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Interactive Uncertainty Reduction Strategies and Verbal Affection in Computer-Mediated Communication

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Abstract

The goal of this study was to investigate the language-based strategies that computer-mediated communication (CMC) users employ to reduce uncertainty in the absence of nonverbal cues. Specifically, this study investigated the prevalence of three interactive uncertainty reduction strategies (i.e., self-disclosure, question asking, and question/disclosure intimacy) in reduced-cue settings. Moreover, this study investigated whether these uncertainty reduction strategies increased the verbal statements of affection in CMC. Eighty-one unacquainted cross-sex dyads were randomly assigned to three experimental conditions: face-to-face, visual CMC supported by a webcam, or text-only CMC. Content analysis of the verbal communication revealed that text-only CMC interactants made a greater proportion of affection statements than face-to-face interactants. Proportions of question asking and question/disclosure intimacy were higher in both CMC conditions than in the face-to-face condition, but only question asking mediated the relationship between CMC and verbal statements of affection. No differences in question asking, question/disclosure intimacy, and verbal statements of affection were observed between the text-only CMC condition and the visual CMC condition. This study provided additional support for social information processing theory by specifying the role of different language-based strategies that may be employed online.

Keywords

computer-mediated communication, uncertainty reduction theory, social information processing theory, self-disclosure, question asking, statements of affection, content analysis

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Initial interactions between unacquainted individuals increasingly take place online, for example, on social network sites and online dating sites (Antheunis, Valkenburg, & Peter, 2010; Gibbs, Ellison, & Lai, 2011; Valkenburg & Peter, 2007). Although these initial conversations often take place in limited-cue settings, they may lead to levels of interpersonal attraction that are similar to those obtained in initial face-to-face interactions (McKenna, Green, & Gleason, 2002; Parks & Floyd, 1996). Experimental research has repeatedly found that text-based computer-mediated communication (CMC) results in similar or higher levels of interpersonal attraction than face-to-face communication (e.g., Bargh, McKenna, & Fitzsimons, 2002; Nowak, Watt, & Walther, 2005; Ramirez & Zhang, 2007; Walther, 1995). Interpersonal attraction refers to a positive attitude one holds about another person's social, task, or physical attractiveness (McCroskey & McCain, 1974).

Although CMC may yield similar results in terms of social outcomes as face-to-face communication, the underlying processes that lead to these outcomes may be different (Walther, Loh, & Granka, 2005). In initial interactions, partners are driven by a need to reduce uncertainty and form impressions of each other. These impressions, in turn, determine interpersonal attraction (Berger & Calabrese, 1975). In face-to-face communication, partners rely for a large part on nonverbal cues to form impressions of each other (Walther et al., 2005). Because many of these nonverbal cues may not be available online, interaction partners have to rely on different strategies to reduce uncertainty and to form impressions of each other (Ramirez, Walther, Burgoon, & Sunnafrank, 2002).

Social information processing (SIP) theory poses that in initial text-based CMC conversations, interaction partners are able to adapt to the reduction in nonverbal cues by using other cues to convey social information and thus form impressions of each other (Pena & Hancock, 2006; Walther, 1992). More specifically, the reduced nonverbal cues of CMC lead conversation partners to use interactive uncertainty reduction strategies, such as self-disclosure and question asking (Ramirez et al., 2002; Tidwell & Walther, 2002). This enhanced use of interactive uncertainty reduction strategies, in turn, is positively related to interpersonal attraction (Berger & Calabrese, 1975; Cooper & Sportolari, 1997).

However, most studies investigating impression formation and relationship formation in CMC tend to focus on the outcomes of the interaction processes, such as comparing similarity or attraction across different media conditions (Walther et al., 2005). Fewer studies have focused on the interaction processes themselves and investigated the verbal strategies observable in communication partners' initial conversations (e.g., Joinson, 2001; Pena & Hancock, 2006; Tidwell & Walther, 2002; Walther, 2007). Tidwell and Walther, for example, investigated how CMC partners use certain language-based strategies to reduce uncertainty. They found that, compared to face-to-face conversations, CMC conversations exhibited a greater proportion of self-disclosure and question asking, resulting in greater attributional confidence and perceived conversation effectiveness. Moreover, they found that CMC conversations were characterized by more intimate self-disclosure than face-to-face conversations.

The goal of this study is to investigate the language-based strategies that users employ to reduce uncertainty in the absence of nonverbal cues. Similar to Tidwell and Walther (2002), this study investigates three different uncertainty reduction strategies: self-disclosure, question

asking, and question/disclosure intimacy. We expect that in the absence of nonverbal cues that are used to reduce uncertainty in face-to-face conversations CMC users employ greater proportions of self-disclosure and question asking and will utter more intimate self-disclosures and questions.

Moreover, we pose that these uncertainty reduction strategies may affect displays of verbal affection in text-based CMC. According to uncertainty reduction theory (URT; Berger & Calabrese, 1975), a reduction in uncertainty in face-to-face communication will lead to an increase in nonverbal affiliative expressiveness, which in turn is positively related to interpersonal attraction (Berger & Calabrese, 1975). This warrants investigation whether similar processes may occur when investigating text-based CMC. Nonverbal affiliative expressions cannot be displayed in CMC. Therefore, it could be that CMC interactants employ more *verbal* affiliative expressions in CMC to express affection.

This study extends SIP theory by specifying the uncertainty reduction processes that occur in limited-cue interactions (Hancock, Landrigan, & Silver, 2007; Ramirez et al., 2002; Tidwell & Walther, 2002; Walther et al., 2005). We aim to identify refined mechanisms that CMC users use to form impressions and to reduce uncertainty in text-based communication. Specifically, we seek to investigate whether verbal statements of affection are indeed more prevalent in channels that limit the use of nonverbal cues that may be communicated. Furthermore, we want to examine whether these verbal statements of affection may occur as a result of interactive uncertainty reduction strategies. To do so, we experimentally compare initial interactions among unacquainted communication partners across three different communication channels: text-based CMC, visual CMC (i.e., text-based CMC supported by a webcam), and face-to-face interaction.

CMC Theories and the Role of Reduced Nonverbal Cues

Contemporary CMC environments differ in the extent to which they support the exchange of nonverbal cues. Although some CMC applications, such as e-mail, are predominantly text based, other environments offer additional cues. For example, social network sites offer self-descriptions, photos, and wall postings that may all be used to passively observe social information, which may help to form impressions (Antheunis et al., 2010). Moreover, instant messaging conversations frequently include audio or video (Peter, Valkenburg, & Schouten, 2007). Therefore, it is increasingly relevant to compare impression formation and uncertainty reduction mechanisms across communication channels that differ in the number of nonverbal cues they convey (Ramirez et al., 2002).

Recent theories have argued that CMC users can adapt to the medium by decoding contextual and stylistic cues and using language-based strategies to gain information about the conversation partner's characteristics, attitudes, and emotions, which allows for an increase in intimate relational communication. SIP theory assumes that in many initial communications, people are motivated to reduce uncertainty about each other and, therefore, will try to adapt to the constraints offered by CMC (Walther, 1992; Walther & Parks, 2002). The theory poses that in absence of the nonverbal cues that may normally be used to convey

relational information, CMC users adapt to the remaining communicative cues——language and textual display—to form impressions of each other (Pena & Hancock, 2006; Tidwell & Walther, 2002; Walther, 1992).

Originally, SIP theory stated that the reduced nonverbal cues in CMC would cause online interpersonal relationships to require more time to develop than traditional face-to-face relationships because CMC users need time to adjust to the constraints of the medium (Walther, 1992). However, when people are motivated to get to know each other, for example, by the task they conduct or by anticipated future interaction (Walther, 1995), they may quickly adopt verbal cues to reduce uncertainty and form impressions. This eventually leads to levels of attraction similar to face-to-face communication (Hancock et al., 2007; Tidwell & Walther, 2002; Walther, 1992).

The hyperpersonal approach specifies the mechanisms of how CMC may sometimes exceed interpersonal levels of face-to-face communication (Walther, 1996). This approach posits that in the absence of nonverbal cues CMC interactants tend to focus on those cues that are available. Therefore, they will engage in an "overattribution" process, leading to idealized impressions of each other (Hancock & Dunham, 2001). Although the hyperpersonal approach acknowledges that these overattributions may be either positive or negative depending on the cues that are initially conveyed, these impressions are most likely to be positive. Due to the absence of nonverbal cues in CMC, interactants can engage in selective self-presentation, which leads to positive rather than negative overattributions. Moreover, research has shown that when two strangers meet online with the goal of getting to know each other, the initial communication is often positive, resulting in higher levels of interpersonal attraction (e.g., McKenna et al., 2002; Ramirez & Zhang, 2007; Walther, 1995).

SIP theory posits that when nonverbal cues are added to a communication channel, the amount of social information that can be communicated increases (Walther, 1992). Therefore, adding nonverbal cues to an interaction will likely result in a reduced need to use language-based strategies to form impressions of each other because many other cues are available with which people may reduce uncertainty and form impressions of each other (e.g., gestures, clothing style). Therefore, the use of language-based strategies to reduce uncertainty is likely to be higher in text-based CMC than in face-to-face communication.

No studies have specifically compared visual and text-based CMC to face-to-face communication. Joinson (2001) compared text-based CMC with visual CMC (i.e., video without audio) and found amount of self-disclosure to be greater in text-only CMC than in visual CMC. Because self-disclosure is a language-based uncertainty reduction strategy, these findings may point to a reduced need for the use of these strategies in visual CMC compared to text-based CMC. Compared to text-based CMC, visual CMC allows several cues that may help reduce uncertainty, such as eye contact, head nods, and facial expressions (Peter et al., 2007). However, visual CMC still lacks many cues (e.g., audio, haptic) compared to face-to-face communication. Therefore, we expect a higher use of language-based strategies to reduce uncertainty in visual CMC than in face-to-face communication. Moreover, because visual CMC gives off more nonverbal cues than text-based CMC, we expect a higher use of language-based strategies to reduce uncertainty in text-based CMC than in visual CMC.

Uncertainty Reduction Processes

SIP theory predicts that CMC users adapt to the reduction of nonverbal cues by using language-based strategies to reduce uncertainty and form impressions of each other (Walther, 1992; Walther et al., 2005). Although originally developed to explain social attraction and relationship development in initial face-to-face interactions, URT provides a useful addition to SIP theory by specifying the mechanisms that reduce uncertainty in initial interactions (Berger & Calabrese, 1975). URT poses that, when people meet, they are motivated to form impressions of each other in order to reduce the uncertainty they have about the other person. Uncertainty reduction is the gathering of information that allows the information seeker to predict someone's attitudes and behavior. Lower levels of uncertainty, in turn, may increase one's liking and affection for his or her communication partner (e.g., Afifi & Metts, 1998; Berger & Calabrese, 1975; Douglas, 1990, 1994).

According to URT, people generally can use three types of uncertainty reduction strategies to get to know a target person: passive, active, and interactive strategies (Berger & Calabrese, 1975; Berger, Gardner, Parks, Schulman, & Miller, 1976). Passive strategies are those in which an informant unobtrusively observes the target person, for instance, by observing the target person's nonverbal behaviors. Active strategies involve proactive efforts to get to know the target person, without confronting the person, for example, by questioning other people about the target person. Interactive strategies require a direct interaction between the communication partners, for example, by asking questions or through reciprocal self-disclosure (e.g., Berger & Calabrese, 1975; Jourard, 1971).

In initial communication through text-based CMC, people can only rely on the verbal information that is available to form these initial impressions (Hancock & Dunham, 2001; Walther, 1992; Walther et al., 2005). In these initial online encounters, passive and active uncertainty reduction strategies are more difficult to employ than in similar face-to-face settings because they require more effort. Therefore, in text-based CMC settings, conversation partners have to rely on the interactive uncertainty reduction strategies to form impressions of each other (Ramirez et al., 2002; Tidwell & Walther, 2002).

Based on the interactive uncertainty reduction strategies that conversation partners can employ in text-based CMC, three strategies can be distinguished by which conversation partners form impressions of each other in text-based CMC (Tidwell & Walther, 2002). The first two strategies focus on self-disclosure and question asking, respectively. First, conversation partners may ask questions in order to procure answers with which to reduce uncertainty. Second, they may use self-disclosure as an uncertainty reduction strategy because self-disclosure of one's self elicits self-disclosure from the target person, due to the norm of reciprocity (e.g., Jourard, 1971). In text-based CMC, we expect a greater proportion of the conversation to be devoted to question asking and self-disclosure, compared to visual CMC and face-to-face communication.

The third strategy is question/disclosure intimacy, which relates to the *depth* of the questions and self-disclosures made in the conversation. Question asking and self-disclosure are quite often employed in initial communication because, in the first phases of acquaintanceship, people disclose nonintimate information about a broad range of topics. In more

advanced phases of relationship formation, however, people tend to deepen their communication and disclose more intimate aspects of themselves (Altman & Taylor, 1973; Jourard, 1971). Similar to Tidwell and Walther (2002), we argue that the latter strategy, which is normally observed in later stages in relationship formation, may be employed in initial communication in text-based CMC because of the paucity of other means to reduce uncertainty. Therefore, question/disclosure intimacy may be higher in reduced cue settings (Walther, 1996).

Verbal Statements of Affection in Text-Based CMC

In this study, we investigate the use of verbal statements of affection as a consequence of uncertainty reduction in CMC. According to Berger and Calabrese (1975), a reduction in uncertainty will lead to an increase in nonverbal affilitiative expressiveness in face-to-face interactions. Verbal statements of affection may play a similar role in text-based CMC. Due to the absence of nonverbal cues that may be transmitted in text-based CMC, verbal statements of affection may be more often displayed in text-based CMC to compensate for the lack of nonverbal cues (Walther et al., 2005). Similar to nonverbal affiliative statements in face-to-face communication, these verbal statements of affection may predict interpersonal attraction in CMC. Walther et al. (2005), for example, found that verbal statements of affection were positively related to affinity in CMC settings, whereas in face-to-face settings only nonverbal expressive behavior predicted affinity. We expect that a reduction of nonverbal cues will lead communication partners to employ a greater proportion of verbal statements of affection to compensate for the lack of nonverbal affiliative statements. Therefore, we hypothesize,

Hypothesis 1: Text-based CMC yields a greater proportion of verbal statements of affection than visual CMC can, which in turn yields a greater proportion of verbal statements of affection than face-to-face communication.

The Mediating Role of Three Uncertainty Reduction Mechanisms

We posit that the three interactive uncertainty reduction mechanisms will mediate the relationship between communication channel and verbal statements of affection. Similar to nonverbal affiliative expressions, verbal statements of affection are more likely to occur once uncertainty has been reduced. When the amount of nonverbal cues that may be communicated decreases in a communication channel, communication partners are more likely to revert to interactive uncertainty reduction strategies—question asking, self-disclosure, and question/disclosure intimacy—to reduce uncertainty and form impressions of the other (e.g., Gibbs et al., 2011; Tidwell & Walther, 2002). The use of these interactive uncertainty reduction strategies, in turn, may positively influence verbal statements of affection.

Proportion of self-disclosure. Several studies have demonstrated that CMC interactions result in higher levels of self-disclosure compared to face-to-face interactions (Bargh et al., 2002; Coleman, Paternite, & Sherman, 1999; Joinson, 2001; Tidwell & Walther, 2002). As nonverbal cues decrease, conversation partners need to rely on interactive uncertainty reduction strategies to reduce uncertainty and to form impressions of each other. Because self-disclosure is an interactive uncertainty reduction strategy, we expect that a larger part of the conversation will be devoted to self-disclosure in the absence of nonverbal cues. Therefore, the proportion of self-disclosure in a conversation will be greater as nonverbal cues decrease in a channel.

Self-disclosure reduces uncertainty in CMC (Antheunis et al., 2010). According to Berger and Calabrese, a reduction in uncertainty may positively affect nonverbal affiliative expressions in face-to-face interactions (Berger & Calabrese, 1975). Moreover, self-disclosure stimulates interpersonal attraction (e.g., Bargh et al., 2002; Collins & Miller, 1994). According to Altman and Taylor's social penetration theory (1973), self-disclosure is viewed as "rewarding because it communicates the discloser's interpersonal attraction and the desire to initiate a more intimate relationship" (Collins & Miller, 1994, p. 458). In addition, disclosing more aspects of one's inner self creates bonds of empathy, which enhances interpersonal attraction between interaction partners (Bargh et al., 2002). Self-disclosure also encourages interpersonal attraction in reduced-cue CMC settings (Antheunis, Valkenburg, & Peter, 2007; Bargh et al., 2002; Collins & Miller, 1994; McKenna et al., 2002). Because verbal statements of affection may be used to signify interpersonal attraction in text-based CMC settings, a greater proportion of self-disclosure in a conversation may be positively related to verbal statements of affection. Therefore, our second hypothesis is,

Hypothesis 2a: Text-based CMC yields a greater proportion of self-disclosure than visual CMC, which in turn yields a greater proportion of self-disclosure than face-to-face communication.

Hypothesis 2b: Proportion of self-disclosure mediates the relationship between the different communication channels and verbal statements of affection.

Proportion of question asking. Two empirical studies have found direct questioning to be higher in text-based CMC than in face-to-face communication (Antheunis et al., 2007; Tidwell & Walther, 2002). Because question asking is another interactive uncertainty reduction strategy (Berger et al., 1976), we also expect that a larger part of the conversation will be devoted to question asking when nonverbal cues are reduced in a channel. Moreover, because question asking procures answers that may reduce the level of uncertainty (Antheunis et al., 2010; Tidwell & Walther, 2002), question asking may also mediate the relationship between the different communication channels and verbal statements of affection. Therefore, we hypothesize,

Hypothesis 3a: Text-based CMC yields a greater proportion of question asking than visual CMC, which in turn yields a greater proportion of question asking than face-to-face communication.

Hypothesis 3b: Proportion of question asking mediates the relationship between the different communication channels and verbal statements of affection.

Question/disclosure intimacy. CMC does not only stimulate the amount of question asking and self-disclosure, it also stimulates their depth (Tidwell & Walther, 2002). In order to reduce uncertainty, conversation partners may ask more intimate questions as nonverbal cues are reduced. Moreover, the absence of nonverbal cues in text-based CMC would make CMC users less attentive to the self and the other, easing the arousal associated with using uncertainty reduction strategies such as intimate self-disclosure and asking intimate questions (e.g., Joinson, 2001; Lea, Spears, & De Groot, 2001; Walther, Slovacek, & Tidwell, 2001). The relative anonymity of reduced-cue settings may also encourage asking for and disclosing intimate information (Kiesler, Siegel, & McGuire, 1984).

The higher the degree of question/disclosure intimacy in a conversation, the more uncertainty is reduced (Tidwell & Walther, 2002), which in turn may affect the degree of verbal statements of affection made in a conversation. Empirical research has consistently demonstrated that intimacy fosters attraction (e.g., Berg & Archer, 1983; Laurenceau, Feldman Barret, & Pietromonaco, 1998). Self-disclosure that involves emotions is believed to generate more intimacy than self-disclosure that is mainly factual because emotional self-disclosure enables the listener to support and confirm core aspects of the discloser's view of his or her self (Reis & Shaver, 1988). Accordingly, Collins and Miller (1994) stated, "It is likely that the mechanisms thought to enhance interpersonal attraction are more strongly communicated by the quality of one's disclosure than by the quantity of information revealed" (p. 465). Because verbal statements of affection may be used to signify interpersonal attraction in text-based CMC settings, greater question/disclosure intimacy may be positively related to verbal statements of affection. Therefore, our last hypothesis is,

Hypothesis 4a: Text-based CMC results in a higher level of question/disclosure intimacy than visual CMC, which in turn results in a higher level of question/disclosure intimacy than face-to-face communication.

Hypothesis 4b: Question/disclosure intimacy mediates the relationship between the different communication channels and verbal statements of affection.

Method

Sample

To investigate the actual language-based strategies that people use to reduce uncertainty, we conducted an experiment between unacquainted students. A total of 162 undergraduate students (81 men and 81 women), between 17 and 31 years of age ($M = 21.07$, $SD = 2.61$), participated in cross-sex dyads for the experiment. The majority of the participants (70%) were recruited from a first-year introductory course in communication science in which a total of 350 students took part, divided over 15 separate classes. The remaining 30% of the participants were recruited from a database with first- and second-year students of a large

university who had agreed to participate in research projects. To form cross-sex dyads, participants were asked to sign up for a 1-hr time slot. Only one man and one woman could sign up in a particular time slot. Students were specifically asked not to sign up with someone they already knew. Wherever possible, we paired students from different classes, as well as communication science students with students from other disciplines. This reduced the likelihood that communication partners would already know each other. After the experiment, all of the participants stated that they did not previously know their conversation partner.

Because self-disclosure depends on the gender composition of a group, we formed only cross-sex dyads (Dindia & Allen, 1992; Hacker, 1981). Moreover, adding a gender composition (i.e., male–male, female–female, and male–female groups) to our experimental design could have led to power problems. Because scores of individual participants in a dyad are not independent from each other (e.g., Kenny, 1995, 1996), we assessed the degree of interdependency between the participants in a dyad using the method for distinguishable dyads as proposed by Alferes and Kenny (2009). Correlations between interaction partners for the mediating and dependent variables varied from .31 (self-disclosure) to .76 (question/disclosure intimacy), $p < .01$. We were interested in the effects of between-dyad predictor variables (i.e., experimental condition) and outcome variables. In such cases, the recommended strategy is to use the dyad as the unit of analysis (Kenny, 1996, 2008). Therefore, individual scores of the dyads' participants were collapsed, and we used the dyad rather than the individual participant as the unit of analysis. Hence, the analyses in this article are based on 81 cross-sex dyads.[1]

Procedure

The dyads were randomly assigned to one of the three experimental conditions: a face-to-face condition ($n = 27$), a visual CMC condition ($n = 27$), and a text-only CMC condition ($n = 27$). For each dyad, both participants were instructed to report to different rooms in order to ascertain that they did not see each other before the experiment started. The participants received the instructions for the experimental task separately and were led to the lab afterwards. For the experimental task, we used a get-acquainted exercise (Frank & Gilovich, 1989): Participants were instructed to get to know each other during the conversation, and they were free to talk about anything they wanted.

In the text-only and visual CMC condition, participants interacted via instant messaging software that had been especially designed for the experiment. The instant messaging software used was a Java-based chat application that was integrated in the browser window. The software was similar to instant messaging software in that the participants could see the conversation unfold in the upper part of the screen, while typing was done in a small field below the conversation window. Participants could use text and a range of emoticons to communicate with each other. The software differed from instant messaging applications in that the participants did not see a picture or photo of themselves or the other participant, had no access to the contact list, and could not log out of the chat or start other conversations.

The visual CMC condition was similar to the text-only condition, but participants saw each other's face in a window at the right-hand corner of the computer screen, directly beside the conversation window. The webcam screen was a high-quality 320 x 240 pixel full-color screen running at 30 frames per second. The video screen was integrated in the browser window. Therefore, participants could not close the video window or stop the video stream. To check whether the participants were attentive to the video stream during the interaction, we coded the transcripts of the visual CMC conversations for specific references to the video stream. In 23 of the 27 groups (85%) specific references were made to the webcam stream. For example, one participant typed, "Ah, I see you are also having tea," and another said that his partner looked like "a model on the cover of a woman's glossy." The visual CMC condition offered no audio and only video. In both CMC conditions, the interaction automatically stopped after 24 min.

The face-to-face condition took place in an observation room that resembled a living room and was equipped with two couches at a 90 degree angle to one another. Both of the participants were seated on a different couch. After 12 min, the experimenter reentered the room and the interaction stopped. In all three conditions, participants could not stop the conversation before the time limit. However, after the experiment, none of the participants indicated that they had wanted to leave the conversation before the time limit was reached.

Different time periods were allocated to the face-to-face condition and the CMC conditions because CMC is relatively slow in comparison with face-to-face communication (Tidwell & Walther, 2002; Walther, 1996; Walther et al., 2001). Therefore, in both CMC conditions, participants interacted for 24 min. In the face-to-face condition, participants interacted for 12 min. The CMC conversations were logged and the face-to-face conversations were recorded (audio only) and subsequently transcribed. We asked the participants for their permission to use their conversations for our content analysis. None of the participants refused. Finally, the participants were paid a fee (15 Euros) for their participation. The participants were debriefed orally right after the experiment and with more detail via e-mail 1 week after the experimental period.

Content Analysis

Because the goal of the study was to investigate the language-based strategies that people employ to reduce uncertainty, we employed a content analysis approach. The content analysis consisted of two phases. In the first phase, two coders split each conversation into a series of utterances by placing utterance breaks in the transcripts to indicate the end of one utterance and the start of another (Tidwell & Walther, 2002). An utterance marks an idea unit, which is an expression of one whole idea or proposition (Weisband, 1992). This can occur either by coordinated exchange or by interruption (e.g., Person 1: "I love reading books," Person 2: "Me too," Person 1: "Especially thrillers"; these are three utterances) or could meaningfully occur, as in the case of speaking turns that contain multiple utterances (e.g., "My name is John and I love playing soccer"; this sentence contains two utterances). To assess intercoder reliability, 18 conversations (22%) were coded by both judges. The

intercoder reliability was .94, as measured by the number of agreements in utterance breaks divided by the total number of utterance breaks coded.[2]

A subsequent analysis of the conversations revealed that the face-to-face communication ranged from 133 to 364 utterances ($M = 219.63$, $SD = 51.81$), visual CMC from 78 to 224 utterances ($M = 170.89$, $SD = 40.31$), and text-only CMC from 72 to 316 utterances ($M = 169.04$, $SD = 55.23$). Despite attempts to equalize talk time, more utterances were contained in the face-to-face conversations than in both CMC conversations, $F(2, 78) = 9.06$, $p < .001$. Although dyads in the CMC conditions interacted twice as long as dyads in the face-to-face condition, the face-to-face communication was, on average, 50 utterances longer. Therefore, our hypotheses were tested using proportions rather than frequencies. Proportions were calculated by dividing the number of occurrences by the total number of utterances in the conversation. In our analyses, we use the arc-sine transformations of the square root of the proportions to normalize the data (Hair, Black, Babin, Anderson, & Tatham, 2005).

In the second phase of the research, for each dyad, self-disclosure, question asking, question/disclosure intimacy, and statements of affection were coded from the transcribed face-to-face conversations and the logged CMC interactions.

Self-disclosure and question asking. Coders assigned each utterance to one of the following categories: self-disclosure, question, or other. Self-disclosure comprises only statements made about the *self* and was operationalized as an utterance that reveals personal information about the sender, describes the person in some way, tells something about the person, or refers to the subject's experiences, including thoughts and feelings (Chelune, 1975; Derlega, Metts, Petronio, & Margulis, 1993; Dindia, 1983). Questions were operationalized as an expression of inquiry that invites or calls for a reply or an interrogative sentence or phrase (Tidwell & Walther, 2002). Utterances that were neither a self-disclosure nor a question, such as statements of fact that were nonpersonal in nature, statements about third parties, exclamations, greetings, and other filler items that were not clearly questions or self-disclosures, were coded as other.

Question/disclosure intimacy. Question/disclosure intimacy is a composite score in which self-disclosures and questions are weighted according to their intimacy. Each utterance that was coded as a self-disclosure or a question was judged on the level of intimacy: low, medium, or high. We used a classification scheme by Altman and Taylor (1973), which consists of three layers. The peripheral layer (low intimacy) is concerned with biographical data, such as height, weight, gender, and other public information that takes little questioning to discover; for example, "I live in New York." The intermediate layer (medium intimacy) deals with attitudes, values, prejudices, and opinions, such as, "I hate watching TV." The core layer (high intimacy) is concerned with personal beliefs, emotions, feelings, needs, fears, and things people are ashamed of, such as, "I am really worried about my poor grades." Question/disclosure intimacy was calculated by summing the number of disclosures and questions, weighted by their degree of intimacy (1 for low, 2 for medium, and 3 for high intimacy), and by dividing this score by the total number of utterances. The resulting score is an index of the mean amount of intimacy.

Verbal statements of affection. Verbal statements of affection were defined as a positive statement directed to the conversation partner. A positive statement is saying something positive about the other, in order to signify liking for, or attraction toward, the conversation partner. These statements are important markers that indicate affection and attraction in communication (Scherwitz & Helmreich, 1973; Sunnafrank & Ramirez, 2004; Weimer, Kerns, & Oldenburg, 2004). They consist of statements that indicate encouragement, respect, appreciation, or acceptance, as well as direct statements that indicate positive affect (Grotevant & Cooper, 1986; Weimer et al., 2004). Examples include, "You are so cool," "You look good today," "Well done," and "I like [specific statement about a characteristic of the conversation partner] about you."

Intercoder reliability. The 81 conversations were divided evenly among two coders. The coders were trained using four additional conversations with which we tested the experimental setup (one face-to-face, two visual CMC, and one text-based CMC). After the first version of the codebook was made, the codebook was discussed with the two coders, and issues, such as clarity, were resolved. The two coders subsequently coded two conversations from the four additional conversations. Afterwards, any conflicting issues were resolved. Finally, the coders coded two conversations again, from the four additional conversations, which resulted in resolving some minor issues. After these instructions, intercoder agreement was sufficient to code the actual log data. The four additional conversations were not used in our analyses.

A total of 18 conversations of the 81 conversations used in our analysis were coded by both coders to assess intercoder reliability. *Kappas* were .96 for coding self-disclosure, question asking, or other; .92 for question/disclosure intimacy; and .86 for statements of affection (Cohen, 1960). Because question/disclosure intimacy was coded by rating level of intimacy of questions and self-disclosures on a 3-point scale, we also calculated Cronbach's alpha as another measure of intercoder reliability. Cronbach's alpha for question/disclosure intimacy was .96.

Results

To test our hypotheses, we used the procedure to test indirect effects in multiple mediator models developed by Preacher and Hayes. This procedure has several advantages above other approaches to test mediation, such as the causal steps approach (Baron & Kenny, 1986). First, multiple mediators can be tested simultaneously, allowing to test the effects of each single mediator controlling for the effect of the other mediators. Second, because a single analysis is used to test the multiple mediator model, the risk of a Type 1 error is reduced. Third, the approach allows taking into account covariates. In our analysis, this means that we could compare the effects of two experimental conditions, controlling for the third condition. Finally, the method uses bootstrapping to test the significance of the mediated effects, eliminating the need for multivariate normality, which is unlikely to be achieved in small samples. The analyses and bootstrap estimates that follow are based on 5,000 bootstrap samples (Preacher & Hayes, 2008).

We conducted two mediation analyses, using text-based CMC as baseline and comparing it with (a) the face-to-face condition and (b) the visual CMC condition. To do so, we created two dummy variables: one with the text-only CMC condition and visual CMC condition

coded as 1 and the face-to-face condition coded as 0, and one with the text-only CMC condition and the face-to-condition coded as 1 and the visual CMC condition coded as 0. In the first analysis, we compared text-based CMC with face-to-face condition, controlling for the visual CMC condition. In the second analysis, we compared text-based CMC with visual CMC, controlling for the face-to-face condition. Figure 1 presents the results of the two analyses.

The first analysis compared the text-based CMC condition to the face-to-face condition controlled for the visual CMC condition. Figure 1a shows the unstandardized regression coefficients for the effects of experimental condition on the mediating variables and the effects of the mediating variables on the proportion of affection statements. We first tested the total effect of experimental condition on the proportion of affection statements before the mediators were included, $b = .093$, $SE = 0.017$, $\beta = .59$, $p < .001$. This partially confirms Hypothesis 1. A greater proportion of affection statements were observed in the text-based CMC condition than in the face-to-face condition.

Next, we tested whether the proportion of self-disclosure mediated the relationship between the experimental condition and the proportion of affection statements. Proportion of self-disclosures, $b = .015$, $SE = 0.025$, $\beta = -.08$, $p = .54$, did not significantly differ between the text-based CMC condition and the face-to-face condition. Therefore, Hypothesis 2a was not supported when text-based CMC was compared with face-to-face communication. Proportion of self-disclosure was significantly related to proportion of affection statements, $b = .314$, $SE = 0.134$, $\beta = .37$, $p < .03$. Finally, the mediating effect of proportion of self-disclosure was not significant, point estimate = .005, $SE = 0.009$, 95% bias corrected and accelerated confidence interval (95% Bca CI: –0.029, 0.007).[3] Thus, Hypothesis 2b was not supported when text-based CMC was compared with face-to-face communication.

Proportion of question asking was significantly greater in the text-based CMC condition than in the face-to-face condition, $b = .084$, $SE = 0.019$, $\beta = .50$, $p < .001$. Therefore, Hypothesis 3a was supported when text-based CMC was compared with face-to-face communication. Proportion of questions asked was significantly related to proportion of affection statements, $b = .302$, $SE = 0.136$, $\beta = .32$, $p < .03$. The mediating effect of proportion of question asking was significant with a point estimate of .025, $SE = 0.013$, 95% Bca CI: 0.004, 0.058. These results partially support Hypothesis 3b: Proportion of question asking mediates the relationship between experimental condition and proportion of affection statements when comparing text-based CMC with face-to-face communication.

Question/disclosure intimacy was significantly greater in the text-based CMC condition than in the face-to-face condition, $b = .120$, $SE = 0.045$, $\beta = .33$, $p = .01$. Thus, Hypothesis 4a was supported when text-based CMC was compared with face-to-face communication. Question/disclosure intimacy was not related to proportion of affection statements, $b = -.139$, $SE = 0.086$, $\beta = -.32$, $p = .11$. The mediating effect of question/disclosure intimacy was not significant, point estimate –.017, $SE = 0.010$, 95% Bca CI: –0.045, 0.000. Hypothesis 4b was not supported when text-based CMC was compared with face-to-face communication. Finally, the direct effect of experimental condition on proportion affection statements after the mediators were included was still significant, $b = .089$, $SE = 0.020$, $\beta = .56$, $p < .001$, suggesting partial mediation.

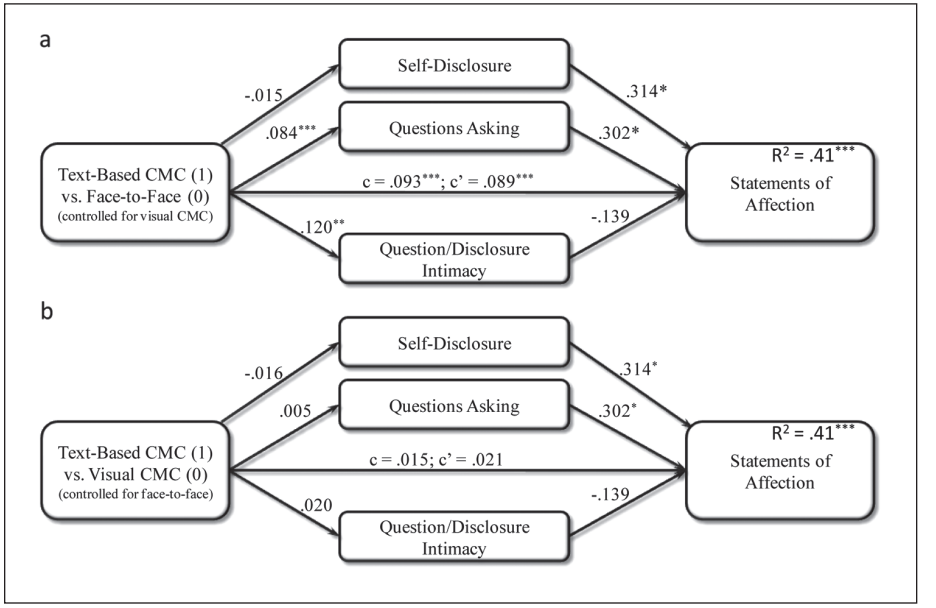

Figure 1. Uncertainty reduction strategies partially mediating the effect of the three experimental conditions on statements of affection. Self-disclosure, question asking, and statements of affection refer to the arc-sine transformation of the square root of the proportions for these variables. Path coefficients represent unstandardized regression weights; "c" is the total effect of experimental condition on statements of affection before inclusion of the mediators, and "c" is the direct effect of experimental condition on statements of affection after inclusion of the mediators
Note: $n = 81$.
*$p < .05$. **$p < .01$. ***$p < .001$.

The second analysis compared text-based CMC versus face-to-face condition controlled for the visual CMC condition (see Figure 1b). No relationship was found between the experimental condition and the proportion of affection statements, $b = .015$, $SE = 0.017$, $\beta = .09$, $p = .39$, indicating a lack of difference between the text-based CMC and the visual CMC condition in the proportion of affection statements. None of the mediating variables significantly differed between the text-based CMC condition and the visual CMC condition, with all $|\beta|$'s $< .09$, p's $> .5$. Finally, none of the indirect effects explaining the relationship between experimental condition and proportion of affection statements were significant, with all 95% Bca CIs containing zero. In sum, no differences in any of the mediating or dependent variables were observed between the text-based CMC and the visual CMC condition.

Temporal Analysis

To further investigate the causal effects of our mediating variables on proportion of affection statements, we conducted a mediation analysis with temporally ordered variables. Since

the data were logged and analyzed over the course of the conversation, it is possible to disentangle the causal and temporal order of influence. More specifically, proportion of questions asked in the first phases of the interaction should predict proportion of affection statements in the later phases of the interaction. The previous analysis revealed no significant differences of any of the mediating and dependent variables between the text-only CMC and the visual CMC conditions. Therefore, for the following analyses, participants' scores in both CMC conditions were collapsed and compared with the face-to-face condition.

To conduct the temporal analysis, each dyad's conversation was split into two equal halves. Next, we created separate variables measuring the proportion of self-disclosures, proportion of questions asked, question/disclosure intimacy, and proportion of verbal affection statements for both the first and the second half of the conversation, again using the arc-sine transformations of the square root of the proportions. Finally, we investigated whether the proportion of self-disclosures, questions asked, and question/disclosure intimacy in the first half of the conversation mediated the relationship between the experimental condition and proportion of affection statements in the second half of the conversation. We controlled for proportion of affection statements in the first half of the conversation.

The mediation analysis showed that, before the mediators were included, the total effect of the experimental condition on the proportion of affection statements was significant, $b = .050$, $SE = 0.024$, $\beta = .23$, $p = .04$. Thus, a greater proportion of affection statements were observed in the second half of the conversation in the CMC conditions than in the face-to-face condition while controlling for the proportion of affection statements in the first half of the conversation. The direct effect of the experimental condition on the proportion of affection statements in the second half of the conversation, after the mediators were included, was no longer significant, $b = .035$, $SE = 0.030$, $\beta = .16$, $p = .24$, indicating full mediation. Figure 2 shows the unstandardized regression coefficients for the effects of experimental condition on the mediating variables in the first half of the conversation as well as the effects of the mediating variables in the first half of the conversation on the proportion of affection statements in the second half of the conversation.

The only significant indirect effect that explained the relationship between the experimental condition and the proportion of affection statements in the second half of the conversation was the effect that ran through the proportion of questions asked in the first half of the conversation, with a point estimate of –.044, $SE = 0.021$, 95% Bca CI: –0.093, –0.012. The two other mediators were not significant predictors of proportion of affection statements in the second half of the conversation, with all 95% Bca CIs containing zero. Finally, the proportion of questions asked in the first half of the conversation did not mediate the relationship between experimental condition and the proportion of affection statements in the first half of the conversation, point estimate = –.018, $SE = 0.018$, 95% Bca CI: –0.055, 0.014. Thus, the proportion of questions asked in the first half of the conversation did not predict the statements of affection in the first half of the conversation. However, it did affect the proportion of affection statements in the second half of the interaction.

In sum, our analyses showed that, compared to the text-based CMC condition and the visual CMC condition, face-to-face condition was characterized by a lower proportion of questions asked and by a lower degree of question/disclosure intimacy. However, only the

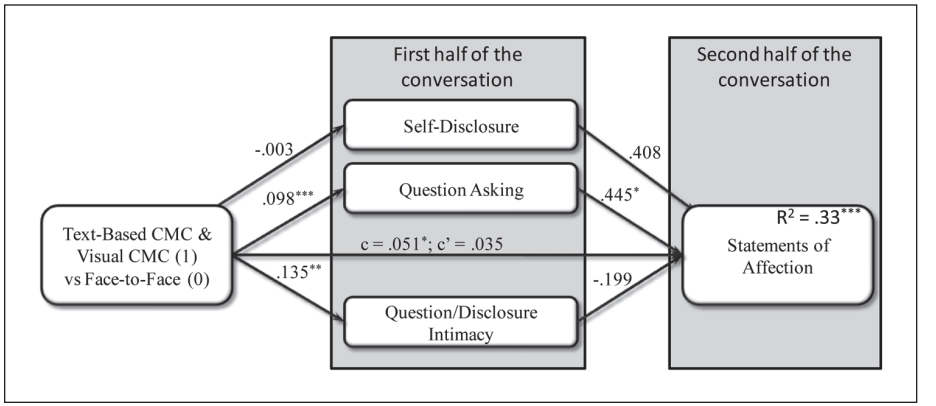

Figure 2. Uncertainty reduction strategies in the first half of the conversation partially mediating the effect of the three experimental conditions on statements of affection in the second half of the conversation (controlled for statements of affection in the first half of the conversation). Self-disclosure, question asking, and statements of affection refer to the arc-sine transformation of the square root of the proportions for these variables. Path coefficients represent unstandardized regression weights. "c" is the total effect of experimental condition on proportion of statements of affection before inclusion of the mediators, and "c'" is the direct effect of experimental condition on proportion of statements of affection after inclusion of the mediators
Note: $n = 81$.
*$p < .05$. **$p < .01$. ***$p < .001$.

proportion of questions asked significantly mediated the relationship between the experimental conditions and the proportion of affection statements. No differences emerged between the effects of the text-based CMC condition and the visual CMC condition on any of the mediating or dependent variables.

Discussion

The goal of this study was to investigate the mechanisms by which CMC users adapt to the absence of nonverbal cues by using language-based strategies to reduce uncertainty. Our first hypothesis concerned the effect of communication channel on verbal statements of affection. In line with our expectations, our results showed that CMC interactants revealed more verbal statements of affection than face-to-face interactants. However, the proportion of affection statements did not differ between the text-only and visual CMC condition.

Second, we investigated three interactive uncertainty reduction strategies that may explain how intimate relational communication develops in CMC. Similar to Tidwell and Walther (2002), we found that question/disclosure intimacy and proportion of question asking were greater in CMC than in face-to-face communication. Text-only CMC and visual CMC interactants asked relatively more questions than face-to-face interactants. Moreover, text-only CMC and visual CMC interactants exhibited more intimate self-disclosures and asked more intimate questions than face-to-face interactants did. Contrary to earlier research

(Bargh et al., 2002; Coleman et al., 1999; Joinson, 2001; Tidwell & Walther, 2002), we did not find an effect of the communication channel on the proportion of self-disclosure. A possible explanation may be that participants in our study could not leave the conversation before the time limit exceeded. Moreover, we asked interaction partners to get to know each other. Our discussion task, therefore, was a self-disclosure task. This may have resulted into conversation partners killing time with superficial self-disclosures.

Of the potential mediators we identified, only question asking mediated the relationship between the communication channel and verbal statements of affection. Conversation partners who asked relatively more questions in the first half of the conversation produced relatively more statements of affection in the second half of the conversation. These results suggest that self-disclosure or question/disclosure intimacy do not result in conversation partners uttering statements of affection in CMC. Rather, it might be the interest of the conversation partner (as indicated by the questions asked) that stimulates these verbal statements of affection. After all, positive verbal attention by showing interest in early stages of relationship formation can have powerful effects on interpersonal attraction (Albada, Knapp, & Theune, 2002).

Question asking in the first half of the conversation significantly predicted verbal statements of affection in the second half of the conversation, but not in the first half of the conversation. These results show that a certain level of uncertainty reduction must occur before interaction partners start to verbally communicate affection to each other. This is in line with URT, which proposes that nonverbal affection statements increase as uncertainty decreases (Berger & Calabrese, 1975). Verbal statements of affection may thus play a similar role in CMC as nonverbal affection statements do in face-to-face communication.

These results provide an interesting view on the processes that may explain interpersonal attraction in CMC. To date, many studies attribute increased attraction in CMC to increased levels of self-disclosure (e.g., Antheunis et al., 2007; Valkenburg & Peter, 2009). Less attention has been paid to question asking as an alternative uncertainty reduction strategy. Therefore, it may be that self-disclosure does not reduce uncertainty per se, but rather that the process of question asking and the self-disclosure procured from it result in a reduction of uncertainty. Therefore, it may be that question asking may be the main driving force in reducing uncertainty in CMC. Future research should investigate the role of question asking in the formation of interpersonal attraction in CMC versus face-to-face settings.

The Role of Reduced Nonverbal Cues

We observed no differences in verbal statements of affection between the text-only CMC condition and the visual CMC condition. It seems that the presence of a visual channel in the form of facial features and facial expressions does not reduce uncertainty in initial interactions to such an extent that it diminishes the need for interactive uncertainty reduction strategies. Therefore, the question remains which channels exactly trigger other uncertainty reduction processes, such as active and passive strategies, which in turn reduce the need for interactive uncertainty reduction strategies. Future research should explore our findings by paying closer attention to the effects of cue-richer versus cue-poorer CMC applications on impression formation in CMC and the mechanisms underlying them.

One set of cues specifically warrant extra investigation. Our study did not include communication in which conversation partners communicated using *audio*-visual CMC. However, audio cues may play an important additional role in reducing uncertainty about others. According to Lombard and Ditton (1997), audio cues elicit increased presence in many circumstances. This increased presence might reduce uncertainty about others and thus hamper the use of interactive uncertainty reduction strategies. Research has found that the presence of audio cues and the absence of visual cues stimulate different communicative processes and social judgments (e.g., Burgoon et al., 2002; Chilcoat & DeWine, 1985; Munzer & Holmer, 2009). However, to our knowledge, no studies have investigated the use of uncertainty reduction processes in audio-visual or audio-only communication. This is an important area of investigation for future research.

An alternative explanation is that the webcam stream may have offered too little information to reduce uncertainty. Although most participants in the visual CMC condition made reference to the webcam stream, and the webcam stream itself was of high quality, it could be that participants were so absorbed in the conversation that they did not notice the visual channel to such an extent as to reduce uncertainty.

Theoretical Implications

The main goal of our article was to specify the language-based strategies that CMC interactants employ to reduce uncertainty in reduced-cues interactions. The combination between SIP theory and URT has not been investigated very much in earlier research. This study adds to SIP theory by specifying the uncertainty reduction mechanisms that may be at work in CMC interactions. Therefore, our study has several theoretical implications. First, this study extends SIP theory by specifying the strategies that conversation partners use in order to reduce uncertainty in limited-cue interactions. SIP theory poses that in the absence of nonverbal cues that may normally be used to convey relational information, CMC users adapt to the remaining communicative cues—language and textual display—to form impressions of each other (e.g., Tidwell & Walther, 2002; Walther, 1992). Our study showed that question asking is an important mechanism by which uncertainty is reduced in CMC. Moreover, the greater proportion of questions asked in a CMC conversation seems to affect proportion of verbal affection statements, which may signify interpersonal attraction in CMC (Walther et al., 2005). Question asking may thus be an important mechanism through which uncertainty is reduced and impressions are formed in CMC.

Second, the results of this study also underline the value of URT in CMC research, particularly the contribution that URT makes to SIP theory (Walther, 1992). As SIP theory proposes, we showed that, in absence of nonverbal cues, conversation partners revert to language-based strategies to reduce uncertainty. In CMC, these language-based strategies take the form of the interactive uncertainty reduction strategies as proposed by URT, that is, more and deeper self-disclosure and question asking. URT may, therefore, be a valuable theory in explaining the mechanisms that underlie CMC outcomes, such as interpersonal attraction. Most CMC research focuses on the sender tactics used in CMC, such as self-presentation, and on the receivers' impressions of these sender tactics (Walther, 1996).

According to the hyperpersonal approach, the receiver forms attributions of the sender on the basis of the information given off by the sender. SIP and URT provide a useful addition to this view in explaining the strategies that may be *actively* employed by a receiver in the interpersonal perception process. Future research may investigate whether uncertainty reduction processes also play a role in explaining uses and effects of other online technologies, such as social networking sites (Antheunis et al., 2010).

Limitations and Suggestions for Further Research

Although our study may improve our understanding of how CMC users adapt to the absence of nonverbal cues by using language-based strategies and its effects on verbal statements of affection, our study is not without limitations. First, in our study, we relied on content analytic data to study interactive uncertainty reduction mechanism and their possible effects on verbal statements of affection. We showed that in reduced-cue settings, the use of interactive uncertainty reduction strategies, specifically question asking, led to a greater proportion of verbal statements of affection. Future research should also investigate the perceptions that conversations partners have about each other, such as their perceptions about uncertainty reduction and perceptions of interpersonal attraction and mutual affection.

Second, we examined only short-term initial interactions. Although impressions of the outcome of a relationship are usually made in the earliest moment of an interaction (Sunnafrank, 1986; Sunnafrank & Ramirez, 2004), it would be interesting to investigate how these initial interactions develop. For example, if initial affection is greater between partners who met in CMC settings, this may affect relationship development in subsequent CMC or face-to-face communication (see McKenna et al., 2002; Walther, 1995). Gibbs, Ellison, and Heino (2006), for example, found that self-disclosure on dating sites is an important predictor of perceived relational success. Therefore, future research should expand on our findings by investigating the prolonged effects of CMC communication and the role of the uncertainty reduction strategies in later stages of a relationship.

Third, in the current study we did not analyze nonverbal behavior in the visual CMC condition and the face-to-face condition. Therefore, we could not investigate the extent to which verbal statements of affection are used as a replacement for nonverbal affection statements. Interpersonal attraction in visual settings is more strongly driven by nonverbal cues than by verbal cues (Walther et al., 2005). In mixed settings, such as visual CMC conditions, where interactants have both access to nonverbal and verbal cues, interactants could potentially use active, passive, and interactive uncertainty reduction strategies to form impressions of each other. Investigating uncertainty reduction strategies in these settings would help further the understanding of the exact cue sets that trigger certain uncertainty reduction mechanisms and the effects these might have on interpersonal attraction.

Conclusion

The goal of this study was to investigate the mechanisms by which CMC users adapt to the absence of nonverbal cues by using language-based strategies to reduce uncertainty. Our

results showed that, in initial interactions, the relative amount of questions asked and question/disclosure intimacy were higher in CMC than in face-to-face communication. Moreover, proportion of question asking mediated the relationship between the different communication channels and verbal statements of affection. This study provided additional support for SIP theory by specifying the role of different uncertainty reduction mechanisms that may be employed online and showed that question asking may especially be an important uncertainty reduction mechanism in CMC interactions.

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Declaration of Conflicting Interests

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Notes

1. We also analyzed our results using the individual-level data, partialing out any interdependency effects using the mixed procedure in SPSS and Baron and Kenny's (1986) approach to test for mediation. First, we assessed the direct effect of condition on statements of affection. Next, we assessed the effects of condition on all of the mediating variables. Finally, we tested the mediating effects by using condition as a fixed factor and all mediating variables as covariates in the analysis. These analyses revealed similar results as our analysis on the group-level data.
2. Because of the way the utterance breaks needed to be coded, we could only use percentage agreement as a statistic of intercoder agreement. Only three situations could occur when two coders (A & B) split a conversation in utterance breaks: Coders A and B could (a) agree on the place of the utterance break; (b) Coder A had an utterance break, but Coder B did not; or (c) Coder B had an utterance break, but Coder A did not. There was no situation possible where both Coder A and Coder B would *not* place an utterance break. If we were to calculate Cohen's Kappa using this data, this would yield a Kappa of .00 because of the empty cell (i.e., a situation in which both coders disagreed). This is caused by Kappa's way of taking into account chance agreement (see Lombard et al., 2002, p. 592). All other intercoder agreement statistics have similar corrections. Therefore, we could only use the percentage agreement as a measure of intercoder agreement.
3. The indirect effect is significant when the confidence interval does not contain zero.

References

Afifi, W. A., & Metts, S. (1998). Characteristics and consequences of expectation violation in close relationships. *Journal of Social and Personal Relationships, 15*, 365-392.

Albada, K. F., Knapp, M. L., & Theune, K. E. (2002). Interaction appearance theory: Changing perceptions of physical attractiveness through social interaction. *Communication Theory, 12*, 8-40.

Alferes, V. R., & Kenny, D. A. (2009). SPSS programs for the measurement of nonindependence in standard dyadic designs. *Behavior Research Methods, 41*, 47-54.

Altman, I., & Taylor, D. A. (1973). *Social penetration: The development of interpersonal relationships*. New York, NY: Holt, Rinehart and Winston.

Antheunis, M. L., Valkenburg, P. M., & Peter, J. (2007). Computer-mediated communication and interpersonal attraction: An experimental test of two explanatory hypotheses. *CyberPsychology & Behavior, 10*, 831-836.

Antheunis, M. L., Valkenburg, P. M., & Peter, J. (2010). Getting acquainted through social networking sites: Testing a model of online uncertainty reduction and social attraction. *Computers in Human Behavior, 26*, 100-109.

Bargh, J. A., McKenna, K. Y., & Fitzsimons, G. M. (2002). Can you see the real me? Activation and expression of the "true self" on the Internet. *Journal of Social Issues, 58*, 33-48.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Berg, J. H., & Archer, R. L. (1983). The disclosure-liking relationship: Effects on self-perception, order of disclosure, and topical similarity. *Human Communication Research, 10*, 269-281.

Berger, C. R., & Calabrese, R. J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research, 1*, 99-112.

Berger, C. R., Gardner, R. R., Parks, M. R., Schulman, L., & Miller, G. R. (1976). Interpersonal epistemology and interpersonal communication. In G. R. Miller (Ed.), *Explorations in interpersonal communication* (pp. 149-171). Beverly Hills, CA: Sage.

Burgoon, J. K., Bonito, J. A., Ramirez, A., 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, 52*, 657-677.

Chelune, G. J. (1975). Studies in behavioral and self-report assessment of self-disclosure. *Dissertation Abstract International, 37*, 453b.

Chilcoat, Y., & DeWine, S. (1985). Teleconferencing and interpersonal communication perception. *Journal of Applied Communication Research, 18*, 14-32.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.

Coleman, L. H., Paternite, C. E., & Sherman, R. C. (1999). A reexamination of deindividuation in synchronous computer-mediated communication. *Computers in Human Behavior, 15*, 51-65.

Collins, N. L., & Miller, L. C. (1994). Self-disclosure and liking: A meta-analytic review. *Psychological Bulletin, 116*, 457-475.

Cooper, A., & Sportolari, L. (1997). Romance in cyberspace: Understanding online attraction. *Journal of Sex Education and Therapy, 22*, 7-14.

Derlega, V. J., Metts, S., Petronio, S., & Margulis, S. T. (1993). *Self-disclosure*. Newbury Park, CA: Sage.

Dindia, K. (1983). Reciprocity of self-disclosure: A sequential analysis. In M. Burgoon (Ed.), *Communication yearbook 6* (pp. 506-528). Beverly Hills, CA: Sage.

Dindia, K., & Allen, M. (1992). Sex-differences in self-disclosure: A meta-analysis. *Psychological Bulletin, 112*, 106-124.

Douglas, W. (1990). Uncertainty, information-seeking, and liking during initial interaction. *Western Journal of Speech Communication, 54*, 66-81.

Douglas, W. (1994). The acquaintanceship process: An examination of uncertainty, information seeking, and social attraction during initial conversation. *Communication Research, 21*, 154-176.

Frank, M. G., & Gilovich, T. (1989). Effect of memory perspective on retrospective causal attributions. *Journal of Personality and Social Psychology, 57*, 399-403.

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*, 152-177.

Gibbs, J. L., Ellison, N. B., & Lai, C.-H. (2011). First comes love, then comes Google: An investigation of uncertainty reduction strategies and self-disclosure in online dating. *Communication Research, 38*, 70-100.

Grotevant, H. D., & Cooper, C. R. (1986). Individuation in family relationship: A perspective on individual differences in the development of identity and role taking in adolescence. *Human Development, 29*, 82-100.

Hacker, H. M. (1981). Blabbermouths and clams: Sex differences in self-disclosure in same-sex and cross-sex friendship dyads. *Psychology of Women Quarterly, 5*, 385-401.

Hair, J. F., Black, B., Babin, B., Anderson, R. E., & Tatham, R. L. (2005). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Hancock, J. T., & Dunham, P. J. (2001). Impression formation in computer-mediated communication revisited. *Communication Research, 28*, 325-347.

Hancock, J. T., Landrigan, C., & Silver, C. (2007). Expressing emotion in text. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2007)* (pp. 929-932). New York, NY: Association for Computing Machinery.

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.

Jourard, S. M. (1971). *Self-disclosure: An experimental analysis of the transparent self*. New York, NY: John Wiley.

Kenny, D. A. (1995). The effect of non-independence on significance testing in dyadic research. *Personal Relationships, 2*, 67-75.

Kenny, D. A. (1996). Models of non-independence in dyadic research. *Journal of Social and Personal Relationships, 13*, 279-294.

Kenny, D. A. (2008). *Dyadic analysis*. Retrieved from http://davidakenny.net/dyad.htm

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

Laurenceau, J.-P., Feldman Barret, L., & Pietromonaco, P. R. (1998). Intimacy as an interpersonal process: The importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchanges. *Journal of Personality and Social Psychology, 74*, 1238-1251.

Lea, M., Spears, R., & De Groot, D. (2001). Knowing me, knowing you: Anonymity effects of social identity processes within groups. *Personality and Social Psychology Bulletin, 27*, 526-537.

Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication, 3*(2). Retrieved from http://jcmc.indiana.edu/vol3/issue2/lombard.html

Lombard, M., Snyder-Duch, J., & Bracken, C. C. (2002). Content analysis in mass communication: assessment and reporting of intercoder reliability. *Human Communication Research, 28*, 587-604.

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

McKenna, K. Y., Green, A. S., & Gleason, M. E. (2002). Relationship formation on the internet: What's the big attraction? *Journal of Social Issues, 58*, 9-31.

Munzer, S., & Holmer, T. (2009). Bridging the gap between media synchronicity and task performance: Effects of media characteristics on process variables and task performance indicators in an information pooling task. *Communication Research, 36*, 76-103.

Nowak, K., Watt, J. H., & Walther, J. B. (2005). The influence of synchrony and sensory modality on the person perception process in computer mediated groups. *Journal of Computer-Mediated Communication, 10*(3). Retrieved from http://jcmc.indiana.edu/vol10/issue3/nowak.html

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

Pena, J., & Hancock, J. T. (2006). An analysis of instrumental and socio-emotional content in online multi-player videogames. *Communication Research, 33*, 92-109.

Peter, J., Valkenburg, P. M., & Schouten, A. P. (2007). Precursors of adolescents' use of visual and audio devices during online communication. *Computers in Human Behavior, 23*, 2473-2487.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in single and multiple mediator models. *Behavior Research Methods, 40*, 879-891.

Ramirez, A., 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.

Ramirez, A., & Zhang, S. (2007). When online meets offline: The effect of modality switching on relational communication. *Communication Monographs, 74*, 287-310.

Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. In S. Duck (Ed.), *Handbook of personal relationships* (pp. 367-390). New York, NY: John Wiley.

Scherwitz, L., & Helmreich, R. (1973). Interactive effects of eye contact and verbal content on interpersonal attraction in dyads. *Journal of Personality and Social Psychology, 25*, 6-14.

Sunnafrank, M. (1986). Predicted outcome value during initial communication: A reformulation of uncertainty reduction theory. *Human Communication Research, 13*, 3-33.

Sunnafrank, M., & Ramirez, A. (2004). At first sight: Persistent relational effects of get-acquainted conversations. *Journal of Social and Personal Relationships, 21*, 361-379.

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.

Valkenburg, P. M., & Peter, J. (2007). Who visits online dating sites? Exploring some characteristics of online daters. CyberPsychology and Behavior, 10, 849-852.

Valkenburg, P. M., & Peter, J. (2009). The effects of Instant Messaging on the quality of adolescents' existing friendships: A longitudinal study. *Journal of Communication, 59*, 79-97.

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

Walther, J. B. (1995). Relational aspects of computer-mediated communication: Experimental observations over time. *Organization Science, 6*, 186-203.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*, 3-43.

Walther, J. B. (2007). Selective self-presentation in computer-mediated communication: Hyperpersonal dimensions of technology, language, and cognition. *Computers in Human Behavior, 23*, 2538-2557.

Walther, J. B., Loh, T., & Granka, L. (2005). 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* (3rd ed., pp. 529-563). Thousand Oaks, CA: Sage.

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

Weimer, B. L., Kerns, K. A., & Oldenburg, C. M. (2004). Adolescents' communication with a best friend: Associations with attachment style. *Journal of Experimental Child Psychology, 8*, 102-120.

Weisband, S. (1992). Group discussion and first advocacy effects in computer-mediated and face-to-face decision making groups. *Organizational Behavior and Human Decision Processes, 53*, 352-380.

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