/heightened public self-awareness) \times 2 (lab B, un-heightened/heightened private self-awareness) \times 2 (lab B, un-heightened/heightened public self-awareness) four factor multivariate analysis of variance (MANOVA) was conducted on intimacy, social orientation, formality, politeness, attractions, and group identification scores. The goal of this analysis was to detect any possible interaction effects on any dependent measures between any two factors at different labs.

No interaction effects were found between private self-awareness (private) conditions at lab A and private conditions at lab B (Pillai's *Trace* $V = .077$, $F(8, 79) = .82$, *ns*, observed power = .35); private conditions at lab A and public self-awareness (public) conditions at lab B (Pillai's *Trace* $V = .074$, $F(8, 79) = .79$, *ns*, observed power = .34); public conditions at lab A and private conditions at lab B (Pillai's *Trace* $V = .136$, $F(8, 79) = 1.549$, *ns*, observed

power = .65); and public conditions at lab A and public conditions at lab B (Pillai's *Trace V* = .045, $F(8, 79) = .48$, *ns*, observed power = .21). Based on these non-significant results with moderate levels of observed power, conditions at each lab were sufficiently independent from any conditions at the other lab, enabling data from both labs to be collapsed into a single 2 (un-heightened/heightened private self-awareness) \times 2 (un-heightened/heightened public self-awareness) factorial design for hypotheses testing.

In addition, participants were paired with partners who were also in one of the four experimental conditions, creating a total of 10 different types of dyadic combinations (i.e., control/control, control/private, control/public, control/both, private/public, private/private, private/both, public/public, public/both, and both/both). To determine any unique effects stemming from the various dyadic combinations, a hierarchical regression model was tested, wherein the two treatment conditions (private and public self-awareness) and the interaction term were effect-coded and entered into the first block of a regression model; 10 types of dyadic combinations were dummy-coded into nine variables and entered into the second block of this regression model. The results showed that the addition of the second block of variables did not provide any significant contribution to the regression models, indicating that the dyadic combinations present in this study did not account significantly for the study's main findings.

6.3. Hypothesis testing and post hoc results

Due to high intercorrelations among dependent measures, Hypotheses 1_{a-e} were tested by a MANOVA of intimacy, social orientation, formality, and politeness scores reported by participants' partners, with private and public self-awareness conditions as two fixed factors. No support was found for these hypotheses: there was no main effect for private self-awareness (Wilks' $\Lambda = .887$, $F(4, 92) = .29$, *ns*), no main effect for public self-awareness (Wilks' $\Lambda = .296$, $F(4, 92) = 1.25$, *ns*), and no interaction effect between the two factors (Wilks' $\Lambda = .794$, $F(4, 92) = .42$, *ns*) on any of the dependent measures.

The second set of hypotheses predicted that heightened private self-awareness and heightened public self-awareness would both have a positive influence on participants' social attraction rating given by their partners. To test these hypotheses, a univariate analysis of variance (ANOVA) was conducted on social attraction scores reported by participants' partners, with private and public self-awareness conditions as fixed factors. As predicted by Hypothesis 2_a, individuals in the heightened private self-awareness conditions ($M = 5.23$, $SD = .14$) received higher social attraction scores from their partners than individuals in the un-heightened private conditions ($M = 4.79$, $SD = .14$), $F(1, 96) = 4.3$, $p < .05$. However, Hypothesis 2_b was not supported—no significant main effect was found for public self-awareness, $F(1, 96) = .08$, *ns*. A marginally significant interaction effect between private and public self-awareness was found, $F(1, 96) = 3.24$, $p = .075$, such that

heightened private self-awareness combined with un-heightened public self-awareness rendered the greatest social attraction ($M = 5.4$, $SD = .19$), whereas the control condition (neither private nor public self-awareness was enhanced) rendered the least social attraction score ($M = 4.58$, $SD = .21$). This interaction is illustrated in Fig. 1.

Hypotheses 3_{a-b} predicted that heightened public self-awareness would cause participants to report greater group identification and heightened private self-awareness would have the opposite effect. An ANOVA performed on group identification scores reported by participants with private and public self-awareness conditions as the fixed factors showed no support for these hypotheses. There was no main effect for private self-awareness, $F(1,94) = .10$, *ns*, no main effect for public self-awareness, $F(1,94) = .19$, *ns*, and no interaction effect between the two factors, $F(1,94) = .32$, *ns*.

To probe the results further, several post hoc tests were conducted. ANOVAs were performed on social versus task orientation, politeness, and physical, task,

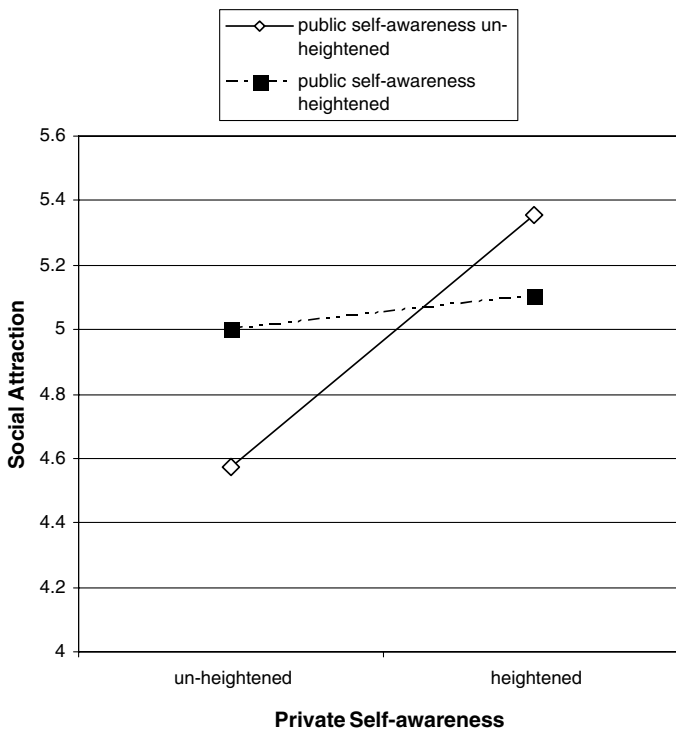


Fig. 1. Interaction of private self-awareness by public self-awareness on social attraction. *Note:* Depicted scale is truncated from its original 7-point range. —□—, public self-awareness un-heightened; -■-, public self-awareness heightened.

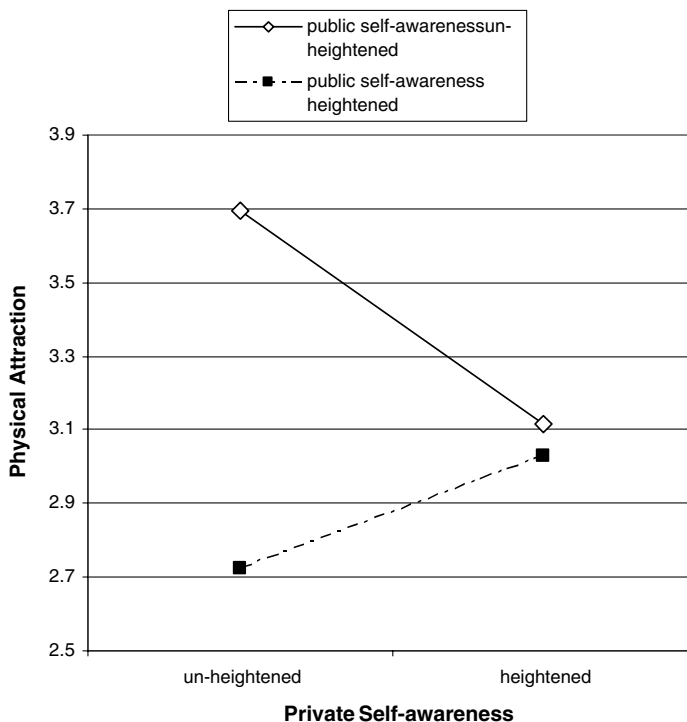


Fig. 2. Interaction of private self-awareness by public self-awareness on physical attraction. Note: Depicted scale is truncated from its original 7-point range. —◇—, public self-awareness un-heightened; -■-, public self-awareness heightened.

and overall attraction. Analyses showed no significant effects for overall attraction and task attraction. However, a significant main effect on physical attraction was found for public self-awareness ($F(1,96) = 5.3, p < .05$): Participants with heightened public self-awareness were perceived by their partners to be less physically attractive ($M = 2.88, SD = .17$) than those without heightened public self-awareness ($M = 3.41, SD = .17$). Additionally, a marginally significant interaction effect between private and public self-awareness was found, $F(1,96) = 3.67, p = .058$, as illustrated in Fig. 2. Individuals who got neither the private nor the public self-awareness heightening treatment received the highest physical attraction scores from their partners ($M = 3.70, SD = .24$), whereas individuals with heightened public self-awareness alone received the lowest physical attraction ratings ($M = 2.72, SD = .24$). Also, individuals with heightened public self-awareness perceived their partners to be more socially oriented ($M = 1.91, SD = .11$) than participants in un-heightened public self-awareness conditions ($M = 1.59, SD = .11$), $F(1,96) = 4.26, p < .05$. Finally, participants in heightened

public self-awareness conditions were rated less polite ($M = 5.4$, $SD = .20$) than those in un-heightened public self-awareness conditions ($M = 6.0$, $SD = .20$), $F(3, 96) = 4.01$, $p < .05$.

7. Discussion

Three sets of hypotheses, each derived from prevalent perspectives on behavior in computer-mediated environments, were proposed to test the effects of users' public and private self-awareness in CMC. Findings showed mixed support for the influence of self-awareness on common outcomes of computer-mediated interaction. Results suggest that levels of public and private self-awareness in short-term, text-based, synchronous CMC do not influence individuals' more substantial assessments such as those regarding intimacy and group identification, but that self-awareness has a strong influence in this environment on perceptions of attractiveness, politeness, and social versus task orientation. Overall, data from this study demonstrate that, beyond current perspectives that focus on time, anonymity, and synchronicity, understanding the underlying psychological mechanisms that may cause individuals to alter their behaviors is important in assessing CMC interaction.

Contrary to what the deindividuation perspective has argued, a lack of private and public self-awareness in this study did not automatically lead to impersonal tendencies in CMC. Indeed, politeness actually decreased under conditions of heightened public self-awareness. Additionally, this study provided strong support for the hyperpersonal perspective: participants with heightened private self-awareness, especially when combined with lower levels of public self-awareness, were perceived by their communication partners to be more socially attractive. Moreover, participants with low private and low public self-awareness were perceived to be the least socially attractive. Collectively, these findings suggest that private self-awareness, effectively heightened by participants' own images displayed on the computer monitor, may prime individuals to focus on self-presentation strategies that emphasize those dimensions of one's personality that define them as unique individuals and that, in turn, may bolster their attractiveness in the eyes of communication partners. Partners of these participants were able to form favorable impressions in a completely anonymous environment based on less than 20 min of synchronous CMC interaction, lending strong support to the notion of the idealization of others, as proposed by hyperpersonal theory (Walther, 1992, 1994, 1996).

Results of this study also show that public self-awareness does not necessarily operate in the same manner as private self-awareness. Contrary to the pattern of expectations, heightened public self-awareness resulted in lower levels of perceived physical attractiveness (especially when combined with low private self-awareness), indicating that in this environment perhaps paying undue attention to the perceived expectations of a supposed audience can be detrimental.

Indeed, physical attractiveness was actually highest under conditions when neither public nor private self-awareness was heightened. Alternatively, recalling that participants with heightened public self-awareness were perceived as less polite, and perceived their partners to be more socially (versus task) oriented, it is possible that individuals were found to be less physically attractive as a result of their behavior toward their partners: perhaps they felt frustrated with their partner's social, versus task, focus and, as a result, were less polite toward them, causing others to view them as less physically attractive. However, because the current study was not specifically designed to test these effects, this conclusion remains speculative until future research addresses these questions directly.

To advance the domain of CMC research, the lack of support for many of this study's hypotheses needs also to be considered. For example, it was proposed that heightened private self-awareness in CMC would cause users to become less formal, more intimate, and more socially oriented, whereas heightened public self-awareness would reverse such tendencies. However, these predictions were not supported. In fact, even though all participants were rated by their partners as very polite (mean score of 5.71 on a 7-point scale) participants with heightened public self-awareness actually were perceived to be *less* polite than other participants. Because comparisons were not made with FtF interactions, this finding does not necessarily contradict the deindividuation perspective (Kiesler et al., 1984; Siegel et al., 1986), but it does suggest that lack of self-awareness may not affect deindividuation directly.

Furthermore, heightened private and public self-awareness were proposed to impact a person's sense of group identification. Public self-awareness shifts one's focus of attention to the public aspects of the self whereas private self-awareness shifts the focus of the attention to the private aspects of the self. Being publicly self-aware, a person often has to evaluate the appropriateness of actions in a given social situation. We thus predicted that heightened public self-awareness would lead to heightened group identification and heightened private self-awareness would decrease group identification. However, results did not support either of these predictions.

This lack of support has several theoretical implications for the SIDE model. First, this suggests that being aware of the social aspects of one's self is not the same as having a salient group identity. It is possible that being aware of the proper social role in a given situation is a necessary, but not sufficient, condition to form a salient group identity. This is consistent with self-categorization theory (Turner et al., 1987) which asserts that people define themselves through the process of meta-contrast, by which they group phenomena based on the magnitude of differences between intra- and inter-group contrasts. In the present study, anonymity may have prevented individuals from having a useful frame of reference, enabling them to form strong group assessments.

Second, CMC research from the SIDE perspective (e.g., Postmes et al., 1998, 2000, 2002; Reicher et al., 1995; Spears & Lea, 1992, 1994; Spears & Postmes, 1995) suggests that very little social information about others is required for

an individual to have a salient group or individual identity. However, given that group identities were often induced by researchers in studies from the SIDE perspective, it is unclear under what conditions people would be motivated to seek information about others. Could it be that although self-awareness may not directly influence an individual's social identity, it may determine the ways in which an individual seeks information about others? Due to the time limit in the current study, participants may not have been able to acquire sufficient knowledge about their partners through their interactions to engage in meaningful social comparisons. To explore this more directly, the relationship between social identity and self-awareness in the CMC context should be investigated in future research.

Finally, although past research has shown that individuals using CMC tend to exhibit increased levels of private self-awareness and reduced public self-awareness, which has been shown to result in negative evaluations of the social context and one's partner (Matheson & Zanna, 1988, 1990), similar negative results were not found in this study. Rather, intimacy, formality, and politeness were largely unaffected by levels of public self-awareness (except as already noted). One possible explanation is that whereas Matheson and Zanna uncovered differences in self-awareness as compared to FtF communication, in this study levels of self-awareness were manipulated within CMC. Thus, although reductions in public self-awareness may be meaningful as compared to face-to-face contexts, differences in public self-awareness within CMC may be less profound and less influential. This suggests that cross-media comparisons accentuate differences in self-awareness more than intra-medium self-awareness distinctions.

Overall, this study serves to highlight the role of psychological phenomena in computer-mediated interaction, as manifested in differences in public and private self-awareness. By heightening levels of self-awareness in text-based, anonymous CMC, task partners' assessments of an individual's politeness, social attractiveness, and physical attraction were altered. These modifications were generally supportive of hyperpersonal theory (Walther, 1996), did not support predictions stemming from strict deindividuation views (Kiesler et al., 1984; Siegel et al., 1986; Sproull & Kiesler, 1991), and offered insight into research from the SIDE perspective that emphasizes the role of group salience as the source of behavior in CMC (e.g., Postmes et al., 1998; Reicher et al., 1995; Spears & Lea, 1992, 1994; Spears & Postmes, 1995). Future research can capitalize on these findings by considering the role of self-awareness, most likely as a mediating variable, in explanations of individuals' behavior in the increasingly prominent domain of computer-mediated interpersonal communication.

Appendix A. Variable operationalization summary

| Variable | Items | α |
|--|--|----------|
| Public self-awareness (used in the pilot study) | I was concerned about how others might judge my appearance during the study | .90 |
| | I was trying to make a good impression during the study | |
| | I felt that no one cared about me during the study* | |
| | I was concerned about my appearance during the study | |
| | I was concerned about how I should act during the study | |
| | I was concerned about how others might view me during the study | |
| | I was afraid that others may form bad impressions about me during the study | |
| | I felt that someone was watching me during the study | |
| | I did not care about how I should act in front of others during the study* | |
| Private self-awareness (manipulation check in the main study) | During the study I was very aware of the way my mind works when I worked through the problem | .56 |
| | During the study I found myself paying attention to changes in my mood | |
| | During the study, I found myself attending to my inner feelings | |
| | During the study I felt that I was trying to figure myself out | |
| | During the study, I felt that I was watching myself | |
| Public self-awareness (manipulation check in the main study) | I was concerned about how others might view me during the study | .62 |
| | I was concerned about how others might judge my appearance during the study | |
| | I felt that no one cared about me during the study* | |
| | I was afraid that others may form bad impression about me during the study | |
| | I felt that someone was watching me during the study | |

(continued on next page)

Appendix A (continued)

| Variable | Items | α |
|-------------------------|---|----------|
| Intimacy | My task partner was sincere | .65 |
| | My task partner was unresponsive to my ideas* | |
| | My task partner wanted to win my approval | |
| | My task partner did not care if I liked him/her* | |
| | My task partner wanted me to trust him/her | |
| | My task partner seemed to desire further conversation with me | |
| | My task partner made the conversation seem intimate | |
| | My task partner was willing to self-disclose personal thoughts to me | |
| Social/task orientation | My task partner was more interested in a social conversation than the task at hand | .65 |
| | My task partner was more interested in working on the task at hand than having a social conversation* | |
| | My task partner wanted to stick to the main purpose of the interaction* | |
| | My task partner was very work-oriented* | |
| Formality | My partner made the interaction very formal | .77 |
| | My task partner wanted the discussion to be casual* | |
| Politeness | My task partner was very polite | n/a |
| Social attraction | I think my task partner could be a friend of mine | .71 |
| | It would be difficult to meet and talk with my task partner* | |

| | | |
|----------------------|--|-----|
| | My task partner just would not fit into my circle of friends* | |
| | My task partner and I could never establish a personal friendship with each other* | |
| | I would like to have a friendly chat with my task partner | |
| Task attraction | My task partner is a typical goof-off* | .77 |
| | I feel confident in my task partner's ability to get the job done | |
| | If I wanted to get things done, I could probably depend on my task partner | |
| | I could not get anything accomplished with my task partner* | |
| | My task partner would be a poor problem solver* | |
| Physical attraction | I think my task partner must be quite handsome (pretty) | .85 |
| | My task partner must be very sexy looking | |
| | I think my task partner must be physically attractive | |
| Group identification | My task partner worked as hard as I did to solve the puzzle | .86 |
| | During the study, I felt that I could identify with my task partner | |
| | During the study, I felt that my task partner and I worked well as a team | |
| | I would like to work with my task partner again in the future | |
| | My task partner and I did not work well together at all* | |
| | I could have completed this task by myself* | |
| | I would not rely on my task partner to complete a similar task* | |
| | I felt positive about working with my task partner | |
| | I felt that my task partner and I worked as separate individuals instead of as a team* | |

Note. Items marked with an asterisk are reverse-coded.

References

- Abrams, D. (1990). How do group members regulate their behavior? An Integration of social identity theory and self-awareness theories. In D. Abrams & M. A. Hogg (Eds.), *Social identity theory: Constructive and critical advances* (pp. 89–112). London: Harvester Wheatsheaf and Springer.
- Abrams, D., & Brown, R. (1989). Self-consciousness and social identity: self-regulation as a group member. *Social Psychology Quarterly*, 52, 311–318.
- Adrianson, L. (2001). Gender and computer-mediated communication: group processes in problem solving. *Computers in Human Behavior*, 17, 71–94.
- Burgoon, J. K., & Hale, J. L. (1987). Validation and measurement of the fundamental themes of relational communication. *Communication Monographs*, 54, 19–41.
- Burgoon, J. K., Bonito, J. A., Ramirez, A., Jr., Dunbar, N. E., Kam, K., & Fischer, J. (2002). Testing the interactivity principle: effects of mediation, propinquity, and verbal and nonverbal modalities in interpersonal interaction. *Journal of Communication. Special Issue: Research on the relationship between verbal and nonverbal communication: Emerging integrations*, 52, 657–677.
- Buss, A. H. (2001). *Psychological dimensions for the self*. Thousand Oaks, CA: Sage.
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. Cambridge: Cambridge University Press.
- Carver, C. S., & Scheier, M. F. (1999). Themes and issues in the self-regulation of behavior. In R. Wyer (Ed.), *Perspectives on behavioral self-regulation* (pp. 1–105). Mahwah, NJ: Erlbaum.
- Culnan, M. J., & Markus, M. L. (1987). Information technologies. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 420–443). Newbury Park, CA: Sage.
- Diener, E. (1980). Deindividuation: the absence of self-awareness and self-regulate in group members. In O. Paulus (Ed.), *The psychology of group influence* (pp. 209–242). Hillsdale, NJ: Erlbaum.
- Duval, S., & Wicklund, R. A. (1972). *A theory of objective self awareness*. New York: Academic Press.
- Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: assessment and theory. *Journal of Consulting & Clinical Psychology*, 43, 522–527.
- Festinger, L., Pepitone, A., & Newcomb, T. (1952). Some consequences of de-individuation in a group. *Journal of Abnormal & Social Psychology*, 47, 382–389.
- Franzoi, S. L., Davis, M. H., & Markwiese, B. (1990). A motivational explanation for the existence of private self-consciousness differences. *Journal of Personality*, 58, 641–659.
- Froming, W. J., Walker, G. R., & Lopyan, K. J. (1982). Public and private self-awareness: when personal attitudes conflict with societal expectations?. *Journal of Experimental Social Psychology*, 18, 476–487.
- Hogg, M. A., & Abrams, D. (1988). *Social Identification: a social psychology of intergroup relations and group processes*. London: Routledge.
- Ickes, W., Layden, M. A., & Barnes, R. D. (1978). Objective self-awareness and individuation: an empirical link. *Journal of Personality*, 46, 146–161.
- Ickes, W. J., Wicklund, R. A., & Ferris, C. B. (1973). Objective self-awareness and self esteem. *Journal of Experimental Social Psychology*, 9, 202–219.
- Insko, C. A., Worchel, S., Songer, E., & Arnold, S. E. (1973). Effort, objective self-awareness, choice, and dissonance. *Journal of Personality & Social Psychology*, 28, 262–269.
- Joinson, A. N. (2001). Self-disclosure in computer-mediated communication: the role of self-awareness and visual anonymity. *European Journal of Social Psychology*, 31, 177–192.
- Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist*, 39, 1123–1134.
- Lea, M., & Spears, R. (1995). Love at first byte? Building personal relationships over computer networks. In J. Wood & S. Duck (Eds.), *Under-studied relationships: Off the beaten track. Understanding relationship processes series* (Vol. 6, pp. 197–233). Thousand Oaks, CA: Sage.
- Lea, M., O'Shea, T., Fung, P., & Spears, R. (1992). Flaming in computer-mediated communication: observations, explanations, implications. In M. Lea (Ed.), *Contexts of computer-mediated communication* (pp. 89–112). London: Harvester-Wheatsheaf.

- Lee, E., & Nass, C. (2002). Experimental tests of normative group influence and representation effects in computer-mediated communication: when interacting via computers differs from interacting with computers?. *Human Communication Research*, 28, 349–381.
- Matheson, K., & Zanna, M. P. (1988). The impact of computer-mediated communication on self-awareness. *Computers in Human Behavior*, 4, 221–233.
- Matheson, K., & Zanna, M. P. (1989). Persuasion as a function of self-awareness in computer-mediated communication. *Social Behaviour*, 42, 99–111.
- Matheson, K., & Zanna, M. P. (1990). Computer-mediated communications: the focus is on me. *Social Science Computer Review*, 8, 1–12.
- Mead, G. H. (1934). *Mind, self and society: from the standpoint of a social behaviorist*. Chicago: University of Chicago Press.
- McCroskey, J. C., & McCain, T. A. (1974). The measurement of interpersonal attraction. *Speech Monographs*, 41, 261–266.
- O'Sullivan, P. B., & Flanagin, A. J. (2003). Reconceptualizing flaming and other problematic messages. *New Media & Society*, 5, 69–94.
- Postmes, T., Spears, R., & Lea, M. (1998). Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication Research, Special Issue: (Mis)communicating across boundaries*, 25, 689–715.
- Postmes, T., Spears, R., & Lea, M. (2000). The formation of group norms in computer-mediated communication. *Human Communication Research*, 26, 341–371.
- Postmes, T., Spears, R., & Lea, M. (2002). Intergroup differentiation in computer-mediated communication: effects of depersonalization. *Group Dynamics*, 6, 3–16.
- Postmes, T., Spears, R., Sakhel, K., & de Groot, D. (2001). Social influence in computer-mediated communication: the effects of anonymity on group behavior. *Personality & Social Psychology Bulletin*, 27, 1243–1254.
- Reicher, S. D., Spears, R., & Postmes, T. (1995). A social identity model of deindividuation phenomena. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 6, pp. 161–198). Chichester: Wiley.
- Scheier, M. F. (1976). Self-awareness, self-consciousness, and angry aggression. *Journal of Personality*, 44, 627–644.
- Scheier, M. F., & Carver, C. S. (1977). Self-focused attention and the experience of emotion: attraction, repulsion, elation, and depression. *Journal of Personality & Social Psychology*, 35, 625–636.
- Scheier, M. F., & Carver, C. S. (1980). Private and public self-attention, resistance to change, and dissonance reduction. *Journal of Personality & Social Psychology*, 39, 390–405.
- Scheier, M. F., & Carver, C. S. (1988). A model of behavioral self-regulation: translating intention into action. *Advances in experimental social psychology. Social psychological studies of the self: Perspectives and programs*. (Vol. 21, pp. 303–346). San Diego, CA: Academic Press.
- Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer-mediated communication. *Organizational Behavior & Human Decision Processes*, 37, 157–187.
- Singer, J. E., Brush, C. A., & Lublin, S. C. (1965). Some aspects of deindividuation: identification and conformity. *Journal of Experimental Social Psychology*, 1, 356–378.
- Spears, R., & Lea, M. (1992). Social influence and the influence of the 'social' in computer-mediated communication. In M. Lea (Ed.), *Contexts of computer-mediated communication* (pp. 30–65). London: Harvester-Wheatsheaf.
- Spears, R., & Lea, M. (1994). Panacea or panopticon? The hidden power in computer-mediated communication. *Communication Research*, 21, 427–459.
- Sproull, L., & Kiesler, S. B. (1991). *Connections: new ways of working in the networked organization*. Cambridge, MA: MIT Press.
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks/Cole.
- Thatcher, A., & De LaCour, A. (2003). Small group decision-making in face-to-face and computer-mediated environments: the role of personality. *Behaviour & Information Technology*, 22, 203–218.

- Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: a self-categorization theory*. Oxford: Blackwell.
- Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: a relational perspective. *Communication Research*, *19*, 52–90.
- Walther, J. B. (1994). Anticipated ongoing interaction versus channel effects on relational communication in computer-mediated interaction. *Human Communication Research*, *20*, 473–501.
- Walther, J. B. (1996). Computer-mediated communication: impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, *23*, 3–43.
- Walther, J. B. (1997). Group and interpersonal effects in international computer-mediated collaboration. *Human Communication Research*, *23*, 342–369.
- Walther, J. B., Anderson, J. F., & Park, D. W. (1994). Interpersonal effects in computer-mediated interaction: a meta-analysis of social and antisocial communication. *Communication Research*, *21*, 460–487.
- Wicklund, R. A., & Duval, S. (1971). Opinion change and performance facilitation as a result of objective self-awareness. *Journal of Experimental Social Psychology*, *7*, 319–342.
- Zimbardo, P. G. (1969). The human choice: Individuation, reason, and order versus deindividuation, impulse, and chaos. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation* (17, pp. 237–307).