

Theories of Computer-Mediated Communication and Interpersonal Relations

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Computer-mediated communication (CMC) systems, in a variety of forms, have become integral to the initiation, development, and maintenance of interpersonal relationships. They are involved in the subtle shaping of communication in almost every relational context. We may observe or participate in the conversations of huge numbers of social actors, from the Twitter messages of experts we have never met to one's family's blog and from messaging a barely acquainted Facebook friend to coordinating with one's spouse through texting about who will pick up the kids that day or saying via e-mail that one is sorry about the fight they had that morning. Individuals exploit the features of these media to make their best impression and attract attention or to ward off undesired contacts (Tong & Walther, 2011a). We continually form and re-form our impressions and evaluations of others online, from deciding whose recommendations to trust in discussion boards (Van Der Heide, 2008) to evaluating the friend who portrays himself online in a not quite

accurate way (DeAndrea & Walther, in press). Although many people perceive that social media messages are trivial and banal, so is the stuff by which relationships are maintained (Duck, Rutt, Hurst, & Strejc, 1991; Tong & Walther, 2011b).

The ubiquity of CMC is not sufficient impetus for it to be a focus of study in interpersonal communication research. How CMC changes our messages—how they are constructed, whether for specific relational purposes or with lesser or greater effect—remain important questions that continue to drive inquiry in interpersonal CMC research. How does the Internet affect the likelihood of having relationships? With whom? And how do we manage these relationships? How do disclosures and affectations influence others and ourselves, and how do online interpersonal processes affect the instrumental and group dynamics that technology enables? How do we exploit existing technologies for relational purposes, and how do we evade the potential dampening effects that technologies otherwise may impose on relational communication? How do technology

developers incorporate features into communication systems specifically designed to support and enhance relational functions?

There are many methodologies employed in studying CMC and social interaction. Large-scale, sophisticated surveys enumerate what people are doing online and why they say they are doing them (e.g., Katz & Rice, 2002; the Pew Internet & American Life Project at <http://pewinternet.org/>). There are accounts of the metaphors that define the online experience for Internet date seekers (e.g., Heino, Ellison, & Gibbs, 2010) and interpretive investigators' insights from interacting with groups of young people about what is going on and what it means online (boyd, 2007). Conference proceedings from design experiments report cognitive and affective responses to variations in the representation of others' online behaviors or different interface characteristics with which to behave online (e.g., the ACM Digital Library at <http://portal.acm.org/dl.cfm>). A number of recent and forthcoming volumes address different aspects of interpersonal interaction online, including works by Amichai-Hamburger (2005), Baym (2010), Joinson, McKenna, Postmes, and Reips (2007), Konijn, Utz, Tanis, and Barnes (2008), Papacharissi (2010), Whitty and Carr (2006), and Wright and Webb (2011), among others. Any of these approaches provide glimpses into the changing landscape of interpersonal communication and CMC. No one chapter can paint this landscape or summarize it well. Worse yet, such an amalgamation of facts would suffer from a lack of coherence, reflecting a field with more work being done than consensus on what work should be done. Moreover, to describe what people are doing interpersonally with CMC today would be to invite obsolescence very quickly, given the pace of change in communication and technology. Readers who expect such an accounting in this essay will be disappointed.

Alternatively, despite the field's youth, there are now a greater number of theoretical positions directly related to CMC than any single overview of the field has previously described. Some theories have matured and are due for evaluation,

both in light of a number of empirical tests of their validity, and intensions and extensions of their explanatory power. New technological developments may have enlarged or diminished their relative scope. Newer theories have also arisen, some barely tested, the ultimate utility of which remains to be seen. This is not to suggest that the only theories the field needs are those focusing specifically on CMC. As Yzer and Southwell (2008) suggested, the most useful explanations of CMC may be those that rest strongly on robust theories developed in traditional contexts. For the present purposes, the chapter focuses on CMC-specific theoretical formulations. As Scott (2009) observed, "We can't keep up with new innovations, so we need theory and models that can" (p. 754).

This chapter provides, first, a description and evaluation of 13 major and minor theories of CMC. Although readers may find many of these approaches reviewed in other sources, particular efforts have been made to review the theories' development and status since the publication of the previous edition of this *Handbook* (see Walther & Parks, 2002). These theories are classified according to their conceptualization of the way users respond to the characteristics of CMC systems, particularly in the adaptation to cue systems that differ from face-to-face communication. These theories include the now standard classification of cues-filtered-out theories, which assert that systematic reductions in the nonverbal cues conveyed by different communication systems lead to impersonal orientations among users. There are differences among the foci of impersonal orientations, some of which are asocial and others quite specific and social in nature. The second group of theories depicts how characteristics of communicators, their interactions with others, and contextual factors affect the perceived capacities of different communication systems. These perceptions, in turn, affect the expressiveness and normative uses of these same technologies as if the capacities themselves had changed. The next set of theories reflects the ways in which communicators adapt to or exploit

the cue limitations of CMC systems to achieve or surpass face-to-face levels of affinity. Finally, new theoretical ideas are mentioned that address the utility of different media over the progression of usage sequences or relational stages or compare media effects of different kinds based on the relative effortfulness of different channels. The discussion includes numerous examples from research that help exemplify critical findings related to these frameworks.

The chapter ends with a few notes of concern about trends in contemporary CMC research. These trends represent understandable developments given the nature of the field, yet they also present potential problems in the further development of knowledge in certain domains. These concerns involve the role of face-to-face comparisons in technology-focused research, the potential impact of new technologies on earlier CMC theories, and the implications of multimodality in relationships (i.e., how to learn about the usage of a variety of communication systems within any single relationship).

Cues-Filtered-Out Theories

As numerous reviews have reflected, Culnan and Markus (1987) coined the term *cues-filtered-out* to describe a group of theories sharing the premise that CMC has no nonverbal cues and therefore occludes the accomplishment of social functions that typically involve those cues.

Social Presence Theory

Social presence theory was imported from teleconferencing research as one of the first analytic frameworks applied to CMC. Short, Williams, and Christie's (1976) theory argued that various communication media differed in their capacity to transmit classes of nonverbal communication in addition to verbal content. The fewer the number of cue systems a system supported, the less warmth and involvement users experienced with one another. Hiltz, Johnson, and Agle (1978)

and Rice and Case (1983) first applied this model to CMC, using it to predict that CMC rendered less socio-emotional content than other, multimodal forms of communication. Numerous experiments supported these contentions. Nevertheless, a number of theoretical and methodological critiques by other researchers challenged the social presence explanation of CMC dynamics (e.g., Lea & Spears, 1992; Walther, 1992). These critiques challenged several assumptions of the social presence model and identified artifacts in the research protocols that supported its application to CMC.

Despite the demise of social presence in some quarters of CMC research, extensive research and definition efforts have continued with respect to the role of presence with regard to settings such as virtual reality and computer-based gaming. Biocca, Harms, and Burgoon (2003) suggested definitional issues that a robust theory of social presence might require and the prospective benefits of a renewed social presence theory for comparing effects among various media. K. M. Lee (2004) highlighted the various conceptions of presence in related literatures, including telepresence, copresence, and social presence, as each construct describes somewhat different states of awareness of the self and others during electronic communication (see also Lombard & Ditton, 1997). Nevertheless, the various constructs and related measures are often used interchangeably or in duplication. Nowak and Biocca's (2003) experiment on the optimal level of anthropomorphism for avatars, for example, compared the research participants' responses to lifelike, cartoonish, or abstract avatars on measures of presence, copresence, and social presence. Each of the presence variables reflected the same result: Abstract rather than lifelike avatars stimulated the greatest presence responses.

Although researchers have in large part rejected the notion that CMC is inherently inferior to traditional communication media on outcomes such as social presence, there appears to be a resurgence of presence-related evaluations that

that were common in first-generation CMC (i.e., text-based e-mail, chat, and discussions) being applied to next-generation CMC, which features photos, graphics, avatars, or videos. Many individuals apparently assume that we no longer need to concern ourselves with earlier forms of minimal-cue CMC (or research about them) now that we have systems with greater bandwidth and presence. Education technologists, in particular, have been eager to recommend avatar-based interactions in *Second Life* as a cure for what remains, in the view of many, an impoverished level of social presence in plain-text educational conferencing (see Baker, Wentz, & Woods, 2009; Barnes, 2009; Childress & Braswell, 2006; Gunawardena, 2004), without much evidence of avatars' interpersonal impact beyond what may be expected due to novelty or to the hyperpersonal intercultural potential of asynchronous learning networks (e.g., Oren, Mioduser, & Nachmias, 2002). In a world where we know our communication partners by photo if not by face, plain-text CMC with no additional multimedia is, in some corners, being retro-conceptualized as never having been quite good enough, especially in comparison with the more presence-bearing media that seem (for now) to be here to stay. It appears that, although the formal theory of social presence has become disregarded in many quarters of CMC research, the concept of social presence as an inherent consequence of multiple cues remains alive and well (e.g., Bente, Rüggenberg, Krämer, & Eschenburg, 2008).

It remains to be seen whether social presence or some other construct and framework will emerge to account for why individuals use various new media for various relational activities. Observers of the new multimodal world of relationships have yet to identify coherent explanations about the relational functions and goals to which older new media and newer new media are being strategically applied. Meanwhile, plain-text messaging through e-mail, mobile phones, and the 140-character Twitter tweet suggest that text-based CMC is not at all gone. The subject of multiple media, interpersonal

functions, and sequences is discussed once more at the end of this chapter.

Lack of Social Context Cues

Like social presence theory, the lack of social context cues hypothesis (Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1986) once guided numerous studies on the interpersonal and group impacts of CMC, although it has been more or less set aside in response to contradictions that became apparent in native Internet environments (see Sproull & Faraj, 1997), as well as to formal theoretical and empirical challenges. The framework originally specified that CMC occluded the cues to individuality and normative behavior that face-to-face interaction transacts nonverbally. As a result, according to the model, CMC users became deindividuated and normless; CMC prevented users from attuning to others' individual characteristics, such as charisma, dominance, or affection, resulting in a cognitive reorientation of its users. The lack of nonverbal cues led them to become self-focused and resistant to influence, disinhibited, belligerent, and affectively negative.

As with social presence theory, a number of critical issues related to the research paradigms accompanying the lack of social context cues approach, and to the various theoretical issues it raised, have led to the model's retreat. Negative social responses to CMC have been accounted for theoretically through more complex frameworks that can explain both negative affective outcomes as well as positive ones, in formulations incorporating CMC's impersonal, interpersonal, and hyperpersonal effects (see Walther, 1996). Researchers articulated alternative assumptions and employed different research designs, leading to the development of second-generation theories of CMC. These latter positions predict different social and interpersonal effects of CMC media depending on other contextual factors (Walther, 2010).

That said, research still surfaces that shares the basic premises of the lack of social context cues

hypothesis, and such studies, ironically, often include methodological strategies that were criticized with regard to the original research on the lack of social context cues and social presence models. One such approach has appeared in several experiments on compliance gaining and social influence in CMC (e.g., Guadagno & Cialdini, 2002): The absence of nonverbal cues in CMC is said to prevent communicators from detecting demographic, personality, and interpersonal characteristics of others. The implication in this case is that CMC confers no peripheral cues to persuasion (see Petty & Cacioppo, 1986). As a result, it is suggested, CMC users process messages based on argument strength—that is, through central routes to persuasion alone—and they experience less overall attitude change than do off-line communicators. Methodologically, such research has employed very short interaction sessions among strangers in CMC and face-to-face (e.g., Di Blasio & Milani, 2008), an approach that has been demonstrated elsewhere to impose a time-by-medium interaction effect, artifactually dampening impression formation in CMC (for a review, see Walther, 1992, 1996).

Other persuasion research following a lack of social context cues approach apparently employed short, scripted real-time chat sessions as the operationalization of e-mail yet made claims about e-mail's persuasion-related potential on that platform (Guadagno & Cialdini, 2007). Whereas gender-by-medium differences in persuadability are obtained in such research, it is difficult to know how to generalize these findings. Using synchronous CMC chat to describe asynchronous e-mail is a questionable, although certainly not a novel, approach. This conflation should be of concern, although differences due to synchronous versus asynchronous CMC remain understudied in CMC research.

In a similar vein, Epley and Kruger (2005) argued that e-mail's lack of nonverbal cues prevents users from deciphering others' individual characteristics following the presentation of a false pre-interaction expectancy about a pending conversational partner. The authors conducted

several experiments in which they primed interviewers to expect a high or low level of intelligence or extraversion from an interviewee. Some dyads communicated using a voice-based system, while so-called e-mail communicators used a real-time CMC chat system. In the voice conditions, although conversations were restricted to simple, predetermined questions and spontaneous answers, they constituted actual interactions between two real (randomly assigned) persons. In contrast, there was no real interaction between CMC interviewers and their ostensible interviewees, since the responses interviewers received to their questions were sent by a researcher who had transcribed what a voice-based interviewee had said to a different, voice-based interviewer. This research strategy was intended to prevent the introduction of random variations in CMC users' language in order to provide a true test of the difference between CMC and speech. Epley and Kruger found that expectancies persisted in the post-CMC evaluations of partners, although they dissipated in voice.

A replication of this work by Walther, DeAndrea, and Tong (2010) challenged the former study's methods, particularly the use of transcribed speech as the operationalization of CMC interviewee responses. This concern focused on the lack of real interactions in the prior study and the employment of language that had been generated accompanying voice, in speech, as if it was structurally and functionally identical to the language that is generated in spontaneous CMC, where communicators know that there are no vocal cues to convey identity and social meanings. Walther, DeAndrea, and Tong argued that CMC users adapt to the medium by altering their language in a way that compensates for the absence of nonverbal cues. Their study therefore involved bona fide interviewees in both voice and CMC who could generate naturalistic responses to interviewers in both media. CMC users' postdiscussion impressions were rated as more intelligent than those of voice-based partners, in contrast to Epley and Kruger's (2005) findings and consistent with the

hyperpersonal model of CMC (Walther, 1996). Impressions changed in conjunction with the number of utterances exchanged, consistent with the social information processing theory of CMC (Walther, 1992).

Indeed, the history of contradictions between cues-filtered-out findings and the more prosocial effects of CMC can be explained in part by the methodological constraints on CMC interaction, which reflect competing theoretical orientations about communication and CMC (Fulk & Gould, 2009; Walther, 2010).

Media Richness

Media richness theory (Daft & Lengel, 1986), also known as information richness theory (Daft & Lengel, 1984), originally modeled the relative efficiency of different communication media for reducing equivocality in organizational decision making. It has also been applied to interpersonal situations either formally or informally. The term *rich media* is often used casually in the literature to signify multimodal or greater-bandwidth media, that is, communication media that support multiple verbal and nonverbal cue systems.

Media richness theory seems to be one of the most popular models of CMC (for a review, see D'Urso & Rains, 2008). This may be because some of its core constructs are so intuitively appealing, especially the media richness construct. This construct, in turn, is defined theoretically by four subdimensions: (1) the number of cue systems supported by a medium, (2) the immediacy of feedback provided by a medium (from unidirectional to asynchronously bidirectional to simultaneous bidirectional interaction), (3) the potential for natural language (compared with the more formal genre of memoranda, business letters, or data printouts), and (4) message personalization (i.e., the degree to which a message can be made to address a specific individual). So in the original formulation, face-to-face communication is the richest mode because it includes multiple-cue systems, simultaneous sender-and-receiver

exchanges (providing great immediacy of feedback), natural language, and message personalization. Telephones, letters, and memoranda each offer progressively declining levels of richness. The second core construct of the model is the equivocality of a messaging situation. Equivocality is defined as the degree to which a decision-making situation and information related to it are subject to multiple interpretations.

The theory argues that there is a match between the equivocality of a message situation and the richness of the medium with which to address it: To be most efficient, greater equivocality requires more media richness, and lesser equivocality requires leaner media. Although the theory was originally formulated so that the result of optimal match (or of mismatch) affects efficiency, it is often described in the literature as being related to communication effectiveness.

It is somewhat surprising that the theory remains as frequently employed as it does given that, even within the domain of organizational communication, it has a poor history of empirical support. The first empirical investigation of the theory (Daft, Lengel, & Trevino, 1987) addressed it indirectly by asking managers to indicate in a questionnaire what media they would use to address a list of various communication situations. These situations had been rated by other research participants in terms of their equivocality. The degree to which the test managers' media selections (in terms of richness) matched the situations' equivocality led to a media sensitivity score for each manager. Through inspection of the same managers' personnel evaluations, researchers found a correlation between media sensitivity and managerial performance. These results were interpreted as supporting the theory.

One can see that the investigation described above does not actually test the theoretical relationships specified by the theory; rather, it evaluates peripheral processes and implications that may be related to the model less directly. That is, rather than examining direct relationships between the actual use of differently rich media, equivocal message situations, and efficiency

(e.g., the time and effort required), Daft et al. (1987) examined organizationally related implications of managers' projections of media selection. Such findings have been contested by other researchers in a variety of ways. For example, Markus (1994) questions whether the projective, self-report approach to asking managers what media they would choose for various communication tasks generalizes to managers' actual media use. In her own study, Markus found that managers express media selection preferences very consistent with the matches prescribed by Daft and Lengel (1986) when completing questionnaires. By shadowing several managers, however, Markus found that their media selection behavior frequently departed from their questionnaire responses. It appears that managers hold normative beliefs about media choice that align with the media richness model but the normal constraints and spontaneous-communication needs that they face lead them to select media in ways that defy media richness sensibilities, and according to Markus, they do not suffer any decrement in performance as a result.

A second significant threat to the model came in the form of an experiment by Dennis and Kinney (1998) that sought to test directly the core theoretical dynamics of media richness theory as well as its extension toward interpersonal perceptions of online collaborators. This study involved small groups that addressed a simple or equivocal task, using videoconferencing (greater in richness) or text-based messaging (lower in richness). They found that media richness produced differences in the time it took different groups to complete their tasks. Media richness did not, however, interact with task equivocality to affect decision quality or interpersonal perceptions. More recent work examined media richness variations with differences in high-context versus low-context cultural backgrounds of users (Setlock, Quinones, & Fussell, 2007). Researchers predicted that there would be more benefit from using videoconferencing than from a reduced-bandwidth medium among those from a high-context culture (see Hall, 1976). Culture, however,

did not interact with media richness differences on conversational efficiency, task performance, or satisfaction.

Walther and Parks (2002) criticized the model as being unable to generate hypotheses that apply to many forms of CMC. Their concern focused on the four subdimensions of richness. When applying these criteria to traditional media, it is easy to see that all four dimensions tend to vary in conjunction with one another as one compares media. As one moves away from face-to-face to memoranda, for example, there are fewer code systems, less immediacy of feedback, less natural language, and little message personalization. However, e-mail does not fit into this scheme so neatly. Although e-mail is generally text based and therefore low in multiple codes, it may be exchanged relatively rapidly (if all addressees are online at the same time), it may use natural language (or formal language), and its capacity for message personalization is great. Likewise, one may use Facebook to broadcast information about oneself to a large audience, but Facebook also features public displays of relatively private one-to-one messages between friends that are sometimes very personally, even idiosyncratically, encoded. As these examples should make clear, media richness theory offers no clear method for ascribing a unitary richness value when the underlying criteria that constitute richness may reflect very different values, and researchers cannot apply the model to media that offer so much variation among richness characteristics. This issue may be an underlying factor that has contributed to the troubling level of empirical support for the model in CMC research.

Notwithstanding the troubling level of empirical support, media richness theory continues to be applied to new media and new interpersonal settings (without much success). For instance, Cummings, Lee, and Kraut (2006) used media richness theory to predict that friends from high school use telephone and face-to-face contact more frequently than CMC to maintain their friendships when they transition to college. Their results showed, however, that CMC was the most

frequently used medium among such friends. Rather than abandon the media richness framework, the authors conjectured that the relatively greater expense of making long-distance phone calls interfered with their predictions.

In a different vein, Hancock, Thom-Santelli, and Ritchie (2004) used media richness theory in a study comparing individuals' media preferences for deceiving another person. They argued that lying can be considered an equivocal message, and therefore, individuals should select rich media such as face-to-face or telephone for deception more often than they would choose text-based chat or e-mail. Results of a diary study did not support the hypothesis. Telephone was the most frequently used medium for deception, followed by face-to-face and instant messaging (which did not differ from each other), and e-mail was the least frequently used medium for deception. Hancock et al. (2004) concluded with a features-based explanation of their findings: Individuals resist the use of media that are recordable (such as CMC) so that their lies cannot be caught later or provide evidence with which to hold them to account. The recordability characteristic of new media, they argued, questions the applicability of media richness's assumption that communication channels differ along a single dimension. Interestingly, more recent research identifying an abundance of deception in date-finding websites has yet to be reconciled with this study's conclusion that liars avoid recordable and accountable media.

The Social Identity Model of Deindividuation Effects

The social identity model of deindividuation effects, or SIDE model, has had an interesting evolution in the literature. Although its developers have argued that it is decidedly not about interpersonal communication, at least in terms of the mechanisms that generate its predictions (e.g., Postmes & Baym, 2005), it has been applied to many settings that appear to be interpersonal in

nature. At one point, SIDE was one of the most dominant theories of CMC. Changes to the theory in response to empirical challenges and changes in communication technology—attributes that bear on the theory's central assumptions—appear to have accompanied a marginal decline in its popularity and scope. In certain contexts, however, it remains a most parsimonious and robust explanatory framework for CMC dynamics.

The SIDE model is included here as a cues-filtered-out theory because it, like others, considers the absence of nonverbal cues in CMC as an impersonalizing deterrent to the expression and detection of individuality and the development of interpersonal relations online. The SIDE model differs from other cues-filtered-out approaches, however, in that rather than leave users with no basis for impressions or relations at all, it predicts that CMC shifts users toward a different form of social relations based on social self-categorization. The SIDE model (Lea & Spears, 1992; Reicher, Spears, & Postmes, 1995) specifies two factors that drive online behavior. The first factor is the visual anonymity that occurs when CMC users send messages to one another through text (in real-time chat or in asynchronous conferencing and e-mail). When communicators cannot see each other, the model puts forth, communicators do not attune themselves to one another on the basis of their inter-individual differences. Drawing on principles of social identification and self-categorization theories (Tajfel, 1978; Tajfel & Turner, 1979), the model originally argued that visual anonymity led to deindividuation, or a loss of awareness with regard to one's own (and others') individuality. When in such a state of deindividuation, the second major factor in the theory comes into play: whether CMC users orient themselves to some salient social category or group (i.e., a social identification). If a CMC user experiences a social identification, the user will relate to other CMC users on the basis of in-group (or out-group) dynamics. These classifications then drive users' perceptions of similarity and attraction toward online partners in gross terms, that

is, as a unified perception based on whether others online seem to belong to the same group that is salient to the user, rather than as a sum or average of one's perceptions of each other partner in a conversation.

The model also specified, theoretically, that when a deindividuated CMC user orients to an individualistic identification rather than a social identification, then systematic effects on similarity and attraction should not occur. The model views interpersonal (rather than group) attraction toward other members as an aggregation of randomly distributed values based on a person's attraction to each idiosyncratic individual. That is, when perceiving others individually, one may like one person a lot, dislike another person a lot, and like others to different degrees, which, on balance, should average to some neutral level. Attraction to a group to which one belongs, in contrast, should be systematically positive. This difference in the form of attraction marks a key distinction between a group-based and an interpersonally based approach to the social dynamics of CMC (Lea, Spears, & de Groot, 2001; for a review, see Walther & Carr, 2010).

The most basic research strategy that provided evidence for SIDE involved experiments manipulating the two factors, visual anonymity and type of identification. In a prototypical experiment, one half of the small groups of CMC users in an experiment would communicate with one another using a text-based chat system only, whereas the other half would use the chat system and be shown photos that were supposed to represent the members. The former condition provides visual anonymity, presumably instigating deindividuation, whereas the latter condition involves visual identification and individuation. The second factor, group identification, is manipulated by prompting participants explicitly to look for the unique and distinctive characteristics of the group in which they were involved rather than to try to detect what made the individuals with whom they were conversing unique and different from one another. Such research has produced predicted interaction effects of visual

anonymity/identifiability by group/interpersonal identity, with conditions involving both visual anonymity and group identity providing the greatest scores on attraction (e.g., Lea & Spears, 1992).

The SIDE model's advocates originally argued that the nature of group memberships with which CMC users identified comprised fairly general social categories (e.g., English vs. Dutch nationalities, psychology vs. business majors, men vs. women, etc.). Although attempts to arouse these kinds of identifications have been employed in SIDE experiments, they have not produced effects as clearly as when identification was targeted only with the local group, that is, the unique and specific small group involved in the interaction. These results have led to revisions of the SIDE model, and recent versions focus on visually anonymous CMC leading to in-group identification with the group of participants rather than via larger social categories.

Although the SIDE model is distinctively not about an interpersonal basis for online relations, it has been argued to offer an explanatory framework for what others consider to be interpersonal phenomena. Lea and Spears (1995) argued that SIDE can explain the development of romantic relationships online. Rejecting notions that intimate attraction is necessarily and exclusively premised on physical appearance or the exchange of nonverbal cues (a rejection with which several other CMC theories in this chapter, described below, concur), they argued that intimacy may result from the perceptions of similarity that arise from a couple's shared membership in a variety of social categories (see also Sanders, 1997). From this perspective, although partners who communicate romantically online may believe that they love each other interpersonally, this would be an illusion. Their projection of interpersonal intimacy would be an outgrowth and projection of the similarity/attraction they share on the basis of their social (rather than interpersonal) identifications. Other essays have made quite strident pronouncements about the superiority of a groups-based, rather than an interpersonally-based, approach to understanding

a variety of online social responses. They have gone so far as to suggest that interpersonally based explanations for systematic social effects in online behavior are empirically conflicting and conceptually misleading and that they have impeded theoretical understanding about CMC effects (Postmes & Baym, 2005).

Despite these pronouncements about its overarching superiority as an organizing model for the entire field, the SIDE model seems now to be taking a more appropriately limited place in CMC research. This change appears to be due to uncertainties about the components of the model itself, empirical “competitions” in which social and interpersonal components both appear, and new media forms that alternately extend or restrict the scope of SIDE’s domain.

The deindividuation aspect of the model itself has been redefined (see E.-J. Lee, 2004). Although visual anonymity is still a key predictor of SIDE’s effects, empirical studies have led to questions about the deindividuation that anonymity was said to produce, in terms of its actual potency and its theoretical necessity in the model. Research has found that in some cases SIDE-like responses to an anonymous online crowd are greater when a CMC user is more, rather than less, self-aware (Douglas & McGarty, 2001). This and other studies have led SIDE theorists to argue that it is not deindividuation but rather depersonalization—the inability to tell who is who online—that is (and always has been) the construct on which SIDE phenomena depend. It is admirable that the theory is open to such modification, although it represents a significant departure from the important elements of social identity theory on which it originally drew and from assertions that were argued strongly in earlier articulations of the model.

Responding in part to SIDE advocates’ claims that their model could explain seemingly interpersonal effects, researchers made efforts to demonstrate more carefully whether group or interpersonal factors were operating in their CMC studies. Greater attention has been paid to whether the operationalizations and measurements

involved in research can discern group-based constructs from interpersonally based constructs (Wang, 2007). Moreover, experiments have directly compared SIDE-based versus interpersonally-based factors in the same study for their effects on the responses of CMC groups. Rogers and Lea (2004), for example, studied a number of virtual groups composed of students in England and the Netherlands who worked over an extended period of time via asynchronous conferencing and real-time chat. Steps were employed to maximize the salience of each virtual group’s unique identity (i.e., researchers addressed groups by their collective name only, rather than individually by member). Repeated measures indicated that group attraction did not maintain evenly or increase over time. To the contrary, interpersonal affiliation among members reflected marginal increases over the duration of the groups’ experience. More recently, Wang, Walther, and Hancock’s (2009) experiment with visually anonymous online groups involved a SIDE-based assignment of four members to two distinct subgroups. The researchers further prompted one member of each four-person group to enact interpersonally friendly (or unfriendly) behaviors toward the rest of the members. In general, other members evaluated the deviants in each group on the basis of the individuals’ interpersonal behaviors and not on the basis of those individuals’ in-group or out-group status with respect to other subgroup members. These results suggest that SIDE is less robust than previously suggested when CMC users confront bona fide behavioral differences among members while remaining visually anonymous. A recent essay offers a more tempered view of when SIDE and other intergroup dynamics are likely to arise in CMC and when they give way to interpersonal dynamics (Walther & Carr, 2010).

Recent revisions to the SIDE model have also retracted its previous assertions that visually anonymous CMC users cannot, theoretically, relate to one another as individuals (Postmes, Baray, Haslam, Morton, & Swaab, 2006; Postmes, Spears, Lee, & Novak, 2005). Now individuals are

seen, over time and under conditions of visual anonymity, to form relationships with each other first and then to identify with and form attachments to the small, interacting group. Group identification arises inductively in this new perspective. These formulations represent a major departure from SIDE's previous assumptions. They also leave unaddressed the mechanisms by which interacting individuals online become sufficiently attracted to one another to provide the interpersonal motivation, attraction, and reward that may be required to facilitate the durations of interaction required for individuals to develop an emergent group identity.

New media forms also raise interesting issues with regard to SIDE's scope. Many new technologies seem quite amenable to SIDE analysis of their effects on users, while others seem distinctly out of its reach. Communication systems such as social network sites, which confront CMC users with photos of prospective interactants, resemble the control group conditions in the prototypical SIDE experiment, that is, the visually identified conditions for which SIDE predicts no systematic effects. Alternatively, some new Web-based communication systems are very compatible with SIDE dynamics (see Walther, 2009): CMC systems display anonymous comments with no visual identification of other commenters, no interaction with other commenters, and the relatively clear implication that participants belong to the same social group. A recent study drew on SIDE theory successfully to predict readers' responses to the comments apparently left by other YouTube viewers in reaction to antimarijuana public service announcements. Researchers appended experimentally created comment sets (featuring all-positive or all-negative comments) to institutionally produced antimarijuana videos on YouTube pages. The more the participants identified with the ostensible commenters, the more the valence of those comments affected viewers' attitudes about the public service announcement videos and about marijuana (Walther, DeAndrea, Kim, & Anthony, 2010). The propagation of visually and authorially anonymous

reviews or talk-back sites on the Web merits further analysis from a SIDE perspective.

Signaling Theory

Donath (1999) was the first to suggest a theoretical basis underlying the skepticism CMC users often hold about the legitimacy of others' online self-presentation and how CMC facilitates such deception. Prior to Donath's position, references abounded (and are still heard) regarding the anonymity of the Internet facilitating deception, although anonymity is a complex concept with various potential meanings pertaining to online interaction (see Rains & Scott, 2007). Anonymity's lack of utility in the case of deception is captured in the fact that individuals may lie about themselves (online or off) using their real names or pseudonyms. A better explanation for why people mistrust others' self-presentations is needed, and Donath's (1999) approach provides a reasonable one to explain why people trust many forms of information that are communicated off-line but tend to mistrust the kind of information individuals provide about themselves that is most prevalent in CMC discussions.

According to Donath, the fields of economics and biology have contributed to the development of signaling theory, which Donath then applied to the evaluation of self-presentational claims in text-based discussion fora. Signaling theory, Donath reviews (2007), shows "why certain signals are reliable and others are not. For a signal to be reliable, the costs of deceptively producing the signal must outweigh the benefits." Within signaling theory there are two types of signals. *Assessment signals* are artifacts that have an inherent and natural relationship with some characteristic with which they are associated. An animal that has very large horns, for example, must be strong; strength is required to support large, heavy horns. It would be impossible to support very heavy horns without being strong, that is, to deceive about one's strength using such horns; one could not falsely bear heavy horns if one did

not actually possess the strength to do so. Conventional signals, on the other hand, bear socially determined symbolic relationships with their referents. Verbal claims about the possession of some attribute such as strength may be conventionally understood in terms of the intention of the claim, but ultimately, conventional signals are not as trustworthy as assessment signals. Conventional signals cost little to manufacture or construct, and they are therefore less trustworthy.

Text-based online discussions, Donath (1999) proposed, are dominated by conventional signals since such discussions are composed only of verbal statements. Because self-descriptive claims can easily be faked through verbal discourse, she argues, there is (rightfully) considerable wariness about whether online discussants can be trusted entirely to be who they say they are.

Rare in the animal world, conventional signals are very common in human communication. The self-descriptions in online profiles are mostly conventional signals—it is just as easy to type 24 or 62 as it is to enter one's actual age, or to put M rather than F as one's gender. (Donath, 2007)

In the context of text-based CMC, Donath's (1999, 2007) application of signaling theory appears to have limited predictive utility and to raise certain validity questions. The perspective suggests no limiting factor to the general proposition that users should be suspicious of verbal claims and self-descriptions in CMC. Although the framework helps us understand online skepticism, it does not provide much in terms of variations in observers' assessments of others' online veracity, although questions of credibility in CMC have received ample attention from several other perspectives (e.g., Metzger, Flanagin, Eyal, Lemus, & McCann, 2003; Sundar, 2008). Second, the perspective does not consider whether there are indeed characteristics that are transmitted sufficiently reliably through text and language alone. It is hard to imagine, for instance, that an individual could convey being articulate

or being humorous online unless the individual actually possessed those characteristics. In such cases, verbal behavior should constitute assessment signals rather than conventional signals. These and other qualities that language might reliably convey are not considered in the application of signaling theory to CMC.

To her credit, Donath (2007) has expanded the application of signaling to explain the benefits and potentials of social network sites in helping observers assess the veracity of others' online claims. Like Walther and Parks' (2002) warranting theory (described below), she contends that the ability to contact other individuals in a target's social network reduces the likelihood that the target will engage in deception. From a signaling theory perspective, an observer's ability to discern a target's deception may result in social sanctions or punishment for the target. These negative repercussions are seen as costly in the parlance of economic theory, and knowing that these costs could accrue provides a disincentive for social network site users to prevaricate in their profiles. Thus, social network sites, unlike text-based discussion systems that are divorced from an individual's off-line social network, should reduce deception and increase the trust that CMC users place in others. These suggestions are yet to be tested, although the findings reported by Toma, Hancock, and Ellison (2008) and Warkentin, Woodworth, Hancock, and Cormier (2010) are consistent with this notion. DeAndrea and Walther (in press) found, however, that individuals are quite well aware of their friends' distorted self-presentations on Facebook profiles.

Experiential and Perceptual Theories of CMC

Electronic Propinquity Theory

The theory of electronic propinquity (Korzenny, 1978) received brief mention in the previous edition of the *Handbook's* chapter on CMC (Walther & Parks, 2002). Those comments noted

that relatively little attention had been paid to the theory since its first appearance in 1978 and its original follow-up in 1981 (Korzenny & Bauer, 1981; cf. Monge, 1980). Possibly because the most advanced technology mentioned in its introduction was interactive closed-circuit television, the theory has almost escaped the attention of the CMC research literature. Its formal structure and the nature of its constructs, however, leave it quite amenable to forms of CMC that can be characterized in terms of their bandwidth and interactivity. The theory has received a modicum of renewed attention since 2002, including empirical research that may contribute to a renewal of interest in its potential.

The central construct in electronic propinquity theory is the psychological closeness experienced by communicators. Whereas physical closeness or proximity is generally associated with interpersonal involvement in face-to-face communication, Korzenny (1978) argued that communicators connected through electronic media could also experience a sense of closeness, or electronic propinquity.

The theory specified the main and interaction effects on electronic propinquity from a number of specific factors. The first factor is bandwidth, or the capacity of a channel to convey multiple-cue systems (like the first factor in media richness, described above, which followed propinquity theory historically); the greater the bandwidth, the more the propinquity. Mutual directionality (like immediacy of feedback) increases propinquity, as do users' greater communication skills, the lower (rather than higher) level of complexity of a task, fewer communication rules, and fewer choices among alternative media. These factors also interact with each other, as specified in a series of derived theorems: The greater the bandwidth, the less the effect of task difficulty; the greater users' skills, the less the effect of more communication rules; and the fewer the choices among media, the less the effect of bandwidth.

Although the theory predated the Internet, these theoretical properties provide a sufficiently open-ended definitional framework in which

specific media may be considered even though they did not exist when the theory was created. Therefore CMC, with or without auditory and/or visual cues, can fit neatly into electronic propinquity's calculus. Owing in part to a failed test using traditional media in an experiment by Korzenny and Bauer (1981), until recently, no such application to CMC had been examined empirically.

A recent replication of electronic propinquity theory's original test has indicated greater validity for the theory and has successfully applied it to CMC. Walther and Bazarova (2008) identified a confound in Korzenny and Bauer's (1981) original experiment that they attempted to isolate in a new empirical study. The confound had to do with the theory's proposition that the fewer the number of media choices one has, the greater the propinquity one experiences with the remaining medium, a dynamic that may have been present in Korzenny and Bauer's study but was unplanned and unchecked. Walther and Bazarova investigated this factor directly. They created experimental groups that alternatively had two media among their members (e.g., audioconferencing among all members but additional videoconferencing among a subset of members) or had only one medium connecting everyone. Media included face-to-face discussion, videoconferencing, audio conferencing, and text-based chat.

Results supported the proposition about the effect of media choice and bandwidth. Those who had no choices (i.e., only one medium) experienced greater propinquity using that medium than did those who used the same medium among two media present, when it was the lower bandwidth medium of the two. For example, text-based chat produced greater propinquity and satisfaction ratings when chat was the only channel a group was able to use, compared with ratings of chat in groups where a member used both chat and audio conferencing. These patterns persisted along all the media combinations evaluated in the study: "There were no differences between ratings obtained as a result of chat, voice, video, or FtF communication among groups who used only one medium"

(Walther & Bazarova, 2008, p. 640), although the use of two media consistently led to less propinquity for the lower bandwidth medium. The experiment offered further support for the theory. It demonstrated complex interactions among choice, bandwidth, communicator skill, and task difficulty, which generally supported electronic propinquity's predictions.

In addition to the renewed potential for the application of propinquity theory to emerging media, Walther and Bazarova (2008) suggested that these results may help account for discrepancies in the existing literature on the social effects of CMC. Numerous studies that have examined natural CMC uses in field settings often indicate that it is less preferred by users for relationships and group maintenance than other, higher bandwidth media and face-to-face interactions. In contrast, numerous experimental studies show relatively high levels of satisfaction and positive relational communication using CMC alone under various circumstances. Electronic propinquity theory's unique focus on the effects of media choice helps resolve this discrepancy. It alerts us to the notion that when communicators are aware or have a history of alternative media options for a specific relationship, CMC should be expected to be the least satisfying. Where communicators are constrained to one channel alone, as experiments often require, electronic propinquity theory explains how users quite readily apply communication skills to make the remaining available medium effective and satisfying. Whether there are many real-world settings where users are constrained in this way to a single medium is a different question, but electronic propinquity theory helps unlock what had been an unexplained paradox in the research literature with regard to these conflicting empirical findings.

Social Influence Theory

The social influence approach to media richness (Fulk, Schmitz, & Steinfield, 1990; Fulk, Steinfield, Schmitz, & Power, 1987), like channel expansion theory (described below; Carlson & Zmud, 1999), focuses on the factors that change users'

perceptions about the capacities of CMC and their consequent uses of the medium. It may be important to note that this approach shifts the definition of media richness to a perceptually based phenomenon describing how expressively a medium may be used. This departs from media richness theory's approach, which defines media richness based on the a priori properties of media.

Social influence theory rejects those aspects of media richness (and social presence) theory that argue that certain properties of media exclusively determine their expressive capabilities and their utility in interpersonal (and other) domains. Instead, Fulk et al. (1987) argue, the nature of media and their potentials are socially constructed, and the richness and utility of a medium are affected by interaction with other individuals in one's social network. Following from this network-analytic perspective, the theory predicts that one's strong ties have more influence on one's perception of CMC richness than do one's weak ties. In organizational settings, these distinctions include one's close coworkers versus workers in other organizational units. The authors of the model suggest that social interaction with network ties may include overt discussions about communication media and their uses. It may also include communications with one's ties via a given CMC medium, and the qualities of those exchanges also shape perceptions about that medium's potential and normative uses.

Social influence has received robust support in previous empirical studies. Research testing the model shows stronger correspondence between individuals' perceptions of e-mail's richness and those of their strongly tied coworkers than those of weakly tied coworkers. Research has established the cognitive and perceptual basis of these effects: One's attitudes about e-mail's utility correspond primarily with one's perceptions about one's coworkers' perceptions and secondarily with those coworkers' actual attitudes. These differences between direct perceptions and metaperceptions help demonstrate that the social influence process is not a magic bullet but a communication process that leads to individuals' reconstructions of others' messages (Fulk, Schmitz, & Ryu, 1995).

The social influence model has not received very much research attention recently. Its developers have shifted their focus after having set a precedent for complex research strategies exploring social influence that would not be simple to replicate. Nevertheless, how users construct perceptions about the potential and preferred uses of newer communication technologies may be a topic of renewed attention. Social network websites, for example, make most visible one's strong and weak ties. They make evident what the normative expressive and usage practices of one's friends are. These phenomena correspond quite clearly to the theoretical factors implicated in social influence theory, and future research on how different groups of users evolve different standards and norms for messaging via these systems can benefit from a social influence approach.

Channel Expansion Theory

Channel expansion theory (Carlson & Zmud, 1994, 1999) also takes issue with the fixed properties ascribed to various media in media richness theory. Whereas social influence theory focuses on how dynamic interaction in a social network of communicators predicts and explains how users come to perceive CMC's richness, the primary focus of channel expansion theory is on internal, experiential factors. The theory's original, central argument is that as individuals gain more experience with a particular communication medium, the medium becomes richer for them (Carlson & Zmud, 1994). That is, theoretically, it becomes more capable for the conduct of equivocal and interpersonally oriented communication tasks. With experience, the authors argued, users learn how to encode and decode affective messages using a particular channel.

The channel expansion theory was expanded to include increasing familiarity with an interaction partner as a second major factor affecting the richness or expressiveness of a medium that is used to communicate with that partner, with experience related to the conversational topic

and organizational experience as additional, potential factors (Carlson & Zmud, 1999). Social influence by other communicators was posited to affect richness perceptions as well. The model was tested by its developers in a cross-sectional survey and in a longitudinal panel study, in both cases focusing only on e-mail. The first study produced a moderate correlation between experience using e-mail and e-mail richness perceptions (see also Foulger, 1990) as well as a correlation between familiarity with the conversational partner and e-mail richness (Carlson & Zmud, 1999). The panel study likewise found an increase in perceived e-mail richness commensurate with e-mail experience over time. Social influence was not significant.

The theory lay dormant until D'Urso and Rains (2008) replicated and expanded investigation of the model. These researchers included traditional media (face-to-face and telephone) as well as text-based chat, along with e-mail, in a survey of organizational users. Results were fairly consistent with Carlson and Zmud's (1999) findings with respect to new media. For chat and e-mail, experience with the media, and no other variables, affected media richness ratings. For traditional media, only social influence and experience with one's conversation partner, and not experience with the medium, affected richness perceptions.

Channel expansion theory offers an antidote to the inconsistencies of media richness research in a sense. The learning-based explanation that channel expansion theory offers is reasonable and intuitive. At the same time, other approaches deal with several of the theory's elements in more sophisticated (as well as in more complicated) ways. For instance, CMC users' ability to encode and decode personal and social cues is central to the social information processing theory of CMC (see below); the influence of others' richness perceptions is demonstrated more particularly in social influence theory; and electronic propinquity theory offers a different account for why the same medium may offer more psychological closeness and satisfaction in some circumstances

and less in others by specifying a constellation of situational, media, and user characteristics.

Theories of Interpersonal Adaptation and Exploitation of Media

Social Information Processing

The social information processing (SIP) theory of CMC (Walther, 1992) has become a widely used framework for explaining and predicting differences between text-based CMC and off-line communication, and recent work has made efforts to expand its scope to include newer, multimedia forms of online communication. The theory seeks to explain how, with time, CMC users are able to accrue impressions of and relations with others online, and these relations achieve the level of development that is expected through off-line communication.

The theory articulates several assumptions and propositions concerning what propels these effects. It explicitly recognizes that CMC is devoid of the nonverbal communication cues that accompany face-to-face communication. It differs, however, from theories of CMC that argue that the lack of nonverbal cues impedes impressions and relations or reorients users' attention to impersonal states or to group-based forms of relating. The SIP theory articulates the assumption that communicators are motivated to develop interpersonal impressions and affinity regardless of medium. It further proposes that when nonverbal cues are unavailable, communicators adapt their interpersonal (as well as instrumental) communication to whatever cues remain available through the channel that they are using. Thus, in text-based CMC, the theory expects individuals to adapt the encoding and decoding of social information (i.e., socioemotional or relational messages) into language and the timing of messages. Although many readers of the theory have interpreted this argument to refer to emoticons (typed-out smiles, frowns, and other

faces; e.g., Derks, Bos, & von Grumbkow, 2007), the theory implicates language content and style characteristics as more primary conduits of interpersonal information.

A second major contention of SIP is that CMC operates at a rate different from face-to-face communication in terms of users' ability to achieve levels of impression and relational definition equivalent to face-to-face interaction. Because verbal communication with no nonverbal cues conveys a fraction of the information of multimodal communication, communication functions should require a longer time to take place. CMC users need time to compensate for the slower rate in order to accumulate sufficient information with which to construct cognitive models of partners and to emit and receive messages with which to negotiate relational status and definition.

With respect to the first major theoretical contention, recent research has demonstrated that communicators adapt social meanings into CMC language that they would otherwise express nonverbally. Walther, Loh, and Granka (2005) had dyads discuss a controversial issue: face-to-face or via real-time computer chat. In each dyad, prior to their dyadic discussion, the researchers privately prompted one of the members to increase or decrease his or her friendliness toward the other individual by whatever means that person chose to do so. The naive partner rated the ad hoc confederate after the interaction was over, providing ratings of the confederate's immediacy and affection dimensions of relational communication. Coders then analyzed recordings of the face-to-face confederates for the kinesic, vocalic, and verbal behaviors that corresponded to variations in immediacy and affection ratings. A number of vocalic cues provided the greatest influence on relational communication, followed by a group of specific kinesic behaviors; the confederates' verbal behaviors had no significant influence on perceptions of their immediacy and affection. In contrast, in the CMC transcripts, several specific verbal behaviors bore significant association with differences in relational communication. No less variance was accounted for

by the verbal cues in CMC than the nonverbal cues accounted for in face-to-face interaction. This research provides confirmation about the hypothetical process mechanisms of the SIP theory, beyond confirmation of a relationship between distal antecedents and consequents.

The theory is somewhat equivocal about the second major element, the temporal dimension. The primary theoretical explanation for the additional time CMC requires for impression development and relational management is that electronic streams of verbal communication without nonverbal accompaniments contain less information than multimodal face-to-face exchanges. Even in so-called real-time CMC, chat communication cues are not fully duplexed in terms of seeing a partner's reactions at the same time that they generate an utterance. From this perspective, even a constant and uninterrupted exchange of real-time CMC should provide a relatively smaller accumulation of interpersonal information than would face-to-face communication over the same time interval. However, discussions of the theory also reflect that more time may be needed for relational effects to accrue in CMC because CMC is generally used in a more sporadic manner than face-to-face communication. Online communication often involves asynchronous media, that is, systems that allow one communicator to create a message at one time and recipients to obtain it later at a point in time they choose. The SIP perspective can account for both approaches to temporal distortion theoretically, and both approaches have been used in empirical research: Recent studies have added support for SIP by using strictly asynchronous communication (Peter, Valkenburg, & Schouten, 2005; Ramirez, Zhang, McGrew, & Lin, 2007) or real-time chat episodes repeated over several consecutive days (Hian, Chuan, Trevor, & Detenber, 2004; Wilson, Straus, & McEvily, 2006). However, greater theoretical precision would enhance understanding of the theory's scope and application.

The SIP theory has been expanded by researchers other than its original developer to incorporate

media other than text-based CMC, although these formulations are tentative. Tanis and Postmes (2003) established that the presentation of partners' photos or the exchange of pre-interaction biographies of CMC users works equivalently well in instilling interpersonal expectations in CMC settings. Previously, SIP research had been more oriented to verbal exchanges, such as CMC users' biographical disclosures, attitudinal statements, and style. Therefore, it is noteworthy that photographic information appears to function similarly as biographical text.

Westerman, Van Der Heide, Klein, and Walther (2008) offered a more sophisticated approach to the potential effects of photos and other multimedia information online within SIP framework. These researchers reconsidered SIP's root proposition that lesser bandwidth media transmit less information per exchange than do greater bandwidth media, affecting the rate of impression formation and relational development. They examined various forms and channels of personal information from this perspective. As a result, they argued that some mediated forms of information are faster (i.e., they transmit more social information in a respective time interval, e.g., photos or videos) and others are slower. This simple assertion is consistent with SIP; yet an expanded view of faster and slower media allows for greater scope and a wider range of predictions about new, multimodal media than the theory was originally conceived to explain.

Despite these potential adjustments with which to integrate visual information in the SIP framework, recent studies have demonstrated considerably limited additional effects on attraction and uncertainty reduction when additional modalities accompany text-based CMC. In one study, Antheunis, Valkenburg, and Peter (2007) compared face-to-face dyadic communication with an instant messaging system, and a hybrid instant messenger that displayed visual information about a dyadic partner alongside textual CMC. After a get-to-know-you session, no significant differences in interpersonal attraction arose between these conditions. Visual cues actually

increased the frequency of disclosures and personal questions, in contrast to previous findings that disclosure and personal questions were proportionately more frequent in CMC than in face-to-face interactions (Tidwell & Walther, 2002).

Finally, a recent examination of uncertainty reduction processes via social network sites focused explicitly on the potential obsolescence of SIP theory in light of new media characteristics providing information aside from the interactive exchanges on which SIP traditionally focuses. Another study by Antheunis, Valkenburg, and Peter (2010) argued that social network sites provide an abundance of asynchronous and unintrusive biographical, multimodal (pictorial), and sociometric information about other people. Therefore, they predicted that these alternative forms of social information should be expected to be the primary sources of uncertainty reduction about others, without need of recourse to interactive communication via text. Results of the study showed that despite the appeal of these newer forms of information display, interactive communication contributed the most to uncertainty reduction about another individual.

Hyperpersonal CMC

The hyperpersonal model of CMC (Walther, 1996) proposes a set of concurrent theoretically based processes to explain how CMC may facilitate impressions and relationships online that exceed the desirability and intimacy that occur in parallel off-line interactions. The model follows four common components of the communication process to address how CMC may affect cognitive and communication processes relating to message construction and reception: (1) effects due to receiver processes, (2) effects among message senders, (3) attributes of the channel, and (4) feedback effects. The model has received a great deal of attention in the literature. At the same time, extensions and revisions to the model have been proposed on the basis of both conceptual and empirical contributions. Certain aspects of the model remain

underresearched—such as the holistic integrity of its subcomponents as well as the reciprocal effects of feedback—although some progress has been made with respect to these issues.

Receivers. When receiving messages from others in CMC, an individual may tend to exaggerate perceptions of the message sender. In the absence of the physical and other cues that face-to-face encounters provide, rather than fail to form an impression, receivers fill in the blanks with regard to missing information. This often takes the form of idealization if the initial clues about another person are favorable. The original articulation of the model drew explicitly on SIDE theory (Lea & Spears, 1992) in formulating receiver dynamics. The SIDE model also describes how CMC users make overattributions of similarity when communicating under conditions of visual anonymity if contextual cues suggest that a conversational partner shares some salient social identity with the receiver. It further proposes that communicators experience heightened attraction in these circumstances. The SIDE model argues that the specific form of attraction is focused on one's attachment to the group identity rather than to the individual person.

Recent rearticulations of the hyperpersonal model, however, have attempted to broaden the concepts related to receiver dynamics (see Walther, 2006). The hyperpersonal approach now suggests that an initial impression may be activated not only by group identifications but through individual stereotypes, such as personality characteristics, or due to the vague resemblance of an online partner to a previously known individual (see Jacobson, 1999). Analysis of online impressions using social relations analysis (Kenny, 1994), which assesses how uniform or differentiated one's impressions of other group members are, offers a promising approach to the question of group- or interpersonally based impressions in CMC (see Markey & Wells, 2002).

Senders. Text-based CMC facilitates selective self-presentation. Online, one may transmit only cues

that an individual desires others to have. It need not be apparent to others what one's physical characteristics are (unless one discloses them verbally), nor do individuals generally transmit unconscious undesirable interaction behaviors such as interruptions, mismanaged eye contact, or nonverbal disfluencies of the kind that detract from desired impressions face-to-face. Instead, CMC senders may construct messages that portray themselves in preferential ways, emphasizing desirable characteristics and communicating in a manner that invites preferential reactions. Self-disclosure quite naturally plays a role in this process, by which individuals not only disclose what content they wish to be known but also, through disclosure, breed intimacy. Research has found that disclosure and personal questions constitute greater proportions of utterances in online discussions among strangers than they do in comparable face-to-face discussion (Joinson, 2001; Tidwell & Walther, 2002). This may be a simple adaptation to the lack of nonverbal expressive behavior, which would normally provide uncertainty-reducing information. Yet CMC users' disclosures are more intimate than those of face-to-face counterparts, suggesting a strategic aspect to this difference as well.

Apart from explicit disclosures, much of what senders selectively self-present is conveyed through the content of the exchanges in terms of how communicators express their evaluations of various subjects, their agreement with partners, word choice, and any number of ordinary expressions of affinity. A recent study (Walther, Van Der Heide, Tong, Carr, & Atkin, 2010) asked one member of an online dyad, who was about to discuss the topic of hamburgers with an online partner, to behave online in a way that prompted the other person to like or to dislike the individual. The significant differences in liking for the actor following the CMC conversation were associated with the actor's level of agreements versus disagreements and concurrence versus divergence in statements about the other partner's favorite hamburger. Online (and perhaps elsewhere), we manipulate our desirability to others

not so much by overt statements of interpersonal affect but through the way we complement or contest others' views of things in the world. In other research, systematic differences among individuals' construction of stories about themselves online led to changes in their self-perceptions. Gonzales and Hancock (2008) asked participants to write about their experiences in a manner that would lead others to perceive them as either extraverted or introverted. Half of the participants in the experiment posted these responses in a blog, presumably accessible to other CMC users, whereas the other half of the participants recorded their answers in a private document for ostensible analysis at a later time, anonymously. The blog writers generated significantly different self-perceived extraversion/introversion scores following the experience, in accordance with the characteristic they had been assigned. Gonzales and Hancock concluded that selective self-presentation online provides a potent influence not only on others but also on the transformation of an individual's self, a phenomenon they called "identity shift."

Channel. The third dimension of the hyperpersonal model involves characteristics of the channel and how CMC as a medium contributes to the deliberate construction of favorable online messages. One part of the channel factor focuses on the mechanics of the CMC interface, suggesting that users exploit the ability to take time to contemplate and construct messages mindfully. In many CMC applications (especially asynchronous systems), users may take some time to create optimally desirable messages without interfering with conversational flow, very much unlike the effects of face-to-face response latencies. The hyperpersonal model further suggests that CMC users capitalize on the ability to edit, delete, and rewrite messages to make them reflect intended effects before sending them. The introduction of the model further suggested that CMC users may redirect cognitive resources into enhancing one's messages, without the need to pay attention to the physical behaviors of one's

conversational partner or oneself, or to the ambient elements where one is physically located when communicating (in contrast to these demands on attention in face-to-face conversations). CMC users can focus their attention on message construction to a greater extent than they would in face-to-face conversations.

Recent research supported a number of these suggestions (Walther, 2007). A study led college student participants to believe that they were joining an asynchronous discussion with a prestigious professor, who was described in much detail; with a relatively undesirable high school student in another state, also described in detail; or with another college student, about whom no details were provided except for the student's name. Participants' message composition was recorded in real time and later coded and rated, and a different group of participants provided ratings of how desirable each type of target would be as an interaction partner. Results of the study revealed that the more desirable the partner was, the more editing (deletions, backspaces, and insertions) the participants exercised in composing their messages to that partner. The degree of editing corresponded to the degree of relational affection ascribed to the messages by raters. Participants self-reported their level of mindfulness during message production, which had been expected to differ based on the attractiveness of the ostensible message target. It did not, and neither did the time they spent composing their messages differ as a result of the different types of targets. However, those who were more mindful spent more of their time editing the messages they had written, whereas those who were lower in mindfulness spent more time choosing what to write. These results add a level of verification to the model's contention that CMC users exploit the unique mechanical features of the medium to enhance relational qualities of their messages.

Another facet of the channel component of the hyperpersonal model has been more difficult to interpret, and research results have challenged the model's original assertions about asynchronous

versus synchronous CMC. The model originally posited that asynchronous CMC allowed users to avoid the problems of entrainment associated with face-to-face meetings. Entrainment, in the small group communication literature (Kelly & McGrath, 1985), refers to the ability to synchronize attention and interaction with collaborators. It is proposed to be difficult to accomplish when participants have competing demands on their time and attention. Time pressures work against entrainment in face-to-face meetings, leading communicators to neglect group maintenance behaviors in favor of impersonal, task-related discussions. Since CMC users working asynchronously can interact with others at times that are convenient and available to them, the model suggested that CMC should not suffer from a lack of maintenance behavior. CMC users would be more likely to engage in off-task, interpersonal discussions than in face-to-face meetings since, without meeting in real time, there is no time pressure constraining such exchanges.

This aspect of the model was challenged very quickly. Roberts, Smith, and Pollock's (1996) ethnographic observations and interviews reflected that individuals who enter real-time, multiplayer online games and chat systems (as opposed to asynchronous discussions) very rapidly exhibit sociable exchanges. Likewise, Peña and Hancock (2006) demonstrated that the conversations in a real-time multiparty sword-fighting game reflected more socio-emotional utterances than game-related statements even during online duels. The sociability benefits originally ascribed to asynchronous CMC in the introduction of the model are fairly clearly an aspect of many synchronous systems as well, at least those in which socializing is a goal that users bring to the system. A recent review of communication that takes place in certain online, real-time, role-playing games describes a great proportion and a wide variety of interpersonal communication behaviors among associates and fellow "clan" members (Klimmt & Hartmann, 2008). Although these findings suggest greater scope for the development of hyperpersonal dynamics, the entrainment

explanation has not been tested since the model was developed, and the conceptual and empirical status of this aspect of the channel component of the model is unclear.

Feedback. The hyperpersonal model of CMC suggested that the enhancements provided by idealization, selective self-presentation, and channel effects reciprocally influenced matters, forming a feedback system by which the CMC intensified and magnified the dynamics that each component of the model contributes. That is, when a receiver gets a selectively self-presented message and idealizes its source, that individual may respond in a way that reciprocates and reinforces the partially modified personae, reproducing, enhancing, and potentially exaggerating them. The manner in which the dynamics of these reciprocated expectations may modify participants' character was suggested to reflect the process of behavioral confirmation.

Behavioral confirmation (Snyder, Tanke, & Berscheid, 1977) describes how one interaction partner's impression about a target partner leads the first partner to behave and how that behavior alters the responses of the target partner in return. The original behavioral confirmation study involved male participants who were shown photos priming them to believe that their upcoming female telephone interaction partners were physically attractive or unattractive (even though the actual partners were not really those depicted in the photos but were randomly selected female participants). Not only did this expectation affect the males' involvement, it affected the females' personality-related responses as well, as revealed in outside raters' evaluations of the females' personalities based on audio recordings of their conversations. The hyperpersonal model appropriated this construct, suggesting that one's idealized impressions of an online partner may lead a CMC user to reciprocate based on that impression, transmitting messages that, in turn, may shape the partner's responses, shifting the target's personality in the direction of the communicators' mutually

constructed and enacted impression. In this way, feedback may intensify the hyperpersonal effects of idealization, selective self-presentation, and channel exploitation.

The feedback component of the hyperpersonal model has received little formal research attention until recently. One study (Walther, Liang, et al., 2011) examined whether feedback to a CMC communicator enhanced the identity shift phenomenon described by Gonzales and Hancock (2008; see above). As Gonzales and Hancock had done, this experiment called on half the participants to answer several questions as if they were extraverted and the other half, as if introverted. Participants posted their responses to a blog or pasted them into a Web-based form. Departing from Gonzales and Hancock, in each condition, participants either did or did not receive feedback confirming their (extraverted or introverted) personality performances. When participants subsequently completed self-report measures of their extraversion/introversion, those who received feedback expressed more extreme scores in the direction of the initial prompting. This study also helps establish a link between two components of the hyperpersonal model—selective self-presentation and feedback—showing that the activation of these components jointly produces stronger effects than in isolation.

Several CMC studies have generated findings consistent with a *behavioral disconfirmation* effect (see Ickes, Patterson, Rajcecki, & Tanford, 1982; Burgoon & Le Poire, 1993). Behavioral disconfirmation takes place when one individual anticipates an unpleasant interaction with a target person and, to avert the unpleasantness, overaccommodates in order to improve the person's demeanor. One was the Walther (2007) study described above, in which participants anticipated online communication with a high school-age loner, a college student, or a professor. Despite pretest indications that the high schoolers were the least desired communication partners, male participants who believed that they were communicating with a male high schooler expressed greater editing and affection than with

a male peer or professor. No voice-based or face-to-face comparisons were done in that study.

As discussed earlier, two recent studies explored the effects of preinteraction expectancies on subsequent impressions following CMC or voice-based communication (Epley & Kruger, 2005; Walther, DeAndrea, & Tong, 2010). Manipulations in both studies instilled preinteraction expectancies among interviewers regarding their partners' high or low intelligence. Manipulations in both studies involved the bogus presentation of one of two sets of a partner's ostensible photograph, grade point average, major, and self-reported greatest high school achievement. In Epley and Kruger's (2005) research, half the interviewers used a phonelike system to speak to a real interviewee, and half the interviewers used CMC to obtain responses that were transcribed from a person other than the actual interviewee. The results superficially appear to reflect greater behavioral confirmation in CMC than on the phone: Interviewers' post-test assessments of interviewees' intelligence were different in CMC but not in voice conditions. The methodology in that study, however, was such that the CMC interviewer could not actually have influenced his or her partner's behavior. Walther, DeAndrea, and Tong's (2010) replication involved actual interviewees in both voice and CMC conditions. The post-CMC ratings indicated relatively greater intelligence assessments than did those following the voice-based interviews, reflecting behavioral disconfirmation in CMC relative to voice. Further research is exploring the reasons for these voice versus CMC differences in confirmation and disconfirmation.

Extensions. In addition to research that has added, supported, or challenged the hyperpersonal model's claims, a variety of extensions to the model have been made, and it has been applied to new social technologies as well.

Research exploring the dynamics of online date-finding systems has applied aspects of the hyperpersonal model in several ways. Many of these systems require users to create profiles that

feature photos and self-descriptions. Ellison, Heino, and Gibbs's (2006) interviews with online daters revealed that users make overattributions from minimal cues that prospective dates exhibit. These include gross inferences based on spelling errors and projections about individuals' character on the basis of what time of day or night he or she initiates a date request. Gibbs, Ellison, and Heino (2006) also drew on selective self-presentation principles in their documentation of the dilemmas faced by daters when honest self-presentations produce fewer dates than do self-aggrandizing or deceptive self-presentations (see also Whitty, 2008).

Research on deceptive self-presentation in online dating profiles has made particular use of the hyperpersonal model. Innovatively acquired data demonstrate that most online daters misrepresent their age, weight, and/or height online (Toma et al., 2008; see also Hall, Park, Song, & Cody, 2010). In several cases, these findings have been attributed to CMC's facility for selective self-presentation and editing under asynchronous communication conditions (Toma et al., 2008). This hyperpersonal perspective has most recently been applied to the manner in which dating system users select or retouch the photographs they post to their electronic profiles (Hancock & Toma, 2009).

Additional work has added new explanatory extensions to the model. Jiang, Bazarova, and Hancock (2011) developed a framework for understanding the exceptional impact of self-disclosure on intimacy in CMC compared with face-to-face communication. Although individuals disclose proportionately more, and more intimately, in CMC than in face-to-face communication (Tidwell & Walther, 2002), questions remained over whether receivers (over) interpret disclosures in a way that increases intimacy in CMC more intensively than in off-line interactions. Jiang et al. (2011) hypothesized that the degree to which receiving disclosure from a conversational partner affects intimacy is shaped by the attributions a receiver makes for the partner's motivation to disclose. A 2 × 2 experiment included CMC chat versus face-to-face interactions between

a naive participant and a confederate who offered several personal disclosures in one condition and no disclosures in a control condition. Posttest measures revealed that the CMC participants receiving disclosures experienced greater intimacy than did face-to-face participants. Among those who were exposed to a greater degree of disclosure, the CMC participants more frequently perceived that the discloser's behavior was motivated by some aspect of their relationship rather than by the medium or the discloser's disposition, compared with the face-to-face participants. The type of attribution fully mediated the relationship between the disclosure-by-medium interaction and intimacy. In addition to documenting a hyperpersonal effect of disclosure on intimacy, this study provided a new attributional mechanism to explain the effect, which is also affected by the medium.

A self-attribution dynamic may also be operating online that leads to exaggerated intimacy as a result of online self-disclosure, a hypothesis that has not appeared in the literature previously. Although it is commonly understood that when another person discloses to us, we experience intimacy with that person, Collins and Miller's (1994) meta-analysis of the relationship between disclosure and liking demonstrates an alternative connection as well: When we disclose to another person, our own disclosure increases our feelings of intimacy toward the recipient. Thus, when users naturally adapt to the absence of nonverbal cues in CMC by disclosing proportionately more than they do in face-to-face interaction (Joinson, 2001; Tidwell & Walther, 2002), it may be due to their own expression of relatively greater disclosure (in addition to or instead of the reception of others' disclosures) that they attribute greater intimacy to disclosive CMC conversations. Although this contention warrants empirical verification, it suggests an interesting contribution to the hyperpersonal cycle.

Another form of self-perception affecting intimacy can be hypothesized on the basis of findings that it takes several times longer to have a conversation online than exchanging the same

amount of verbal content in a face-to-face meeting (see Tidwell & Walther, 2002). If CMC chaters have an online conversation that feels as though it should only have taken an hour but turns out to have taken four hours, and if the communication rate differential is not apparent to CMC interactants (as it is apparently unapparent to online game players; Rau, Peng, & Yang, 2006), this temporal distortion may also lead to exaggerated inferences about the desirability of the online partner. When time seems to pass more quickly than it actually does, people attribute enjoyment to the events that occurred during that time (Sackett, Nelson, Meyvis, Converse, & Sackett, 2009).

Other researchers have also examined the role of disclosures in the development of relatively more intimate relations online and their effects. Valkenburg and Peter (2009) identify three relationships among four specific processes that explain how CMC may be related to improvements in adolescents' well-being. For reasons that have appeared in the literature (see above; for a review Kim & Dindia, 2011; see also Schouten, Valkenburg, & Peter, 2007), the first important relationship in the model is the effect of CMC in promoting online self-disclosure. Drawing on extensive literature, Valkenburg and Peter (2009) proceed to connect self-disclosure with the development of higher quality relationships among people. Finally, the authors point out the connection between high-quality relationships and development of psychological well-being. The first two linkages in particular implicate CMC as a catalyst in the relationally-based development of adolescent adjustment.

In contrast to Valkenburg and Peter's depiction of the beneficial effects of CMC to well-being, another application of the hyperpersonal model is seen in Caplan's (2003) approach to the study of *problematic Internet use*. Caplan focuses on the usage and consequences of CMC by individuals who have social skill deficits in their face-to-face communication abilities and who experience disruptive communication-related anxieties. To such people, Caplan has shown that

Internet interaction is especially appealing, particularly real-time discussion systems. Because CMC provides individuals greater control over their messages and their self-presentation, it reduces anxiety (see also Amichai-Hamburger, 2007). Under these conditions, individuals may develop what Caplan (2005) refers to as a *preference for online social interaction*, “characterized by beliefs that one is safer, more efficacious, more confident, and more comfortable with online interpersonal interactions and relationships than with traditional (face-to-face) social activities” (p. 723). This use of CMC is paradoxical and problematic, according to Caplan’s research, because such individuals experience a decline in their off-line social skills in conjunction with their more socially rewarding online interactions.

Warranting

A new theoretical construct, known as the warranting construct, was introduced in the previous edition of the *Handbook of Interpersonal Communication* (Walther & Parks, 2002). Warranting pertains to the perceived legitimacy and validity of information about another person that one may receive or observe online. Individuals often come to learn quite a lot about each other through discussions in topical online discussion groups or through online role-playing games (see Parks & Floyd, 1996; Parks & Roberts, 1998), as well as from personal homepages and other forms of online interaction and self-presentation, including online dating sites (see Ellison et al., 2006). However, as Donath (1999) explained, it is widely suspected that the information one obtains through interaction in such venues leaves open the possibility for distorted self-presentations and outright deception with respect to participants’ off-line characteristics. As a relationship develops online, there may come a point at which it becomes very important to interactants to have information that they believe reliably describes a partner’s off-line characteristics. This may become

especially acute if they decide to initiate an off-line meeting, as many online friends and prospective romantic partners decide to do (Parks & Roberts, 1998).

The introduction of the warranting construct argued that an individual is less likely to distort his or her self-presentation when the receiver has access to other members of the sender’s social circle, since others can corroborate the individual’s real-life characteristics and hold that person accountable for misrepresentation. To increase a partner’s confidence in one’s self-descriptions, an individual may make efforts to put an online partner in touch with members of the individual’s off-line network.

The greater value of the warranting construct is found in its definition of what kind of information provides more confidence to receivers about the potentially true nature of an individual’s off-line self. From this perspective, receivers are expected to be more confident about their impressions based on information that is more likely to warrant, or connect, the online persona to the off-line body and person (see Stone, 1995). Information is more likely to be seen as truthful to a receiver to the extent that the receiver perceives it to be “immune to manipulation by the person to whom it refers,” according to Walther and Parks (2002, p. 552). They argued that CMC users may take deliberate steps to provide online partners with information having relatively great warranting value by using links to individuals in one’s social network or hyperlinks to websites or archives containing information about the user over which the user himself or herself has no control.

Recent research has provided several empirical tests of the warranting construct. Although warranting was originally conceptualized in the context of relationships originating in text-based online discussions, recent research has applied and extended the construct to contemporary multimedia websites in interesting ways. The first reference to warranting came in a study of impression management in online dating sites. Ellison et al. (2006) reported that online date

seekers warrant their claims about their proclivities or participation in certain activities by including photographs on their user profiles that depict them engaged in the activity they are claiming. Showing oneself rock climbing, for instance, would be difficult to manipulate or manufacture if it was not an individual's actual activity (see Donath, 1999, and below). Other research from an online dating context (Toma et al., 2008) found that individuals who used online date-finding services distorted their online self-presentation to a lesser extent the more their off-line acquaintances knew they were using these services. Similarly, Warkentin et al. (2010) investigated whether individuals' displays of information that could be used to hold them to account for self-presentations affected the frequency and degree of deception they displayed with respect to their claims about demographic characteristics and personal tastes and preferences. Although chat systems featured more deception than was present in social network profiles and e-mail, the presence of cues to off-line identity in any of these platforms reduced the level of deception in that medium, according to Warkentin et al.

Walther, Van Der Heide, Hamel, and Shulman (2009) tested warranting experimentally by juxtaposing flattering versus unflattering statements about an individual on mock-up Facebook profiles. The comments were made to appear to have been posted by the profile owner or by the owner's Facebook friends. Facebook provides a format in which an individual can indicate qualities about himself or herself via "about me" descriptions, favorite quotations, current activities, and so on and where one's acquaintances can also post comments reflecting the activities and characteristics of the profile host via postings on the host's "wall" (and other commenting systems). When individuals' suggestions about their own physical attractiveness (either positive and self-promoting or negative and self-denigrating) were contradicted by the cues contained in wall postings from friends, observers' ratings of the

profile owner significantly reflected the friends' comments more than the profile owner's self-claims. A replication focusing on profile owners and friends' assessments of an individual's extraversion provided more ambiguous results. In related research, an experiment that varied only the coefficients representing the number of friends a Facebook profile owner appeared to have found a curvilinear relationship between the number of one's friends and the observers' ratings of the profile owner's popularity and social attractiveness (Tong, Van Der Heide, Langwell, & Walther, 2008). Although the sociometric friend coefficient did not contradict any particular self-generated claim of the profile owner, its effect nevertheless reinforces the influential nature of online information about a user that is beyond the immediate reach of the user to manipulate. A similar study by Utz (2010) examined observers' ratings of a profile owner's popularity and social attractiveness via the Dutch Hyves social network site. Profile mock-ups reflected variations in self-claims for extraversion, the photographically depicted extraversion of nine of one's friends, and the number of friends a profile owner had. An interaction effect between the number of friends and the apparent extraversion of friends significantly affected the social attractiveness ratings of the profile owner.

The warranting principle remains a relatively new construct at this time, although its empirical application in contemporary multimedia systems suggests that it is likely to see additional rather than decreased use. Concerns about the legitimacy of others' online self-presentations has been a pernicious issue related to CMC since before the widespread diffusion of the Internet (see Van Gelder, 1985), and sensationalistic accounts of identity deception and manipulation still attract headlines (Labi, 2007). Likewise, as systems for meeting new friends and lovers shift from the casual discussion site to purposive online dating sites, concerns about others' online authenticity continues (Lawson & Leck, 2006). Theoretical structures that help explain how

CMC users assess the veridicality of others' online self-presentations may increase in value.

Efficiency Framework

A new framework was developed to resolve previously contradictory findings about satisfaction with, and the effectiveness of, CMC collaboration. Its investigation has incorporated very novel CMC technologies and has implicated presence as a mediating factor.

The framework's developers, Nowak, Watt, and Walther (2005, 2009), noted that many studies of CMC generated relatively low ratings on interpersonal satisfaction and related notions (typically in field experiments or surveys) compared with ratings of face-to-face communication or video communication. Although researchers are frequently aware of the known linkage between interpersonal cohesiveness and productivity or quality, many of the same studies in which CMC earned lower sociability ratings found no deleterious effects of CMC on task accomplishment. For example, Galagher and Kraut (1994) found that text-based CMC groups were less satisfied with their communication than video-mediated groups but that there were no significant differences in the quality of the outputs that these conditions produced. Research assessing CMC often relies on measurements of its subjective appeal and does not consider its instrumental utility for communicative tasks independently.

Nowak et al. (2009) argue that users are likely to conflate their impressions of CMC's presence and satisfaction with their estimates of its utility. Enjoyment or frustration responses override an individual's objective assessment of effectiveness, and individuals may be expected to dislike CMC when there are easier alternatives (see Korzenny's, 1978, electronic propinquity theory, described above). People are cognitive and behavioral misers, as Nowak et al. (2009) note, and prefer to do a task using less effort than using more effort. Compared with face-to-face communication, CMC is more effortful. Face-to-face communication is intuitive and provides rapid exchange of

information through multiple modalities. Drawing on SIP theory, CMC may be just as capable as face-to-face interaction in achieving task and social outcomes, but it requires more time and effort, which are inherently less desirable in most cases than doing things in an easier way. There is a natural efficiency to face-to-face communication that is often satisfying.

Satisfaction and utility may be unrelated, however, or even inversely related, depending on the task. When people collaborate on writing something together, for instance, talk is only useful to a point. In contrast, if collaborators plan, organize, and execute a writing task via the written (and stored and editable) medium of CMC, it may provide a greater efficiency in the long run, since things have been made recorded, retrievable, and reusable in a way that speech is not. This process is not less effortful than talk. Greater effort, however, in addition to being frustrating, may lead to better outcomes. In this way, the efficiency framework attempts to explain how, within and across studies, CMC may be rated as socially unsatisfactory but, nevertheless, may offer instrumental benefits. To evaluate CMC on an affective basis alone, which is common, may be misleading from a utilitarian perspective.

Empirical research on the efficiency framework has been extremely limited. One study involved small groups collaborating on the preparation of presentations for five weeks, using face-to-face meetings, text-based real-time chats at specific times, asynchronous text-based conferencing, real-time videoconferencing, or an asynchronous video communication system that allowed members to record, leave, and play multimodal messages to and from one another (Nowak et al., 2009). Consistent with previous research and the efficiency framework's predictions, self-administered questionnaires showed higher scores on presence and conversational involvement for face-to-face communication above all other conditions. A greater number of cue systems also led to greater subjective project quality and satisfaction, as did synchronous (compared with

asynchronous) media. With respect to the objective quality of their projects, however, external coders' ratings identified the asynchronous video condition as having facilitated the best actual work, with no other differences between conditions. Real-time versus asynchronous comparisons did not affect the quality of the work.

Although this perspective seems especially suited for the study of mediated collaborations, its central lessons may apply to a variety of interpersonal as well as instrumental settings as media characteristics evolve: Those media that are the easiest to use may not, in fact, offer the greatest instrumental benefit. As interface options increase and become more natural, more research will be needed that separates affective reactions from those pertaining to interaction goals. In strictly recreational social settings, these two aspects—social and purposive outcomes—may be isomorphic. As new electronic media such as avatar-based systems and desktop video are employed for an increasing number of activities, including the common instrumentalities that make up so much of the maintenance of ongoing relationships, whether easier is better or not, will deserve continued reexamination.

ICT Succession

Perhaps the most recent new framework about CMC is Stephens's (2007) prescriptive formulation involving the strategic sequencing of messages across multiple communication channels. This approach recognizes different forms of information and communication technologies (ICTs), including traditional media, face-to-face channels, and newer forms of CMC. It primarily concerns how combinations of ICTs predict communication effectiveness in organizational communication, although it includes predictions related to the use of the media for "tasks that are personal and social in nature" (p. 499).

In terms of its structure, the ICT succession model presents several propositions inferred by the author from principles and findings in a wide

variety of literatures, rather than deriving them from a set of related higher order constructs. The major theoretical terms of the model can be identified as (a) successive (vs. single) message transmissions and (b) complementary (vs. singular) channel usage. The central proposition of the model is that the repetition of a message through two different types of communication channels causes the greatest communication effectiveness and efficiency (for certain types of tasks). For example, a message sent once face-to-face might be followed up by e-mail, or vice versa, which should be more effective than repeating messages using a single medium (or no repetitions at all).

Among these terms and relationships, singular versus successive messaging is easily defined: A communicator may send a message once or send it more than once. The definition of complementary modalities is less clear. The model reflects a variety of different approaches to identify groupings of channels based on criteria found in other CMC theories as well as in perceptual studies of media uses and gratifications (Flanagin & Metzger, 2001), rather than on the basis of some underlying functional property. It clusters channels into the following groups: face-to-face, mass media, oral media, or textual media. Although a proposition refers to "maximizing modalities through complementary successive ICT use" (Stephens, 2007, p. 496), the theory does not indicate what kind of combinations among different ICT groups would be optimally complementary. It may be that the use of two nominally different ICTs constitutes sufficient complementarity, although later propositions address the superiority of mass media as an initial medium and elsewhere the benefit of text-based media for subsequent messages.

The ICT succession model received mixed empirical support in a recent experiment (Stephens & Rains, 2011). Research confederates either e-mailed a persuasive message to participants encouraging them to use the career services center at their universities or read the message face-to-face to the participant. A few minutes later, based on the experimental condition, one

of several events transpired: (a) a confederate then communicated a second message, with different content, that also advocated using the career services center, using either the same channel (e-mail or face-to-face) as the first message or the other of the two channels, or (b) a confederate provided a message about a different topic using one or other of the media combinations. This experimental design allowed the researchers to examine the influence of media succession on outcomes independently of the effect of the simple addition of more persuasive arguments. Results revealed significantly greater intention to use the career services center when messages were conveyed using complementary successive messages than when other message/media combinations were used, although attitudes (rather than intentions), information effectiveness perceptions, and recall did not differ among the conditions as predicted. Complementary media effects overrode the simple effects of being exposed to multiple messages.

In one sense, the ICT succession theory offers a modest digital-age update and elaboration to conventional suggestions. As Koehler, Anatol, and Applbaum wrote in their 1976 organizational communication textbook, "We suggest that a combination of oral and written (printed) media are more effective in achieving employee understanding than either oral or written messages alone" (p. 204). The initial empirical research compared two media that are rather conventional by current standards, and despite the Stephens and Rains (2011) article's title alluding to interpersonal interaction, no interpersonal processes per se seem to have been involved. Nevertheless, other aspects of the researchers' discussion of the model offer a glimpse at research to come that may expand the scope of the predictions beyond conventional wisdom or first-generation Internet applications. When the authors point out that "ICTs such as mobile phones, e-mail, text messaging, and instant messaging have made it increasingly possible to communicate repeated messages over time" (p. 102), they open the door to the discovery of media selection strategies that may go well

beyond choices based on differences in the number of code systems supported by different media. How communication partners may choose among many more options than simply just written versus oral ones may be an interesting focus of inquiry and illuminate much about communicators' literacies, opportunities, effort economies, and communication strategies. These issues will bear repeated attention across both organizational and relational contexts such as the development of friendships, courtship, maintenance, conflict, and perhaps relational dissolution. The issue of multimodality is addressed more fully below, after some other concluding observations.

Challenges to CMC Research

This review ends with some notes of concern about current trends in CMC research. These concerns focus on three issues: (1) the increasing neglect of off-line comparisons in CMC studies, potentially undermining broad theoretical understanding and leading to potentially inflated views of CMC's effects; (2) how and whether new technologies affect the utility of theories that were developed in the context of somewhat older technological contexts; and (3) how we study interpersonal communication when many relationships are radically multimodal.

There appears to be an increasing tendency for CMC research to focus on different features and different users of CMC and not to make comparisons with face-to-face communication or communication using other traditional media. This trend is supported by different disciplinary orientations about what questions should concern us and by the development of research tools that make CMC much easier to analyze than its off-line counterpart. For a number of years, many researchers have extolled the end of the face-to-face "gold standard" for CMC research (for a review, see Nardi & Whittaker, 2002), meaning that online behavior itself is a legitimate and significant focus of study and that descriptions of it, or comparisons of different interfaces or users, are sufficiently interesting without having to compare observations of online

to off-line behavior. Technology design research, for example, may largely be uninformed by what happens off-line, since its focus is on the discovery of technology users' needs and preferences and the evaluation of technology features that optimally address those criteria.

Additionally, there has been significant growth in the development of low-cost computer programs that provide powerful analyses of digitally represented behavior. In particular, language analysis programs that can be applied to large corpuses of digital texts have made online behavior more amenable to analysis and made textual analysis far less onerous than it previously was. The ease, cost, availability, and power of these applications make them very appealing. At the same time, their availability may privilege analysis of the kind of digital primary data to which the programs are especially well suited and facilitate disregard for the analysis of analog face-to-face interaction recordings, which require significant resources to transcribe and/or prepare for digital analysis.

These factors, as well as others, may be promoting the analysis of online interpersonal behavior more frequently and of off-line behavior less so. Although to many of us the dynamics of organic online behavior are often quite interesting, the lack of comparison with off-line behaviors has the potential to lead to artificial conclusions. We may infer support using native digital sources for theoretically universal effects when the effects are limited. We may likewise conclude that certain behaviors are primarily or exclusively the result of various qualities of media, but without comparison with off-line behavior that may exhibit similar patterns, such conclusions may be fallacious and misleading.

Second, questions arise whether new technologies should lead us to retire theories that were developed in light of other, older technologies. Good ways to ask these questions examine the boundary conditions and scope of extant theories. We should always assess how the topography of new technologies' features meet or violate the assumptions of a theory. As discussed above, theories that were premised on the lack of

visual information about one's partners may not hold as much utility for multimedia interfaces. At the same time, advances in technology-enabled social arrangements allow us to see if theories can stretch their original assumptive boundaries. Human and Lane (2008), for instance, have appropriated elements of electronic propinquity theory and the hyperpersonal model to try to account for the idealization that emerges through the online communication that takes place between the occasional face-to-face meetings of geographically separated off-line relational partners. Exploring the degree to which the processes implicated in older models may be reconfigured for newer media presents intriguing possibilities (as is demonstrably the case with electronic propinquity theory). To the extent that the older media's boundary conditions continue to appear within other, newer systems, the vitality of the theories remains even if the scope of their application declines. When multimedia news stories or videos appear in a Web 2.0 application but are accompanied by user-generated comments appearing as anonymous, plain-text messages, for example, theories premised on unimodal media and focused on anonymity remain quite potent with respect to the effects of the comments.

Finally, just as the previous *Handbook* suggested that relationships may develop through multiple modalities (Walther & Parks, 2002), many researchers have come to suggest that interpersonal communication research must explicitly recognize that contemporary relationships are not conducted through one medium or another but often through a great variety of channels. Multimodality has become the primary channel characteristic of interpersonal relationships:

We conduct our relationships face-to-face, over the phone, and online through modes as diverse as e-mail, instant messaging, social network friending, personal messages, comments, shared participation in discussion forums and online games, and the sharing of digital photos, music, and videos. (Baym, 2009, p. 721)

Research has yet to conceptualize what this means for the study of relationships, except by reference to media ecologies (e.g., Barnes, 2009), the implications of which are not yet clear beyond phenomenological levels. Even advocates of a multimodal perspective at times do no more than survey individuals about the use of all their Internet and mobile applications and enter their total new technology use as one undifferentiated predictor variable comparing new technology, old media, and face-to-face interaction on relational outcomes of some kind. In contrast, other researchers have advanced good questions based on established theories applied to new media to describe and explain the disappointing effects of moving a new relationship from online to off-line and back (e.g., Ramirez & Wang, 2008; Ramirez & Zhang, 2007).

We will need new theoretical concepts with which to describe the functional attributes of groups of technologies. Qualities such as the opportunistic availability of different media (e.g., texting or mobile-enabled microblogging) may be such a concept. Economy of effort may be a useful property with which to describe social media that allow one to contribute to the maintenance of numerous relationships with a single message. Knowing which applications provide asymmetrical interpersonal information-seeking (I can Google you without you knowing it) or symmetrical requirements (You have to grant me access to your Facebook profile before you can see mine) may be a useful frame, depending on the theoretical questions these phenomena arouse. It is also likely that different media are used in functional, strategic sequences (beyond repetition) that may illuminate relational patterns. Our chapter in the previous *Handbook* quoted Mitchell (1995): “Hacker lore has it that burgeoning cyberspace romances progress through broadening bandwidth and multiplying modalities—from exchange of e-mail to phone and photo, then taking the big step of going (face-to-face), then climbing into bed” (p. 19). Lore aside, technology sequences and their relational significance deserve an update: If a man takes an interest in a woman he sees in a class, he

may want to scan the Web for information about her. If that search suggests potential reward, he may talk to her to establish a minimal basis of familiarity so that he can request access to her social network profile and be able to see how many friends she has, what they look like, what their comments have to say about her, and how she interacts with them in turn. If results are encouraging, a face-to-face conversation may come next, followed by a reinforcing e-mail or social network posting. Do increases in channel access signify relational escalation? Do we meet new partners’ Flickr family photo collection before we meet the parents, and why? Rather than resign ourselves to undifferentiated, massive multimodality, future research may begin to contemplate the strategic and interpersonal signification possibilities it presents as its users exploit the vast relational potentials of CMC.

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