Available online at www.sciencedirect.com
ScienceDirect
Computers in Human Behavior 23 (2007) 2538–2557
Computers in Human Behavior
www.elsevier.com/locate/comphumbeh

Selective self-presentation in computer-mediated communication: Hyperpersonal dimensions of technology, language, and cognition

Joseph B. Walther *

Department of Communication/Department of Telecommunication, Information Studies & Media, Michigan State University, 473 Comm Arts Building, East Lansing, MI 48824, United States

Available online 30 June 2006

Abstract

The hyperpersonal model of computer-mediated communication (CMC) posits that users exploit the technological aspects of CMC in order to enhance the messages they construct to manage impressions and facilitate desired relationships. This research examined how CMC users managed message composing time, editing behaviors, personal language, sentence complexity, and relational tone in their initial messages to different presumed targets, and the cognitive awareness related to these processes. Effects on several of these processes and outcomes were obtained in response to different targets, partially supporting the hyperpersonal perspective of CMC, with unanticipated gender and status interaction effects suggesting behavioral compensation through CMC, or over-compensation when addressing presumably undesirable partners.

Keywords: Impression management; Self-presentation; Computer-mediated communication; Hyperpersonal model

* Tel.: +1 517 355 3470; fax: +1 517 432 1192.
E-mail address: jwalther@msu.edu.

0747-5632/$ - see front matter
doi:10.1016/j.chb.2006.05.002

1. Introduction

The most interesting aspect of the advent of computer-mediated communication (CMC) is how it reveals basic elements of interpersonal communication, bringing into focus fundamental processes that occur as people meet and develop relationships relying on typed messages as the primary mechanism of expression. While many encounters in electronic space involve no more than simple queries for and provision of information, other relationships evolve over CMC. CMC-based relationships range from professionally friendly to quite intimate (see e.g. Landis, 1994; Reid, 1991). Some lead to off-line relations (e.g. Baker, 1998; Parks & Floyd, 1996; Parks & Roberts, 1998), while others remain entirely online (e.g. Allen, 1996; Preece, 2001).

Regardless of eventual trajectory, some basic processes take place during first acquaintanceship, where CMC differs substantially from face-to-face (FtF) communication, in form if not in function. Physical features such as one's appearance and voice provide much of the information on which people base first impressions FtF, but such features are often unavailable in CMC. Various perspectives on CMC have suggested that the lack of nonverbal cues diminishes CMC's ability to foster impression formation and management (see e.g. Kiesler, 1986; Kiesler, Siegel, & McGuire, 1984), or argued impressions develop nevertheless, relying on language and content cues (see e.g. Baym, 1995; Walther, 1992, 1993).

One approach that describes the way that CMC's technical capacities work in concert with users' impression development intentions is the hyperpersonal model of CMC (Walther, 1996). The model specifies several concurrent dynamics in sender, receiver, channel, and feedback systems that are affected by CMC attributes, which promote the development and potential exaggeration of impressions and relationships online: As receivers, CMC users idealize partners based on the circumstances or message elements that suggest minimal similarity or desirability. As senders, CMC users selectively self-present, revealing attitudes and aspects of the self in a controlled and socially desirable fashion. The CMC channel facilitates editing, discretion, and convenience, and the ability to tune out environmental distractions and re-allocate cognitive resources in order to further enhance one's message composition. Finally, CMC may create dynamic feedback loops wherein the exaggerated expectancies are confirmed and reciprocated through mutual interaction via the bias-prone communication processes identified above.

As a cross-contextual model, the hyperpersonal framework has received support in a variety of settings, involving both dyads and groups, in educational, romantic, and group/leadership settings (e.g., Chester & Gwynne, 1998; Gibbs, Ellison, & Heino, 2006; Wickham & Walther, in press, resp.). With regard to its propositions regarding impression formation and management, empirical tests have shown how CMC leads to more extreme impressions than FtF (Hancock & Dunham, 2001) and more positive relations over time compared to FtF (Walther, 1997) and compared to CMC accompanied by users' photos (Walther, Slovacek, & Tidwell, 2001). Few studies have explored aspects of senders' behavior, with exceptions focusing on self-disclosure, personal questions, and verbal expressions of affinity in CMC relative to FtF communication (Tidwell & Walther, 2002; Walther, Loh, & Granka, 2007). No research to date has specifically and empirically focused on the elements of the model that posited (1) how CMC users exploit interface attributes of the channel in order to attempt to enhance impressions

and relational messages, (2) message characteristics corresponding to these efforts, and (3) the degree to which cognitive resources are allocated to message composition in CMC, all in the service of selective self-presentation online. The present study examines these processes in an experiment designed to identify the degree to which CMC participants deliberately affect their self-presentations and relational messages by using the affordances of CMC.

2. Self-presentation

The importance of self-presentation is certainly not unique to CMC. Goffman's classic work, *The Presentation of Self in Everyday Life* (1959), suggests that people are concerned with the way others perceive them, motivating actors to manage their behavior in order to present favorable and appropriate images to others (see also Schlenker, 1985; Snyder, 1974). Impression management takes place through a variety of verbal and nonverbal cues in FtF settings (Jones & Pittman, 1982). Yet the enactment or modification of impressions in text-based CMC is limited to language, typographic, and chronemic information (see for review Walther & Parks, 2002). Several theories focus on the limitation of physical cues as the primary difference between CMC and FtF communication, alternately suggesting interpersonal deficits or accommodations as a result of these differences (see for review Culnan & Markus, 1987).

Previous research has begun to examine the formation of impressions via CMC. In some studies researchers used direct manipulations of linguistic features to demonstrate impression effects in CMC. Adkins and Brashers (1995) demonstrated that powerful versus powerless language elements affect interpersonal impressions in CMC. Lea and Spears (1992) found that variations in paralanguage and punctuation affect social judgments in CMC. In both these efforts, however, the linguistic variations were produced deliberately and consistently by scripted confederates rather than by natural participants, as the research endeavored to show differences in receiver judgments rather than in intentional production behaviors.

Although it acknowledges the significant role of language and receivers' impression formation processes, the hyperpersonal perspective offers specific propositions about CMC senders' communication strategies and the technical affordances that CMC interaction provides for impression management and selective self-presentation. The model has been applied to relatively static self-presentations in an online dating context (Ellison, Heino, & Gibbs, 2006). The extent to which users employ the means suggested by the hyperpersonal model in electronic conversations, however, has not been tested in previous research.

2.1. Hyperpersonal affordances

The hyperpersonal CMC model (Walther, 1996) posits that CMC users take advantage of the interface and channel characteristics that CMC offers in a dynamic fashion in order to enhance their relational outcomes. It is unique in its focus on technological affordances, rather than limitations of the medium, on which users draw in order to enhance the otherwise normal process of self-presentation and impression management through message

creation. There are several mechanisms and processes that the model proposes to facilitate self-presentation in online dialogue.

First, CMC is editable. As it is tied in to keyboard usage, it allows users to change what they write before they transmit their messages. Almost all asynchronous systems offer a high degree of editability, and many email programs allow composition and editing of messages no less flexibly than a word processor. Online editing systems encourage more editing than the use of pencils and paper (Hass, 1989). The capacity to change the content and appearance of a message before it is emitted, or abort a message and begin anew, is a luxury not afforded by FtF interaction.

Second, the amount of time one can spend constructing and refining a message prior to its utterance, with less social awkwardness also differs from FtF conversation, allowing "the user almost unlimited time for editing (and) composing," according to Hesse, Werner, and Altman (1988, p. 151). Synchronous discussions or real-time chats vary in the degree to which editing may be invisibly employed. In these cases, one does well not to spend too long re-writing one's comments, as conversational lags may be disruptive. The level of editability in both forms of CMC, however, is different than in FtF communication, where speech acts once done can only be amended through repairs or accounts after the fact rather than before they are articulated.

A third affordance of CMC is that a writer composes and exchanges messages in physical isolation from receiver, masking involuntary cues. That is, senders do not exude their natural physical features and non-deliberate actions into the receiver's realm of perception. There is much less "leakage" in CMC since there is no unwanted nonverbal indication of undesirable affect or attitude. While language use may also carry subtle cues about affective attitudes users might otherwise wish to conceal (see Wiener & Mehrabian, 1968), even spontaneous language composition is considered to be more controllable and malleable than the less overtly controlled physical behavior of FtF encounters (Ekman & Friesen, 1969). Edited written messages may be even more malleable. Thus CMC users are able to convey about themselves a much more discretionary front, better concealing that which they do not wish to convey while accentuating that which they do.

A fourth factor suggested to operate in CMC is the reallocation of cognitive resources from environmental scanning and nonverbal management toward message composition. Environmental scanning refers to the activities in FtF conversation of sensing ambient stimuli, attending to other conversants' symbolic and physical expressions, and monitoring feedback. Nonverbal management pertains to the efforts required to express oneself through the various nonverbal code systems and to maintain appearance during FtF interaction. While these FtF tasks may be accomplished with little conscious attention, they are assumed to require the devotion of some level of attention resources (see Burgoon & Walther, 1990). In communication that does not require body, face, voice, or space, however, these kinds of surveillance and expressive systems may be disregarded. Energies normally devoted to their operation FtF may be reallocated to the single expressive vehicle in CMC, message production and reception. These tendencies may also heighten the communication adaptation process of CMC.

When CMC users are motivated to do so, these processes allow them to manage impressions and ultimately exceed parallel FtF partnerships in social orientation or intimacy, according to the hyperpersonal perspective.The mechanisms enumerated by the hyperpersonal perspective represent sociotechnical characteristics. This is to say that

aspects of the technology allow, enable, or promote certain social cognitive and communication processes, which are recursive. For instance, the ability to edit must interact with some desire or motivation to optimize one's message, but the desire to optimize one's message may be enhanced by the prospect of being able to do so. The editability characteristic means little unless users are motivated to edit, and self-presentation goals affect this motivation and editing behavior. The hyperpersonal perspective has less to say about the specific social contexts, or target partners, among whom these dynamics should occur. Although the original introduction of the model drew on other perspectives to posit that a modicum of perceived similarity and anticipated future action were stimuli to hyperpersonal processes, further research has challenged whether similarity and/or anticipation are theoretically necessary and sufficient, as the processes posited by the model have been demonstrated in situations varying in these qualities (e.g., Boucher, Hancock, & Dunham, 2004; Hancock & Dunham, 2001; Herring & Martinson, 2004). The model seems best suited to predicting online cognitive and behavioral processes that may be set into motion by affinity drives that are accounted for by other frameworks.

Based on the general propositions reviewed above, a number of hypotheses may nevertheless be derived related to the nature of the messages and the process of message construction in CMC. These hypotheses address three basic questions: (1) What differences in the process of creating messages correspond to variations in motivation to selectively self-present? (2) Do objective language differences result from selective self-presentation and message management in CMC? (3) Do the hypothetical process and language differences correspond to social evaluations about those messages?

2.2. Language hypotheses

What message composition elements may lead to more favorable presentations, at the level of language use? Offering more verbiage might prompt a prospective partner to reciprocate. Spending time on someone is normatively a signal of interest and availability (Burgoon, Buller, & Woodall, 1989); online asynchronously, the only evidence of greater time spent communicating is more verbiage produced. Tacitly aware of this, message senders will selectively self-present by writing more. Thus

H1: CMC users write more verbiage to desirable than to undesirable targets.

Another manner in which people may signal positive affect in CMC is through linguistic markers of involvement (Walther, 1992; Walther et al., 2007). While there are several ways to assess this, one indicator used in previous CMC research is the analysis of personal pronoun usage (Sherblom, 1990; Witt, 2004; see Wiener & Mehrabian, 1968), in which more pronoun use is associated with greater immediacy and involvement with an auditor or topic. Thus

H2: Users exhibit more personal pronouns writing to desirable than to undesirable targets.

A further indicator of care in language assembly may be seen in the sophistication of language used. It is unclear what level of language complexity might be most normatively desirable in CMC, and indeed some have suggested the linguistic register of much CMC

appears to be a hybrid between speech and writing (Ferrara, Brunner, & Whittemore, 1991). Nevertheless, greater lexical diversity in speech tends to be evaluated more positively (Bradac, Courtwright, & Bowers, 1980). To the extent that this same principle applies to written complexity,

> H3: Users display more complex sentences when writing to desirable than to undesirable targets in CMC.

While these micro-behaviors may provide some evidence of linguistic attempts at enhanced impressions or affiliation, it is worthwhile to discern whether these variations are indeed associated with affective evaluations of communication. Granted there are likely to be other, content-related differences, which accompany such linguistic shifts. Therefore, a research questions is tendered,

> RQ1: To what extent do linguistic variations affect social judgments of the immediacy/affection of CMC messages?

2.3. Human–computer interaction hypotheses

In addition to proposing that CMC users make certain impressions via language, the hyperpersonal perspective specifies how they go about it, suggesting several means of technology use achieve enhanced impressions. CMC allows communicators to spend time composing messages prior to their expression, and the hyperpersonal model suggests that time spent in CMC prompts especially mindful and deliberative message composition. Several studies in social cognition establish that time is associated with extensive cognitive processing (Abelson & Reder, 1977; Bower, Black, & Turner, 1979; see Fiske & Taylor, 1984). Greene and Lindsey (1989) found that people who were given more time to plan and prepare a complex message before they spoke were more fluent and successful at addressing the interpersonal needs of their target. In CMC research, Sproull, Subrami, Kiesler, Walker, and Waters (1996, p. 113) concluded "that a longer time to answer questions bespeaks thinking more carefully about one's answers." Following from this, interpersonally motivated CMC users might take more time composing messages of similar length than less motivated users. Another argument from the hyperpersonal perspective is that users may take advantage of the written interface, extra time, and cognizance, to edit and re-write their messages in CMC before sending them. Thus the straightforward main effects hypotheses on when CMC users change the *process* of message composition,

> H4: Users spend more time composing CMC messages to desirable than to undesirable targets.
> H5: Users edit CMC messages more when composing messages to desirable than to undesirable targets.

The use of additional time to compose, and greater editing of messages should be reflected in the quality of the messages that result from these efforts. Additional hypotheses were derived from the hyperpersonal contention that CMC users employ the composition time and editing affordances of the medium to affect the *qualities* of the messages that are ultimately produced, as follows:

H6: Composition time in CMC is positively associated with greater immediacy/affection and more social orientation.

H7: Editing activity in CMC is positively associated with greater immediacy/affection and more social orientation.

Although the behavioral indicators of time and editing may indicate more mindful communication, it is also useful to see if users perceive whether they are more aware of their self-presentation activity under facilitating conditions. The hyperpersonal model proposes that individuals reallocate cognitive resources from the typical environmental scanning they do in FtF environments toward message construction activities when using CMC. While the model does not specify overt self-consciousness, it would be consistent if editorial and composition activities are accompanied by self-reflection. Indeed, Matheson and Zanna (1988, 1990) found that subjects using synchronous CMC exhibited significantly greater "private self-awareness" than those communicating FtF did (see also Joinson, 2001), whereas Daly, Weber, Vangelisti, Maxwell, and Neel (1989) documented users' cognizant strategies for interpersonal knowledge gaining and impression management strategies using think-aloud protocols accompanying real-time CMC chat. Thus users may be more self-aware, more conscious of their writing, more calculating regarding their partners, or some combination. Such an orientation may enable communicators to express themselves in ways more intentional and desirable than they might otherwise. Thus,

H8: Users report greater mindfulness during CMC message composition when writing to desirable than to undesirable targets.

Finally, it is valuable to ask whether the composition and message selection processes in CMC are as highly deliberate as the hyperpersonal perspective suggests. As Kellermann (1992) argues, even communication which is strategic may be highly automatic. If this is the case, it follows that CMC users might not actually use more time, even when composing more complex messages. By examining alternative relationships among time, editing, and verbosity we may gain a more detailed understanding about how CMC users approach message construction and self-presentation.

Users may exhibit mindful composition processes in several different ways, each of which has a different relationship to activity over time. If motivated CMC users take more time than less-motivated users but they do not differ in their verbosity, or if they spend similar amounts of time but write less, they are spending more time per word composing. If, on the other hand, their composing time is positively correlated with editing – more so than among less motivated users – we can conclude that time and editing go hand-in-hand during selective self-presentation. If time and editing are uncorrelated, however, or especially if negatively correlated, we can infer that motivated users are being more automatic in their constructions. Any of these results may reflect the contention that motivated users are more mindful in their message composition. To find that their time composing did not differ from less motivated users, *and* that they wrote as many (or more) words rather than less, would undermine the proposition. The research question may be posed,

RQ2: What is the relationship among composing time, editing, and verbosity, and does it differ between CMC users communicating to desirable targets and to undesirable targets?

3. Methods

3.1. Participants

Sixty individuals were recruited from a large undergraduate university course. Participation was rewarded by extra course credit. Solicitation for subjects included the qualification that they used e-mail in the previous month. Failure to attend the experiment resulted in the loss of six subjects. The final sample consisted of 26 females and 28 males. Their ages ranged from 18 to 23, with a mean of 19.69 years (SD = 1.03).

Participants were recruited under the guise that volunteers were being sought for an experimental, multi-institutional computer-based discussion regarding the development of college curricula for the future. They were scheduled to report individually to a specific computer laboratory on campus where they would be taught how to use a computer conferencing system and begin conferring with another person. They were told that prospective partners might include faculty or college students from another institution, or high school students from another state. They were led to believe that the discussions would take place asynchronously over four weeks' time, and that they were to return to the lab at subsequent intervals to continue the online discussions. In actuality, there were no subsequent sessions. Once all of the participants completed their "initial" sessions, the entire sample was debriefed and rewarded.

3.2. Stimuli and offset manipulation checks

The stimulus materials were descriptions of individuals intended to vary in level of desirability, one of which was assigned to a subject under the guise of an upcoming online conversation with that person. As Jones and Pittman (1982) observed regarding the study of self-presentation behavior in general, "about the only way to study strategic self-presentation is to arouse particular impression-management motives experimentally, and to observe the features that distinguish ensuing responses from behavior without such implanted motivation" (p. 233). Thus, the experiment sought to arouse this motive by manipulating pre-interaction information about the presumed target's social desirability, assuming that desirability would induce self-presentation motives and behaviors. In the actual use of CMC and the Internet, users may have various levels of information about their targets prior to first exchanges, via web pages, message archives, and other sources (Ramirez, Walther, Burgoon, & Sunnafrank, 2002). Differences in the degree of prior knowledge and the desirability of anticipated partners may be assumed to create different levels of desirability and motivation for selective self-presentation.

In terms of specific desirable attributes, the parameters of the hyperpersonal model do not specify much about the type of partner that motivates the desire to selectively self-present online. Other research traditions were consulted to design manipulations intended to create variations in target desirability. Characteristics were adopted that have previously stimulated high or low levels of pre-interaction social "reward" for confederates in FtF research (Burgoon, Walther, & Baesler, 1992), including social attractiveness, topical expertise (in the present case, in the context of discussion over technology curriculum issues), and status of the target. A third level of stimulus description was designed to work as a neutral control condition. These three levels were duplicated crossing genders so that there was a male and a female version for each level, for a total of six prospective stimuli.

For the high reward sources, prestigious university professors with interests in technology were selected. Real names of these personae were left intact, as there was some concern that relatively "net-savvy" participants might attempt to verify their reality. With their permission, two real persons' biographies with some common characteristics were modified to form versions that differed only by gender and institutional affiliation. Based on initially weak pretest results, the professor descriptions were made to appear even more sociable by adding that each "is known as a popular and entertaining teacher among her (or his) students, and it is common to see more than one of them in (her) office in an informal discussion or 'surfing the net' together". The low attractiveness stimuli were designed to depict targets with whom communication over technology issues would be unrewarding. These biographies were fabricated to depict high school students who were disinterested in technology and reluctant to participate in this project. Pretesting suggested further reducing these descriptions' sociability, and the targets' hobbies notes were changed from "playing baseball and meeting (girls/guys)" to "S/he describes (herself) as a loner. Hobbies include bowling, listening to music, and spending time alone." Control conditions depicted a male or female name, and the statement "...is a student who is participating in this project. (Information pending)".

Descriptions of these individuals were presented to offset groups of 24 subjects for manipulation checks on task attractiveness (Cronbach *alpha* reliability = .97), social attractiveness ($\alpha = .91$; McCroskey & McCain, 1974), and credibility (McCroskey, 1966), which factored into *capability*, $\alpha = .85$, and *dynamism*, $\alpha = .88$. These tests indicated significant differences on task attractiveness, $t(22) = 6.45$, $p < .001$; social attractiveness, $t(22) = 3.92$, $p < .001$; capability, $t(22) = 3.03$, $p = .006$; and dynamism, $t(22) = 2.72$, $p = .01$, with high-attractive stimuli scoring more positively than the low-attractive stimuli.[1]

A final manipulation check was conducted to establish whether the stimuli aroused different levels of desire for communication with the targets. This test also examined interactions with rater and target gender, since previous research has documented gender combination effects on wordiness and language selection in CMC (e.g. Savicki, Kelley, & Lingenfelter, 1996), and differences in self presentations due to gender combinations in FtF interaction (e.g. Ickes & Barnes, 1977), any of which might impact hypothesis tests in the present study. An additional sample ($N = 33$) was assembled, and participants were randomly assigned one set of all three stimuli, segregated by gender. That is, some of the male participants were presented the three male-depicting descriptions (high school loner, sociable professor, and student/control), while the other male participants viewed all three female-depicting stimuli. Likewise, some of the female participants were presented the three male descriptions, and other females viewed the female stimuli. The order of presentation was rotated and counterbalanced across sets. Participants were told that they would participate in a national panel discussion, similar to the induction described above, and asked how much they would like to interact with each of the three targets, using a 1–3 scale, where 1 was least desirable and 3 was most desirable.

[1] Means and standard deviations ($n = 12$) from the manipulation check are as follows. Task attractiveness, $M_{\text{desirable}} = 4.17$, SD = .53; $M_{\text{undesirable}} = 2.81$, SD = .50. Social attractiveness, $M_{\text{desirable}} = 4.26$, SD = .55; $M_{\text{undesirable}} = 3.44$, SD = .47. Capability, $M_{\text{desirable}} = 4.02$, SD = .74; $M_{\text{undesirable}} = 3.29$, SD = .41. Dynamism, $M_{\text{desirable}} = 4.15$, SD = .32; $M_{\text{undesirable}} = 3.61$, SD = .65.

A within-subjects general linear model analysis tested the effects of target status, target gender, and subject gender on desirability of the target. A significant linear contrast test reflected a three-way interaction, $F(1,29) = 5.00$, $p = .03$, with no significant main or two-way interaction effects obtaining. The pattern of the means showed a complex pattern of desirability. Surprisingly, both male and female participants indicated their strongest preferences for discussion with an opposite-sex but undescribed student. Male subjects' secondary preference indicated a same-sex professor, followed by a same-sex (ambiguous) student, a same-sex high school student, female professor, and female high school student. Female subjects similarly preferred the same-sex professor and high school target, after which their preferences diverged from the pattern of male subjects: male high school targets next, followed by a same sex (ambiguous) student, and last, a male professor. Although these patterns are complex and unanticipated, they do show that variation in desirability was achieved by the stimuli. No revisions to the basic hypotheses were tendered, since the hypotheses involve target desirability as the cause of selective self-presentation behaviors, rather than specifying the specific features of the target that might prompt desirability and its outcomes. However, the potential interaction of gender combination and target status was evaluated in subsequent hypothesis tests. In the main experiment, one of these six descriptions was randomly assigned to each subject.

3.3. Typing ability

It was reasoned that typing speed might be a strong predictor of the amount of time participants spent composing their computer conferencing notes regardless of hypothesized factors. In order to prevent confounding results, the typing speed was ascertained for each participant. Each participant individually reported to a private computer lab room and completed a typing test in which s/he was asked to retype a passage from a children's novel, which had been enlarged and displayed at eye-level. Participants typed for 60 s onto a PC running the *Typemate* program (de Deugd, 1993), which measures words typed in any time interval. Participants were then handed stimulus materials and instructions which they read before proceeding.

3.4. CMC system

Instructions indicated how to use the university's computer conferencing system, which is accessible over the Internet. The system requires users to enter or join discussions in which they have been registered, and then initiate a new message or read and reply to an existing message. A lab assistant guided participants who were unfamiliar with these procedures, and directed all participants to a practice conference to teach, or verify that participants knew, how to start, edit, and post a message, and retrieve others'. Participants were then each directed to a discussion space – one per subject – to begin the (fictitious) discussion, with the instruction "your first message to your partner should describe your general Internet use and your feelings about it." Subjects were instructed to write for as long or as little a time as they wished, and to post their messages when they felt they were finished, after which they were to get the attention of a research assistant. The final messages were stored in the computer conferences, and retrieved later for analysis.

To capture interactive messaging behaviors a video converter, which translated computer VGA output into NTSC television signal, was connected from the PC and to

a videotape recorder out of sight from participants. The recorder superimposed a timer over the video image. Videorecordings from this process allowed the subsequent analysis of composing time and editing behaviors, as it captured all keystroking.

Finally, subjects completed a short post-test questionnaire. Among several dummy items related to the usability and responsiveness of the computer conferencing system was the critical measure assessing the subject's mindfulness during the composition process: "Would you say you considered the impression you wanted to convey..." with response scales from 1 ("not at all") to 5 ("a great deal").

3.5. Analyses

Composition. Three outside coders reviewed the videotapes of message composition sessions. The amount of time a subject spent composing was defined as the number of seconds from the point at which subjects accessed their private conferences until the time they pressed the command to post their message to the conferencing system. A simple reliability check indicated that all three coders made the same calculations within 3 s of each other on a sample of three videotapes, after which they coded time segments independently.

Editing behavior was also coded, using the following four definitions: (1) forward *deletions*; (2) *destructive backspaces*; (3) *insertions* (putting in spaces, letters, or punctuation where there previously had been none); and (4) *replacements*, such as changing capitalization to lower case, or changing words or letters. Three coders sampled 10 per cent of the tapes in common, with inter-rater reliabilities achieving Scott's $pi = .63$, which was acceptable under these conditions.[2]

Language differences. Linguistic analyses were performed on the electronic transcripts from the computer conferences. Transcripts were subjected to an automated language analysis program, Pro∼Scribe (Smetana, 1994) that analyzes text files for syllables, words, pronouns, and sentences. From these structures it derives measures of message personalization (per cent of words that are personal pronouns), syllables per word, words per sentence, and higher-order indexes such as the Flesch readability level[3] (see Flesch, 1948). While a number of measures was thus available, several were related to one another in their computation. The following measures were selected for subsequent analysis: the Flesch index (containing syllables-per-word and words-per-sentence) as a measure of complexity, the number of words as a measure of length, and percentage of personal words as

[2] The *pi* coefficient is sensitive to fluctuations in the base rate of the frequencies in the use of different categories (Scott, 1955). That is, when the true occurrence of different types of behaviors is not uniform among different categories, *pi* is reduced even if there is great agreement among coders. In this case, if people use different approaches to editing, with participants preferring deleting to backspacing, *pi* is lower. Additionally, *pi* assumes mutually exclusive categories and these may not be. That is, to make a replacement requires a deletion. However, a deletion does not mandate a replacement. In this research the priority was to be exhaustive in observing all editing, which the notation of all four codes provided. So while the precise relationship among these editing micro-behaviors is not exact, a comprehensive measure collapsing across them offers the most exacting view of the level of online edits that participants made.

[3] The Flesch index formula states Reading Ease $= 206.835 - ([.846] \times [\text{syllables per hundred words}]) - ([1.015] \times [\text{sentences per hundred words}])$. Thus larger coefficients indicate lower complexity and greater readability. The Pro∼Scribe software analysis was found to be very consistent with judgments made by an expert human analyst in a previous validation effort (personal correspondence, Baesler, 1990).

a measure of personalization. Two of the measures exhibited correlation (Flesch and Personalization $r(53) = .50$, $p < .01$), so hypothesis tests were conducted using the Bonferroni *alpha* adjustment set to critical $p < .025$.

Social judgments. In order to evaluate the effects of subjects' linguistic behaviors on the social evaluations of their messages' affect, two outside coders reviewed the subjects' messages and rated them using the scale assessing immediacy/affection from Burgoon and Hale's (1987) relational communication measure. This measure employed 14 Likert-type 5-interval items (e.g., "The subject disliked his/her partner," "The subject communicated coldness rather than warmth" [both reversed]). The two raters' combined scores achieved a Cronbach *alpha* reliability of .96.

4. Results

4.1. Examination of covariates

The time a participant spent composing may be due to one's motivation to manage impressions and to reflect thoughtfulness, but it may also be affected by native typing skills or how much verbiage one types. Preliminary correlation analyses examined (1) composing time and typing speed (in words-per-minute), and (2) composing time and the length of the finished messages (in words). Indeed, composing time was negatively correlated with typing speed, $r(52) = -.39$, $p < .005$, as expected. However, composing time was also strongly associated with the number of words, $r = .70$. There was no difference between these relationships, $z = 1.53$, and it remains unclear whether some participants took longer to type because they were slower typists or because they typed more. For this reason typing skill was a covariate in subsequent analyses where time typing was a variable.

4.2. Hypothesis tests

Message qualities. The first analyses examined the effects of the target on subjects' language production. Multivariate analysis of variance examined whether the independent variable, anticipated partners' desirability, had a significant effect on the three dependent variables characterizing the participants' writing behavior (verbiage, personalization, and complexity). The multivariate effect was significant, Wilks *lambda* $= .77$, $F(6, 98) = 2.30$, $p = .04$, $\eta^2 = .123$.

Hypothesis 1 predicted more verbiage from participants motivated to selectively self-present than from unmotivated users within CMC. No univariate main or interaction effect obtained for the partner factor on the number of words transmitted. Although this calls for rejection of the hypothesis, it is interesting to note that the results of language adjustments described below appear to have been accomplished rather efficiently, without significant variation in wordiness.

The second hypothesis predicted that the target affects language personalization through pronoun selection. The main effect was significant at the univariate level, $F(2, 51) = 4.65$, $p = .014$, $\eta^2 = .15$, with no overriding gender interactions. The directions of the means were not consistent with predictions or the desirability manipulation check. Results showed that those communicating with a target they assumed to be a high school student used the most personalized language ($M = 104.00$, SD $= 22.79$), which post hoc Newman–Keuls analyses revealed to be greater than personalization toward control

targets ($M = 92.63$, $SD = 27.37$) and high-status target communicators ($M = 79.06$, $SD = 21.70$). Hypothesis 3 specified that target desirability affects language complexity. Partner level had a significant effect on Flesch index, $F(2, 50) = 4.36$, $p = .018$, $\eta^2 = .16$. Newman–Keuls comparisons demonstrated that the highest and lowest scores were significantly different. Language complexity was greatest (i.e. the mean Flesch score was lowest) for those subjects who believed they were addressing the university professors, $M = 60.47$, $SD = 8.25$. Flesch scores for those allegedly addressing the high school addressee were highest, $M = 69.00$, $SD = 9.70$, while those associated with the undescribed control target ranged in the middle, $M = 67.53$, $SD = 8.02$. Mirroring the language accommodation to high school students in pronoun personalization, when the student subjects anticipated an electronic conversation with a professor, they adjusted their language upward, so to speak.

While the independent linguistic features were each reflected differently in response to the anticipated partner, it remains a question what extent these micro-level differences correspond to differences in the perceived social nature of the messages, which RQ1 sought to discern.

Stepwise multiple regression analyses were conducted to explore the contributions of the micro-linguistic variations within messages (provided by automated coding) on the relational communication evaluations of those messages (provided by outside raters). The language variable primarily related to immediacy was the sheer number of words, which rendered a very large positive effect and was the first predictor to enter the model, adjusted $R^2 = .45$, $F(1, 50) = 41.99$, $\beta = .69$, $p < .01$. Language complexity was also significantly and positively related to immediacy, $\beta = .29$, with the final equation rendering an adjusted $R^2 = .52$, $F(2, 49) = 28.85$, $p < .001$. The percentage of personal words did not enter the model with these other factors.

Composing time and editing behaviors. The next analyses examined the effects of anticipated partner on the composition and editing processes CMC users undertook. H4 predicted more time being spent, and H5 predicted more editing, when participants were writing to more desirable targets. An analysis of time composing with typing rate as a covariate yielded no significant effects due to the partner to whom subjects believed that they were writing. Typing speed exerted a significant effect on time composing, $F(1, 50) = 7.24$, $p = .01$, without which no other effects persisted.

Analysis of editing behaviors yielded a significant three-way subject sex by target sex by target status ($2 \times 2 \times 3$) interaction effect, $F(2, 42) = 4.34$, $p = .02$, with no two-way interactions or main effects persisting. Among male participants, the *greatest* editing was directed to female control targets (i.e., females about whom it was only stated that they were students), followed closely by the targets who were described as male high school loners. Males edited *least* when they believed they were addressing high-status male or female (professor) targets, or control (unspecified student) males. Female participants, on the other hand, edited most when addressing a female, high-status target, closely followed by a male/control. The range of female subjects' editing was greater than male subjects', with their highest-edited target (female professor) averaging 71.5 edits, while their least-edited target averaged 16.8 edits (female/control). Males ranged from 49.50 to 20.75 edits. (Means are reported in Table 1.) Thus the female subjects edited for the female professor most while they, like male participants, disregarded their respective same-sex "peer," editorially speaking. Male subjects edited more for a cross-sex peer, but least for a professor of the opposite sex. In the final analysis, the results indicate that editing is employed dif-

Table 1
Means (and standard deviations) for editing behaviors (insertions, deletions, backspaces) by subject sex, presumed target sex and status

Subject sex	Male		Female	
Target sex	Male	Female	Male	Female
Target status				
High	21.33 (18.01)	20.75 (13.05)	25.75 (35.37)	71.50 (37.04)
Neutral	24.00 (16.15)	49.50 (24.72)	70.00 (42.12)	16.80 (31.52)
Low	44.25 (39.99)	26.25 (11.64)	41.00 (45.40)	26.20 (18.08)

ferently when communicating with partners with different attributes in CMC, with gender and status of the target mediating these effects.

Analysis for H6 and H7 examined whether, as suggested in the hyperpersonal perspective, variations in editing and composition behaviors were used to enhance the relational tone of the messages they produced. Correlation tests examined whether time spent composing or whether editing frequency were related to the immediacy/affection of the final messages. Results showed significant one-tailed correlations between both composing time, $r = .36$, $p = .005$, and editing, $r = .44$, $p = .001$, with immediacy/affection. The hypotheses were supported.

Self-reported mindfulness was also analyzed. H8 specified that communicating with more desireable targets prompts greater mindfulness during the message composition process. Mindfulness results were obscured by a significant two-way interaction for target sex by target status, $F(2,40) = 3.28$, $p = .048$, $\eta^2 = .13$. The means do not present readily interpretable patterns.[4] Among male targets there was slightly more mindfulness when the stimuli were more identifiable (that is, the professor or the high school student) than the ambiguous control, but female targets induced less mindfulness when identified and more mindfulness when ambiguous.

Research question 2 asked about the relationships among time, editing, and the production of words: whether individuals use their time for more deliberation, more editing. A preliminary regression analysis on composing time, with typing score forced into the model first and with editing and word counts entered next, demonstrated that composing time was influenced by editing and word count over and above variations in typing ability. Since previous results ambiguated the a priori expectation regarding which experimental conditions provided greater motivation to selectively self-present, a median split on mindfulness was used as a break variable to create two sub-groups. Results indicated that for those reporting *less* mindfulness online ($n = 29$), the more total amount of time they spent in the writing session, the more word volume they produced ($r = .75$, $p < .001$) and the more they edited ($r = .51$, $p = .006$), with no differences between these two activities, $z = 1.48$. However, for those experiencing *more* mindfulness online ($n = 22$), although the associations of time with both word count ($r = .49$, $p = .03$) and editing ($r = .87$,

[4] The greatest mindfulness occurred when participants believed they were communicating with an undescribed female in the control condition, $M = 3.22$, SD = .83. The male control stimulus elicited less mindfulness, $M = 2.22$, SD = 1.09, and was higher only than the female high school stimulus, which was lowest, $M = 2.00$, SD = .71. Communicating with a professor entailed moderate mindfulness: male professor $M = 2.56$, SD = .73; female professor $M = 2.63$, SD = .74.

$p = .001$) were significant, the association between time and editing was significantly stronger than the relationship between time and word production, $z = 2.48$. These findings are consistent with the hyperpersonal contention that more mindful processing in CMC accompanies more effort in message construction, increasing CMC editing.

5. Discussion

This study investigated the manner in which CMC users engage in selective self-presentation under conditions that were created in order to arouse differential motivation to modify one's messages. Specific technical affordances of CMC such as editability and off-line composition, with the passage of conversational time in suspension, have been argued to allow CMC users to augment their self-presentations in a process called hyperpersonal interaction. This research called on participants to write first messages to different apparent targets, in order to detect variation in the facilitation of language creation and language effects by virtue of the time, editing, and mindfulness that CMC affords.

In general, several processes specified in the hyperpersonal model of CMC were observed to take place. For instance, the model specifically mentions that CMC users spend time crafting messages, editing them, and doing so with greater allocation of cognitive resources under certain circumstances. The model also suggests that these efforts contribute to greater intimacy. Indeed, these phenomena – the relationships of time and mindfulness to editing, and the relationship of editing to immediacy – were observed in the present study. These phenomena sometimes varied as a function of complex interactions between gender by status of the target, but when they did occur, editing was related to mindfulness, and it resulted in greater message immediacy.

Other relationships that occurred in directions other than expected may nevertheless reflect some underlying propositions of the hyperpersonal model. That is, pronoun personalization and sentence complexity were nominal operationalizations of message management, a construct in the hyperpersonal model. They performed as expected in terms of their social effects, through the observed relationships with immediacy ratings, although the targets to whom they were exhibited deviated from the initial predictions of this study.

A summary of the most robust findings reveals the following: More personalized language was delivered to apparent high school students, rather than to college professors, but more complex sentence structures were employed for supposed professors than for high school targets, which conflicted with predictions based on target desirability, but are interpretable through other mechanisms addressed below. In terms of editing behavior, a subject gender $\times$ target gender $\times$ target status effect occurred, such that male subjects revealed different levels of editing, depending on sex and status of target, than did female subjects. Males seemed to work harder on their messages for opposite sex peers or high school students, whereas females re-wrote for female professors or peer males, but edited least for female peers. Time and editing were related to immediacy/affection. Mindfulness varied in ambiguous patterns with respect to targets, but when participants were more mindful they engaged in greater editing than when they were less mindful.

Mindfulness in particular is suggested to be sensitive to the composition time that asynchronous CMC provides, as are other aspects according to the hyperpersonal model. Indeed, how well the present results generalize to *synchronous* CMC such as Instant Messenger and other real-time text messaging deserves further exploration. It may be that time stops until users press "send" when they compose CMC messages regardless of synchrony,

or that the conversational coherence pressures of real-time chat make editing and deliberative composition ill-afforded luxuries. At the same time, with fewer cues to monitor and no physical spatial intrusions on conversations, synchronous chat may harness greater mindfulness, and the communication behavior associated with it, just as well as in the present results.

Some of the observed patterns resemble findings that have accumulated in research on communication accommodation theory, particularly the greater use of personal pronouns toward high school students and more complex language directed toward professors. These patterns reflect the socially beneficial convergence by lower-status partners to the lexical complexity of their higher-status targets (see for review Giles & Wiemann, 1987), and similarly, accommodation by a high-status speaker to that of a lower-status partner (Bradac, Mulac, & House, 1988). Indeed, accommodation, or "overaccommodation" (Coupland, Coupland, & Giles, 1991), may also explain male's extra editing efforts toward the lowest-status, male high school targets; according to Thomson, Murachver, and Green (2001, p. 171), "hyperconvergence might occur when a speaker converges toward behaviors expected of his or her partner by virtue of the partner's (different) social category," although this phenomenon is associated elsewhere with speaking to the elderly rather than to the young.

Addressing the desirability of unknown targets described only as students participating in this study, experiments examining the social identification/deindividuation, or "SIDE" model of CMC have exploited the assumption that when CMC users know only that they and their partners are students, and are otherwise anonymous, this is sufficient to trigger ingroup identification and social attraction (e.g. Lea & Spears, 1992; Spears, Lea, & Lee, 1990). Like communication accommodation theory, SIDE assumes an intergroup rather than interpersonal basis for relational cognition. However, because of its emphasis on social-categorical similarity as a basis for attraction, it is unclear how SIDE accounts for the cross-sex (and cross-status) effects. This may be due in part perhaps because the model, according to its authors, is less applicable to online dyadic interaction (which may cross these levels) than it is to online groups (Postmes, Spears, & Lea, 2002).

Despite the reflection of some of these results to findings from intergroup research, the unanticipated directional effects on language may be explained more parsimoniously by theories of interpersonal expectancies, reciprocation, and compensation, which do not require assumptions of ingroup/outgroup identification. The findings that reflect greater affinity displays toward lower-status, ostensibly unattractive stimulus personae, for instance, map quite well to "behavioral compensation" dynamics: "Under certain conditions, individuals with preinteraction expectations may engage in a process of behavioral compensation whereby they attempt to offset or minimize the anticipated negative reactions of others," according to Christensen and Rosenthal (1982, p. 85). One example is seen in the reactions of subjects in research by Burgoon and Le Poire (1993): Although expected to react aversively to partners whom they were forewarned were shy and withdrawn, subjects in FtF conversations following such forewarnings seemed to use affiliative behavior reach out, cheer up, and coax the recalcitrant partners out of their shells. Indeed, in line with the present findings, Chen and Bargh (1997) point out that "Self-*dis*confirming prophesies are just as likely to develop out of expectancies as are self-fulfilling ones" (p. 544); "Expecting a person to be shy, one can try to put him or her at ease and, if successful, produce more gregarious and outgoing behavior…" (p. 556).

These additional approaches do not contest the hyperpersonal model's central predictions, especially those tenets regarding the sociotechnical means by which selective self-presentation is enacted online. They indicate that the tenets of the hyperpersonal model may be quite complementary with directional predictions presented in other, traditional theories of affiliation and attraction, to which the model adds sociotechnical factors and ultimately accounts for a broader range of behavior than other perspectives, alone, encompass. It remains to future research to learn more about the precise conditions under which these processes are most likely to take place, and to incorporate principles from other paradigms that may do so. In terms of the model itself, the observed differences in the amount of message crafting these participants undertook, along gender and target lines, indicate that differential motivation and selective self-presentation levels occurred through several specified mechanisms. These differences in micro-communication behaviors illuminate certain dynamics of CMC users' appropriation of technology in the process of impression management and message enhancement.

Acknowledgement

The author is grateful for editorial suggestions from Howard Giles and Jeff Hancock.

References

Abelson, R.P. & Reder, L.M. (1977). Linear ordering in scripts. Unpublished research, as cited in Abelson, R. P. (1981), Psychological status of the script concept. *American Psychologist*, *36*, 715–729.

Adkins, M., & Brashers, D. (1995). The power of language in computer-mediated groups. *Management Communication Quarterly, 8*, 289–322.

Allen, C. L. (1996). *Virtual identities: The social construction of cybered selves*. Unpublished doctoral dissertation, Northwestern University.

Baker, A. (1998). Cyberspace couples finding romance online then meeting for the first time in real life. *CMC Magazine*. http://www.december.com/cmc/mag/1998/jul/baker.html (retrieved December 1, 2000).

Baym, N. K. (1995). The emergence of community in computer-mediated interaction. In S. G. Jones (Ed.), *Cybersociety: Computer-mediated communication and community* (pp. 138–163). Thousand Oaks, CA: Sage.

Boucher, E., Hancock, J. T. & Dunham, P. D. (2004). The equalization phenomenon: interpersonal sensitivity and the impact of medium. *Poster presented at the 5th annual meeting of the society of personality and social psychology*, Austin, TX.

Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in text comprehension and memory. *Cognitive Psychology, 11*, 177–220.

Bradac, J. J., Courtwright, J. A., & Bowers, J. W. (1980). Effects of intensity, immediacy, and diversity upon receiver attitudes toward a belief-discrepant message and its source. In H. Giles, W. P. Robinson, & P. Smith (Eds.), *Social psychology and language: The selected proceedings of the international conference on social psychology and language* (pp. 217–221). Oxford: Pergamon Press.

Bradac, J. J., Mulac, A., & House, A. (1988). Lexical diversity and magnitude of convergent versus divergent style shifting: perceptual and evaluative consequences. *Language and Communication, 8*, 213–228.

Burgoon, J. K., Buller, D. B., & Woodall, W. G. (1989). *Nonverbal communication: The unspoken dialogue*. New York: Harper & Row.

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., & Le Poire, B. A. (1993). Effects of communication expectancies, actual communication, and expectancy disconfirmation on evaluations of communicators and their communication behavior. *Human Communication Research, 20*, 67–96.

Burgoon, J. K., & Walther, J. B. (1990). Nonverbal expectancies and the evaluative consequences of violations. *Human Communication Research, 17*, 232–265.

Burgoon, J. K., Walther, J. B., & Baesler, E. J. (1992). Interpretations, evaluations, and consequences of interpersonal touch. *Human Communication Research, 19*, 237–263.

Chen, M., & Bargh, J. A. (1997). Nonconscious behavioral confirmation processes: the self-fulfilling consequences of automatic stereotype activation. *Journal of Experimental Social Psychology, 33*, 541–560.

Chester, A., & Gwynne, G. (1998). Online teaching: Encouraging collaboration through anonymity. *Journal of Computer-Mediated Communication, 4*(8). http://jcmc.indiana.edu/vol4/issue2/chester.html (retrieved April 26, 2006).

Christensen, D., & Rosenthal, R. (1982). Gender and nonverbal decoding skill as determinants of interpersonal expectancy effects. *Journal of Personality and Social Psychology, 42*, 75–87.

Coupland, N., Coupland, J., & Giles, H. (1991). *Language, society, and the elderly*. Oxford, UK: Basil Blackwell.

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.

Daly, J. A., Weber, D. J., Vangelisti, A. L., Maxwell, M., & Neel, H. (1989). Concurrent cognitions during conversations: Protocol analysis as a means of exploring conversations. *Discourse Processes, 12*, 227–244.

de Deugd, M. Y. (1993). *Typemate* (Version 5.20) [Computer software] http://garbo.uwasa.fi/windows/util.html (retrieved January 23, 1996); Version 5.70 http://www.dda.nl/Pages/software.htm (retrieved July 14, 2004).

Ekman, P., & Friesen, W. V. (1969). Nonverbal leakage and clues to deception. *Psychiatry, 32*, 88–105.

Ellison, N. B., Heino, R. D., & Gibbs, J. L. (2006). Self-presentation processes in the online dating environment. *Journal of Computer-Mediated Communication, 11*(2). http://jcmc.indiana.edu/vol11/issue2/ellison.html (retrieved February 1, 2006).

Ferrara, K., Brunner, H., & Whittemore, G. (1991). Interactive written discourse as an emergent register. *Written Communication, 8*, 8–34.

Fiske, S. T., & Taylor, S. E. (1984). *Social cognition*. Reading, MA: Addison-Wesley.

Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology, 32*, 221–233.

Gibbs, J. L., Ellison, N. B., & Heino, R. D. (2006). Self-presentation in online personals: The role of anticipated future interaction, self-disclosure, and perceived success in Internet dating. *Communication Research, 33*, 1–26.

Giles, H., & Wiemann, J. M. (1987). Language, social comparison, and power. In C. R. Berger & S. H. Chaffee (Eds.), *Handbook of communication science* (pp. 350–384). Newbury Park, CA: Sage.

Goffman, E. (1959). *The presentation of self in everyday life*. New York: Anchor Books.

Greene, J. O., & Lindsey, A. E. (1989). Encoding processes in the production of multiple-goal messages. *Human Communication Research, 16*, 120–140.

Hancock, J. T., & Dunham, P. T. (2001). Impression formation in computer-mediated communication revisited: an analysis of the breadth and intensity of impressions. *Communication Research, 28*, 325–347.

Hass, C. (1989). Does the medium make a difference? Two studies of writing with pen and paper and with computers. *Human–Computer Interaction, 4*, 149–169.

Herring, S. C., & Martinson, A. (2004). Assessing gender authenticity in computer-mediated language use: evidence from an identity game. *Journal of Language and Social Psychology, 23*, 424–446.

Hesse, B. W., Werner, C. M., & Altman, I. (1988). Temporal aspects of computer-mediated communication. *Computers in Human Behavior, 4*, 147–165.

Ickes, W., & Barnes, R. D. (1977). The role of sex and self-monitoring in unstructured dyadic interactions. *Journal of Personality and Social Psychology, 35*, 315–330.

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.

Jones, E. E., & Pittman, T. S. (1982). Toward a general theory of strategic self-presentation. In J. Suls (Ed.). *Psychological perspectives on the self* (Vol. 1, pp. 231–262). Hillsdale, NJ: Lawrence Erlbaum.

Kellermann, K. (1992). Communication: inherently strategic and primarily automatic. *Communication Monographs, 59*, 288–300.

Kiesler, S. (1986). The hidden messages in computer networks. *Harvard Business Review*, 46–54, 58–60.

Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist, 39*, 1123–1134.

Landis, D. (1994). Cyberspace as a frontier for romance. *USA Today*, sec. D, pp. 1–2.

Lea, M., & Spears, R. (1992). Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing, 2*, 321–341.

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. (1990). Computer-mediated communications: The focus is on me. *Social Science Computer Review, 8*, 1–12 (Special issue: Computing: Social and policy issues).

McCroskey, J. (1966). Scales for the measurement of ethos. *Speech Monographs, 33*, 65–72.

McCroskey, J. C., & McCain, T. A. (1974). The measurement of interpersonal attraction. *Speech Monographs, 41*, 261–266.

Parks, M. R., & Floyd, K. (1996). Making friends in cyberspace. *Journal of Communication, 46*, 80–97.

Parks, M. R., & Roberts, L. D. (1998). 'Making MOOsic' The development of personal relationships on line and a comparison to their off-line counterparts. *Journal of Social and Personal Relationships, 15*, 517–537.

Postmes, T., Spears, R., & Lea, M. (2002). Intergroup differentiation in computer-mediated communication: effects of depersonalization. *Group Dynamics: Theory, Research, and Practice, 6*, 3–16.

Preece, J. (2001). Sociability and usability: Twenty years of chatting online. *Behavior and Information Technology, 20*, 347–356.

Ramirez, A., Jr., Walther, J. B., Burgoon, J. K., & Sunnafrank, M. (2002). Information seeking strategies, uncertainty, and computer-mediated communication: Toward a conceptual model. *Human Communication Research, 28*, 213–228.

Reid, E. M. (1991). *Electropolis: Communication and community on Internet Relay Chat*. Unpublished master's thesis, University of Melbourne. http://www.ee.mu.oz.au/papers/emr/electropolis.html (retrieved December 25, 1996).

Savicki, V., Kelley, M., & Lingenfelter, D. (1996). Gender, group composition, and task type in small groups using computer-mediated communication. *Computers in Human Behavior, 12*, 549–565.

Schlenker, B. R. (1985). Identity and self-identification. In B. R. Schlenker (Ed.), *The self and social life* (pp. 65–99). New York: McGraw-Hill.

Scott, W. A. (1955). Reliability of content analysis: The case of nominal scale coding. *Public Opinion Quarterly, 19*, 321–325.

Sherblom, J. C. (1990). Organizational involvement expressed through pronoun use in computer mediated communication. *Communication Research Reports, 7*(1), 45–50.

Smetana, R. W. (1994). *Pro∼Scribe Professional Scribe* (Version 4.8) [Computer software]. San Francisco: Pro∼Formance.

Snyder, M. R. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology, 30*, 526–573.

Spears, R., Lea, M., & Lee, S. (1990). De-individuation and group polarization in computer-mediated communication. *British Journal of Social Psychology, 29*, 121–134.

Sproull, L., Subrami, M., Kiesler, S., Walker, J. H., & Waters, K. (1996). When the interface is a face. *Human–Computer Interaction, 11*, 97–124.

Thomson, R., Murachver, T., & Green, J. (2001). Where is the gender in gendered language? *Psychological Science, 12*, 171–175.

Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research, 28*, 317–348.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research, 19*, 52–90.

Walther, J. B. (1993). Impression development in computer-mediated interaction. *Western Journal of Communication, 57*, 381–398.

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., Loh, T., & Granka, L. (2007). Let me count the ways: The interchange of verbal and nonverbal cues in computer-mediated and face-to-face affinity. *Journal of Language and Social Psychology, 24*, 36–65.

Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in: Computer-mediated communication and relationships. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of interpersonal communication* (pp. 529–563). Thousand Oaks, CA: Sage.

Walther, J. B., Slovacek, C., & Tidwell, L. C. (2001). Is a picture worth a thousand words? Photographic images in long term and short term virtual teams. *Communication Research, 28*, 105–134.

Wickham, K. R. & Walther, J. B. (in press). Perceived behaviors of emergent and assigned leaders in virtual groups. *International Journal of e-Collaboration*.

Wiener, M., & Mehrabian, A. (1968). *Language within language: Immediacy, a channel in verbal communication*. New York: Appleton-Century-Crofts.

Witt, P. L. (2004). An initial examination of observed verbal immediacy and participants' opinions of communication effectiveness in online group interaction. *Journal of Online Behavior, 2*(1). http://www.behavior.net/JOB/v2n1/witt.html (retrieved December, 2004).