In August 1998, news of the results of a study soon to be published in the *American Psychologist* sent shock waves through the Internet community and, to no small extent, through public discourse about the social impact of the Internet. Robert Kraut and his colleagues (1998) had found that Internet use in a sample of 93 families had resulted in small but significant increases in loneliness, social isolation, and depression over a 2-year period. The researchers asserted that the cause of these decrements in well-being was that on-line relationships do not sustain social support, and the substitution of on-line relationships for stronger, off-line relationships led to these negative outcomes. The ensuing debate was a forceful reminder that the Internet has become a flash point for more general concerns about technology. For some, Kraut et al.'s findings were a direct challenge to their prized ideological positions about the Internet as a source of meaningful relationships, social support, therapeutic engagement, and identity growth. For others, the findings were striking confirmation of the dehumanizing, destructive potential of computer technology. We will present a thorough assessment of these findings later in this chapter, but for now the essential point is that the impact of Internet communication on personal relationships is a central issue in
technology research, one that raises controversy in academic and public discussions. In doing so, it underscores the fact that, for good or ill, the Internet is a profoundly social medium.

The social nature of the Internet has been recognized, albeit unevenly, throughout the history of Internet research. Such research has drawn heavily on interpersonal constructs such as self-presentation, impression formation and management, socioemotional orientation, hierarchical role awareness and performance, deference, cooperation, intimacy, attraction, affection, and relational development. Moreover, even when the focus of Internet research moves beyond the immediate world of dyadic and small group relationships to consider features such as organizational communication, community dynamics, collective action, and educational developments, the work's theoretical underpinnings have often remained solidly rooted in the relational aspects of interaction.

In this chapter we examine the theoretical research about computer-mediated communication (CMC) and relational dynamics. We begin by reviewing several theories that have emerged from or have been applied to these issues. Recent reviews have covered some of the same ground (e.g., Postmes, Spears, Lea, & Reicher, 2000; Walther, 1996), but our assessment is both more far reaching and set more squarely in the context of interpersonal communication. Next, we explore the use of CMC in three contexts of particular relevance for interpersonal communication: mental health and social functioning, social support, and relationship development. Finally, we evaluate the adequacy of existing theories of CMC and interpersonal communication in light of the observation that any given relationship frequently exists in several different media at once. We contend that these "mixed-media relationships" create challenges for current theoretical approaches. We offer a potentially unifying approach to the phenomenon of relationships that develop on-line and migrate to off-line encounters, and identify several approaches from previous interpersonal communication research that suggest promise for adaptation into the electronic domain.

Computer-mediated communication is a broad term, and it is growing broader with each technological innovation. We therefore limit our review to those features that are likely to hold the greatest relevance for students of interpersonal communication. First, although inquiry ranges from rigorous ethnographic, interpretive, and linguistic work (e.g., Baym, 1999; Herring, 1993) to psychoanalytic and postmodernist accounts (e.g., Bruckman, 1992; Turkle, 1995), we devote the bulk of our attention to work rooted in traditional social scientific approaches. In many cases, of course, this research has been stimulated and enriched by alternative perspectives. Our emphasis, however, is on efforts to provide more general, theoretical explanations for the interpersonal dynamics of on-line interaction. Second, we focus here on text-based messaging systems on the Internet. This might strike the reader as an overly restrictive stance, given the proliferation of sound and sight in recent Internet technologies (e.g., voice messaging, video and photographic displays). However, the fact remains that text-based systems still dominate interaction on the Internet. E-mail, chat rooms, multiuser discussions (popularly called "MOOs" or "MUDs"), and Listservs and other mailing lists, as well as the global system of Usenet newsgroups that hosts thousands of group discussions on myriad topics, continue to link millions of people in text-based interaction on a daily basis. And innovations in text-based communication continue to unfold beside or within their flashier technological cousins. Instant messaging and "chat boxes" that stand alone or that accompany on-line games or retail shopping sites illustrate the continuing expansion of text-based interaction on the Internet (see Nardi, Whittaker, & Bradner, 2000; Pew Internet & American Life Project, 2001a, 2001b). Another reason we
focus on text-based systems is that they are the most interactive and hence the most engaging for scholars of interpersonal communication. Although Web pages providing personal information (see Miller, 1995) can be revised, and files containing photographs or video can obviously be exchanged, the real give-and-take of social life involving the Internet still occurs in text-based interaction.

THEORIES OF COMPUTER-MEDIATED COMMUNICATION

The dominant theories with implications for the interpersonal dynamics of CMC have not, as a rule, developed in the context of interpersonal relations. Some were based in small group communication, whereas others were concerned with message comprehension in organizations. Still others were imported from nondigital domains and adapted to explain on-line phenomena. Some observers have raised questions about the applicability of such theories to the interpersonal uses of the Internet (e.g., Baym, 1995), and it is true that we do not yet have a clear sense of what the boundary conditions of these theories may be. They may or may not be applicable to interpersonal behavior on the Internet. Certainly a few have been stretched so far from their original starting places that the value of their guidance is open to question. Nevertheless, rooted as they are in basic communication constructs, and without any theoretical competition in sight at present, these general theories continue to be applied to interpersonal dynamics and CMC. In one way or another, all deal with how the communicative cues available in on-line settings affect the ensuing interaction. They differ in terms of the cues they consider and their conceptions of how people use those cues. In this section we consider five approaches, which for convenience we label cues filtered out, cues to choose by, cues filtered in, cues about us, and cues bent and twisted.

Cues Filtered Out

The Internet is only one in a succession of new media spawned over the past 150 years. It is therefore not surprising that early attempts to account for social behavior on the Internet drew on theories that were originally focused on other media. Short, Williams, and Christie's (1976) social presence theory, for example, dealt with more traditional media in terms of their bandwidth and social presence. Bandwidth refers to the number of communication cue systems a technology can convey, specifically, the incremental addition to verbiage of voice, kinesics, and proxemics. Short and his colleagues argue that nonverbal cues make the presence of communicators more salient to one another and enhance the warmth and friendliness of interaction. Thus the greater the bandwidth a system affords, the greater the social presence of communicators.

Researchers used this theory to explain CMC's effects on group discussion (e.g., Hiltz, Johnson, & Agle, 1978) as well as to predict preferences among alternative media for various tasks (Rice & Case, 1983). Because of their low bandwidth, text-based systems were thought to result in low social presence. This in turn was hypothesized to increase task orientation and to facilitate group discussion (e.g., Turoff, 1991). Early studies partially supported these speculations. Task-oriented communication was more frequent in computer-mediated settings than in face-to-face (FtF) settings. However, it also appeared that groups using CMC reached consensus less frequently. The lack of nonverbal cues and lower social presence made it more difficult for leadership to emerge and for groups to reach agreement in socioemotional terms (for a review, see Walther, 1996).

Other researchers pointed to the lack of social context cues in on-line settings (Kiesler, Siegel, & McGuire, 1984; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1986). CMC was thought to lack the nonverbal
cues that are typically used in FtF settings to express purpose, setting, decorum, roles, relative status, and affect. Without such cues, researchers argued, communicators would become absorbed in the task and the self, and become disinhibited and hostile. Without nonverbal cues, communicators should be less able to "alter the mood of a message, communicate a sense of individuality, or exercise dominance or charisma" (Kiesler, 1986, p. 48). Research supported these predictions; compared with people in FtF groups, CMC users were found to express greater hostility (commonly called "flaming") and to send more task-oriented messages.

These approaches have been combined in what is generally referred to as the cues filtered out model (Culnan & Markus, 1987). They share the assumption of a one-to-one correspondence between communicative cues and communicative functions. That is, they assume that the functions served by nonverbal cues in FtF interaction go unmet in computer-mediated interaction because the nonverbal cues are absent. If no other cues can perform the social functions that physical appearance, copresence, and dynamic nonverbal behavior can, then, as Culnan and Markus (1987) point out, CMC must always be impersonal.

In spite of its considerable intuitive appeal and early empirical support, the cues filtered out perspective came under heavy criticism as evidence came in from a wider range of on-line settings and theoretical conceptualizations became more sophisticated. One critique pointed to the relatively short time periods allowed for both CMC and FtF groups in the early studies and the possibility that it simply takes longer to achieve the same level of content exchange in CMC as in oral FtF communication (Walther, 1992). If time limits interrupt group and relational development, task orientation and lack of agreement may be the result of different rates of communication. Indeed, reanalyses of existing data as well as new studies supported the belief that it was time limitations, rather than the ultimate capacity of CMC to convey relational dynamics, that accounted for the differences in early studies (Walther, Anderson, & Park, 1994). Recent research also suggests that time limits may affect CMC interactions and FtF groups in qualitatively different ways. Reid and colleagues found that CMC groups were more sensitive to time pressure than parallel FtF groups. When time was restricted, CMC users expressed less positive affective content relative to unhurried CMC groups and FtF groups (Reid, Ball, Morley, & Evans, 1997; Reid, Malinek, Stott, & Evans, 1996).

Another line of critique challenged the notion of the isomorphism of communicative cues and communicative functions. The problem with the isomorphism assumption, as Lea and Spears (1995) observe, is that more complex factors outside the exclusive domain of spatial and nonverbal cues might predict attraction and affect; factors such as group identity and attitude similarity are not considered. Observations in newsgroups and field settings demonstrated that people were clearly making strong judgments based on text alone. The cues filtered out perspective has fallen out of favor with many CMC researchers because of these objections. Although the original advocates have not explicitly recanted their positions, their subsequent work has reflected more positive assessments of CMC's relational potential (e.g., Galagher, Sproull, & Kiesler, 1998; Sproull & Faraj, 1997). Elsewhere, however, researchers continue to draw on the images of restricted interactions and restricted cues (e.g., Gunawardena, 1995; Gunawardena & Zittle, 1997).

Cues to Choose by

Some types of messages might be conveyed more efficiently in one medium than in another. This seemingly commonsense proposition is the premise upon which media richness theory (or information richness
theory; Daft & Lengel, 1984, 1986) is based. Although the theory originated in work on information processing in organizations, it has the potential to help explain why people used computer-mediated channels and why these channels might be particularly appealing for certain types of tasks.

The core argument in media richness theory is that there is an optimal match between the equivocality of communication tasks and the communication media among which one may choose. It is important to note that the original theory proposed a single and simple outcome as a result of such matching: efficiency (in turn, the effective accomplishment of understanding within a specific time interval; Daft & Lengel, 1984). Thus the more equivocal the communication task and the richer the medium one uses, the more efficient the exchange. Conversely and ingeniously, when equivocality is low, it does not matter what medium is used for effectiveness, but a leaner medium is more efficient.

Richness of a medium is determined by four characteristics: multiplicity of cue systems (analogous to the concept of bandwidth), the availability of immediate feedback (i.e., whether the medium offers delayed interaction or full interruptibility), message personalization (whether messages can be tailored to a specific individual versus a large audience), and natural language or language variety (formal versus conversational language). CMC, particularly electronic mail, has been incorporated into the model as a relatively lean medium (e.g., Daft, Lengel, & Trevino, 1987).

Media richness theory draws on a straightforward definition of equivocality as the number of possible interpretations one can make, but then takes a turn of particular relevance to those interested in the relational aspects of on-line communication. Emotionally arousing, personally involving tasks are conceptualized as having high equivocality and thus are seen as more appropriate for richer media (Daft & Lengel, 1984; Dennis & Kinney, 1998). This implies that relatively lean media, such as text-based messaging systems, should not lend themselves to efficient communication of emotionally complex matters. And this, of course, suggests that lean media should be poor carriers of interpersonal communication.

Empirical tests of this framework have yielded inconsistent results. When projective methods have been used, findings have generally been supportive. These methods typically involve asking respondents to indicate which media they would most likely choose, from FTF through e-mail, for each of several kinds of communication episodes that vary in equivocality (see, e.g., Rice, 1993). These studies indicate, for example, that managers who make optimal matches between equivocality and medium tend to be rated more successful in their organizations than those who make less sensitive matches (Daft et al., 1987). Results from observational and experimental studies have not been as supportive. These studies demonstrate that people often make very effective use of lean media to accomplish highly equivocal tasks (e.g., Dennis & Kinney, 1998; Fulk, Schmitz, & Steinfield, 1990; Markus, 1994a).

The discrepancy between projective and observational results is testimony to the fact that actual media choices often do not match normative expectations. One reason for this is that media choices in the real world are not always made on the basis of optimal efficiency. Even if a FTF meeting would be most efficient, such meetings cannot always be held on the spur of the moment; we walk down the hall to pay someone a visit but find the office empty, and telephone calls go unanswered, leaving e-mail, perhaps the last choice, as the first among unequals. This is not to say that CMC is a preferred medium, the easiest, or the most efficient. It is likely, however, that an asynchronous medium wins the day when synchronous choices are not available (see Bozeman, 1996). How, then, does a lean medium overcome its restrictions? Although this suggestion has not appeared in the literature to date, the answer may be found in a
root proposition of the theory: We must work less efficiently—communicate more effortfully, or at least more iteratively—to achieve the same relative effectiveness that FtF or other rich media afford with less difficulty.

In this respect, Korzenny's (1978) theory of electronic propinquity, which also predates the Internet, offers a different perspective: The fewer one's choices of media, the more psychological closeness one may experience, even through low-bandwidth channels. Korzenny does not state whether this phenomenon should result from perceptual or behavioral processes. That is, does a low-bandwidth medium merely seem richer when alternatives are limited? Or, if forced to rely on the structurally least expressive of media choices, does a user accommodate and expand the otherwise limited range of the medium through greater effort, greater application of communication skills, and the reduction of formality? Such a process would go far in explaining how lean media can be used for the effective performance of interpersonally demanding tasks. Unfortunately, the sole empirical test of electronic propinquity theory failed to support the framework (Korzenny & Bauer, 1981), although the experimental protocols may have been problematic. The theory has received less subsequent attention than it probably deserves, and new experimentation is currently under way.

Closer inspection of the core definitions and propositions of media richness theory illuminates other problems as well. It is apparent that the relationships among the four characteristics of media richness have never been specified with any level of precision. It is not clear how or whether changes in cue multiplicity, immediacy of feedback, message personalization, and linguistic form might be related to one another. Although the theory appears to assume that all four move in unison as we examine one medium or another, obvious exceptions abound (Markus, 1994a). E-mail, for example, offers little immediate feedback but many opportunities for personalized language. Moreover, communicative efficiency may rest on sequences or combinations of media rather than on isolated choices about a single medium. It may be more efficient, for example, to raise discussion of a difficult, emotionally charged topic in e-mail in advance of a FtF conversation than to raise the topic out of the blue in conversation. People may make suboptimal media choices as part of larger strategies to optimize overall series of exchanges.

Despite media richness theory's problems, it is also apparent that the research to date has not directly tested the underlying claim of the theory. The fundamental claim is that if users select richer media for equivocal messages, then their efficiency will be greater. Researchers who have asked respondents what they might use or have assigned users to tasks and media in order to assess perceptions or effectiveness have not addressed that proposition. This is equivalent to refuting the lawlike proposition that greater fuel efficiency and reduced fatalities result when motorists drive at 55 rather than 65 miles per hour by arguing that many drivers don't think so and that many good drivers exceed 55 miles per hour. The basic proposition remains untested.

Examination of media selection in interpersonal contexts makes it clear that media selection also depends on situational and relational goals of the participants. Thus Kayany, Wotring, and Forrest (1996) found that e-mail and phone were preferred to FtF communication in relationally competitive situations as well as in situations in which the communicators wished to regulate the extent to which they imposed on each other. Moreover, in relationally complementary settings, e-mail and phone were advantageous because they reduced the amount of pressure placed on the other party, conveyed deference, and were thought to maintain goodwill. O'Sullivan (2000) explored how the presence of potential face threats to the sender or receiver in an
interpersonal encounter might affect media choice. His initial assumptions were consistent with media richness theory; namely, that electronic media with fewer cues and less temporally immediate interaction would create less emotional impact than FtF speech. However, he turned one of the implicit assumptions of media richness theory on its head by drawing on other lines of research to argue that people do not always seek unambiguous or unequivocal communication (e.g., Bavelas, Black, Chovil, & Mullett, 1990). Subjects were presented with scenarios in which they were called upon to communicate in a way that would bolster or threaten either their own egos or their partners' egos. They were then instructed to choose between FtF interaction and one of several “partial-cue” media (e-mail, telephone, answering machine, or letter). Results confirmed that subjects preferred partial-cue media over FtF when a preferred impression was threatened, and especially when the impression at stake was the subject's rather than the partner's. These results lend credence to Markus's (1994b) speculation that different aspects of different media may promote secrecy, privacy, hostility, or openness, depending on their application by users. Such applications would not be apparent either from a unitary media richness hierarchy or from conceptualizations of choice in which the sole focus is the reduction of equivocality.

Cues Filtered in

The social information processing (SIP) theory of CMC interaction (Walther, 1992) departs from the theories discussed above by explicitly rejecting the view that the absence of nonverbal cues restricts communicators' capability to exchange individuating information. It assumes instead that communicators are just as motivated to reduce interpersonal uncertainty, form impressions, and develop affinity in on-line settings as they are in other settings. When denied the nonverbal cues available in FtF interaction, communicators substitute the expression of impression-bearing and relational messages into the cues available through the CMC. Thus SIP theory posits that communicators exchange social information through the content, style, and timing of verbal messages on-line. The rate of information exchange is slower on-line, not only because both instrumental and relational information must be conveyed in a limited bandwidth, but because typing and reading are slower than speaking, looking, and listening. Time therefore becomes the critical predictive variable. When time limits are imposed in CMC, interaction should not go beyond impersonal and task-oriented behavior. When interaction time is not restricted, people in on-line settings should ultimately reach, although more slowly, levels of impression and relational development similar to what they would reach in FtF settings.

Support for SIP theory has been obtained in several settings. One was a test of impression development in which comparisons were made between CMC and FtF groups that met over a period of 6 weeks to discuss three decision-making tasks (Walther, 1993). The CMC groups used asynchronous computer conferencing at times of their own choosing, and the FtF groups met once every 2 weeks for 2 hours. Participants completed measures assessing their willingness to rate group members on a number of attributes after each task was completed. Repeated measures analyses supported SIP predictions by indicating that FtF participants formed more fully developed impressions sooner than CMC participants, but the impressions of CMC participants continued to develop over time until the end of the 6-week study period, at which point they were not significantly different from those of the FtF participants.

Walther and Burgoon (1992) used similar procedures in a more extensive study of relational communication (see Burgoon & Hale, 1984, 1987). It was predicted that immediacy,
composure, receptivity, and social orientation would initially be greater in FtF settings, but that over time, relational communication levels in CMC would increase and converge with those in FtF settings. These predictions were partially supported, although not all of the relational levels differed after only the first task. Moreover, although both CMC and FtF communication became more socially oriented over time as predicted, social orientation was greater in CMC than in FtF settings across all time points, in stark contrast to the earlier cues filtered out findings about task-oriented CMC. In an earlier study, Rice and Love (1987) also found relatively high levels of socioemotional content in a longitudinal examination of electronic bulletin board use, but did not find an expected increase over time in this behavior.

Additional support for social information processing theory emerged from a meta-analysis of previous research in CMC (Walther et al., 1994). Comparisons were made between previous studies in which time limits were placed on groups, and experiments with no deliberate time limits as well as field studies with cross-sectional data on socioemotional tone in CMC. The comparisons demonstrated a significant effect for time limitation. Studies in which there were no time limits found significantly more positive socioemotional communication than did studies in which interaction was cut off at any point.

These results all suggest that people who communicate using computers must either place greater weight on the cues that remain in text-based CMC or use alternative cues as substitutes for those they would typically use in FtF interaction. The first possibility directs attention to the fact that text-based communication systems still carry at least one nonverbal code, chronemics: the nonverbal cue system regarding “how we perceive, structure, and react to time and . . . the messages we interpret from such usage” (Burgoon & Saine, 1978, p. 99). E-mail users, for example, regularly attend to the time stamps that are automatically placed on their messages (Rice, 1990). Time stamps allow e-mail users to determine when the messages they receive were sent and how much time passed before one of their messages received a response. Walther and Tidwell (1995) hypothesized that these cues are potent enough to affect judgments of affection and dominance. They tested this hypothesis by varying the time stamps on two pairs of apparent e-mail message transcripts. One pair was socially oriented (gossip and plans to visit), and the other pair was a task-oriented request. The time stamps were manipulated to vary the time of day (night versus day) the first message was sent and the time it took for the receiver of that message to respond (immediate versus one day later). As predicted, chronemic codes had a significant impact on subjects’ interpretations of senders’ dominance and affection. Nighttime, task-oriented messages were rated the most dominant and the lowest in relational equality compared with daytime task requests. Social messages sent in the day signaled less equality and more dominance than did those sent at night. The amount of affection subjects ascribed to messages resulted from a complex interaction of the time a message was sent, its content, and the promptness with which it received a reply. The messages that were rated most affectionate were those that replied quickly to a task message sent during the day; those that gave a prompt response to a nighttime task message were rated least affectionate. A slow reply to either day or night task messages signaled moderate affection. As for social messages, more affection was perceived in a slower reply to a daytime message than in a fast reply, but a fast reply at night showed more affection than a slow one.

Other studies have focused on the cue systems that are unique to CMC. Chief among these are “emoticons” (graphical smiles, frowns, and other facial expression simulations created with various keyboard symbols) and “scripts” (preprogrammed texts that
narrate nonverbal actions among players). Utz (2000), for example, found that players of a German MUD not only used more emoticons and scripts as they became more experienced, they also believed that they were becoming more skillful at conveying relational and emotional messages using these cues. Utz also found that the use of such cues was a significant predictor of relationship development in MUDs, accounting for 14% of the variance in users' frequency of friendly or romantic relationships online.

Although there is no shortage of speculation about the role of emoticons (e.g., Godin, 1993; Rezabek & Cochenour, 1998), only a few researchers have made systematic attempts to understand exactly how these symbols function in on-line discourse. Instead, researchers have focused on who uses them, examining gender differences (Witmer & Katzman, 1997), regional influences (Rezabek & Cochenour, 1998), and how their usage diffuses in mixed-gender on-line groups (Wolf, 2000).

The two studies that have examined the communicative functions of emoticons have yielded engaging, if somewhat inconsistent, results. Thompson and Foulger (1996) found that the impact of a positive emoticon (presumably a happy face) varied with the perceived hostility of the accompanying verbal message. Whereas the emoticon diminished the perceived hostility of a message showing "tension," it increased the perceived hostility of more antagonistic verbiage. Walther and D'Addario (2001) conducted a controlled experiment in which familiar emoticons depicting a smiling face, a winking and smiling face, and a frowning face were inserted in simulated e-mail messages that contained either positive or negative evaluations about a college course. Based on the messages, subjects evaluated their own attitudes toward the course in question as well as the affective states of the supposed message senders. Although the subjects were familiar with the emoticons and interpreted them as intended, the impacts of the emoticons were extremely limited. The smiling face emoticons had no effect on message interpretation. The frown emoticons, on the other hand, attenuated positive verbal messages, but failed to affect subjects' interpretations of negative verbal messages. These findings suggest that emoticons, by themselves, have only limited effects on the interpretation of verbal messages. However, it could be that emoticons help the writer more than the reader. Generating an emoticon may act "as a self-signaling cue, prompting the writer to write in such a way that is as expressive as s/he intends" (Walther & D'Addario, 2001, p. 343). Just as speakers sometimes use gestures to help them construct verbal messages in FtF settings (Freedman, 1977), individuals using CMC may employ emoticons to prompt the construction of other affective messages.

Researchers are only now beginning to move beyond analysis of isolated cues to consider the relative availability of higher-order information-seeking strategies in CMC and FtF. Studies of initial interactions in FtF settings have identified several distinct types and subtypes of information-seeking strategies (Berger, 1979; Berger, Gardner, Parks, Schulman, & Miller, 1976). Tidwell and Walther (2002) argue that, unlike FtF settings, on-line systems offer individuals only limited opportunities to observe others unobtrusively or to gain information about them indirectly (e.g., by questioning third parties). Although group-based CMC and MUDs with textually represented rooms and objects may offer some opportunities for observational strategies (Ramirez, Walther, Burgoon, & Sunnafrank, 2002), e-mail and dyadic computer chat offer little other than interactive strategies.

Tidwell and Walther (2002) further argue that if CMC users do indeed adapt available cues to perform interpersonal functions, then they would rely on interactive strategies to a greater extent in CMC than in FtF settings. They tested this hypothesis by examining the information-seeking strategies employed by CMC and FtF dyads engaged in
either acquaintance or decision-making tasks. Their results support the adaptation contention. CMC users employed a greater proportion of self-disclosures and questions than did FtF partners. Additionally, the personal questions employed by CMC users showed greater depth than those used by their FtF counterparts, with FtF partners employing proportionally more superficial interrogations and CMC partners using more intermediate ones. Moreover, the correspondence between the frequency of these interactive strategies and partners' ratings of one another's communication effectiveness was significantly more positive in CMC than in FtF communication. Thus, consistent with SIP theory, it appears that whereas FtF partners draw on numerous visual, auditory, and verbal cues at their disposal, CMC users readily avail themselves of the remaining strategies for effective interpersonal information acquisition.

Anticipation: A Solution and a Problem

Although the studies to date generally support most aspects of SIP theory, at least one finding has created both a refinement as well as a question about the theory's integrity. As we have noted, Walther and Burgoon (1992) discovered that people in initial interactions in CMC settings were rated no less positively along some relational dimensions than were people in initial interactions in FtF settings. This finding was inconsistent with the SIP prediction that initial CMC interactions should be less personal than initial FtF interactions. In an effort to explain the inconsistency, Walther (1994) proposed that members of the CMC group might have had heightened anticipation concerning future interaction. We know, for instance, that anticipating future interaction prompts greater exchange of personal information, greater perceived similarity, and more friendliness (for a review, see Kellermann & Reynolds, 1990). We know also that the groups in the initial study were aware that they would be interacting on several occasions in the future.

On this basis, Walther (1994) formed CMC and FtF experimental groups in which medium (CMC versus FtF) was crossed with anticipation of future interaction. Half the groups were told they would be working together on multiple projects over a period of time, and the other half were told they would work together only once. At the end of the first period, analyses confirmed that anticipation prompted more positive relational communication. Indeed, when the effect of anticipated future interaction was factored out, communication medium itself did not predict relational immediacy, similarity, trust, or composure. Results also revealed that anticipation had greater effects among the CMC groups than among the FtF groups. That is, anticipating future interaction had a large effect across media, but it had a particularly large effect on CMC. These findings may account for the positive initial ratings in CMC groups in Walther and Burgoon's (1992) study, particularly given the fact that these groups were well aware that they would be working together over an extended sequence of projects. This dynamic may also account for Rice and Love's (1987) finding that socioemotional content in an ongoing electronic bulletin board discussion was high but did not grow higher over time; the participants may have assumed their communication would be ongoing.

Although the anticipation factor clarifies some aspects of the conflicting results found in research on SIP, it points to at least two theoretical challenges, one that has been addressed and one that has not. First, social information processing theory did not originally consider variations in the motivation to reduce uncertainty across different types of media. Anticipation has been acknowledged as one such factor, as have general expectations about CMC's relational potency: As Utz (2000) has found, people who are skeptical about the relational potential of CMC are less likely to report
that they have formed relationships on-line. Utz's results may indicate little more than a self-fulfilling prophecy, but they also suggest that general expectations for the medium could influence motivations to seek information and to develop relationships using CMC.

The second issue concerns precisely what kind of catalyst anticipated future interaction provides, in CMC as well as FTF settings. One possibility is that anticipation stimulates greater amounts of information exchange (as seen in Calabrese, 1975; Cline & Musolf, 1985). Alternatively (or simultaneously), anticipation may stimulate heuristic processing and positively bias interpretations of information (as seen in Berger & Douglas, 1981). The net effect of either dynamic can be more favorable impressions and relational communication, obscuring which underlying process is functioning. At a practical level, it matters little how anticipation operates. At a theoretical level, however, this paradox raises questions about the fundamental assumptions of both SIP theory and reformulations of uncertainty reduction theory (Berger, 1979; Berger & Bradac, 1982). Both theories assume that a relatively straightforward and linear accretion of social information leads to impression formation and relational development. A qualitative shift in interpersonal evaluations, although very plausible from other perspectives, is not consistent with these theories' specifications.

Cues About Us, Not You or Me

Social identity/deindividuation (SIDE) theory is another theory founded on the assumption that CMC's lack of nonverbal cues filters out interpersonal and individual identity information (Lea & Spears, 1992; Spears & Lea, 1992). However, in contrast to previous theories, SIDE theory focuses on the effects of contextual cues and cues that indicate the common social categories of CMC group members. Communicating without nonverbal information, and in physical isolation, promotes greater group identification and self-categorization in line with social identity. For instance, individuals' participation in particular groups—such as Usenet newsgroups on specific topics, corporate e-mail lists, or social psychology experiments among college students—provides others with clues about them based on the nature of those groups. According to SIDE theory, people use such clues about collectives as a basis for relating. They interpret the content of others' messages not as individuating characteristics, but as signals creating or reinforcing group norms (Lea, O'Shea, Fung, & Spears, 1992). Rather than temper their impressions and relations on the basis of so little information, CMC users overinterpret the information they have. When context makes group identity salient, CMC users overattribute similarity and common norms, resulting in social attraction to the group and thereby its members.

This positive group bias is nullified when users relate on the basis of individual instead of social identities. Individuating information may result in a broader range of partner evaluations or stimulate attributions of dissimilarity and negative evaluations. A recent study offers a good example of SIDE theory's approach and utility. Lea, Spears, and de Groot (2001) formed groups with students in two countries who communicated via CMC. Some groups used text-based messaging alone and were visually anonymous, whereas others augmented their interaction with videoconferencing, providing physical appearance and nonverbal cues, and were thus identifiable as individuals. Not only were members of the visually anonymous groups more attracted to the group at the distal outcome level, but results also supported SIDE theory's predictions about the underlying processes involved. Analyses revealed that the text-only users developed greater group-based self-categorizations, which structural equation modeling showed to affect group attraction; group
attraction was also indirectly affected through increased stereotyping of out-group members. Interestingly, group identification overcame the prospective in-group/out-group influence of nationality, which had no effect on member evaluations.

SIDE theory has accumulated an impressive body of empirical support for its central claims and has extended its domain into gender categories, differences in power and status, and intergroup perceptions and behavior. Its originators acknowledge that more work is needed on the strategic, as opposed to the interpretive, components of the theory; work to date has generally focused on perceptual outcomes rather than on direct assessment of message behavior, although some progress has been made on the latter front (e.g., Postmes, Spears, & Lea, 2000). As our discussion here must be somewhat abbreviated, we are glad to note that several extensive reviews cover this work in depth (e.g., Postmes, Spears, & Lea, 1998; Postmes, Spears, Lea, & Reicher, 2000).

Although SIDE theory offers a powerful lens through which to view certain CMC relationships, its application to interpersonal relations (in the sense of dyadic or close personal relationships) is less clear. The implication that all on-line interaction stays fixed at the social or group level, never reaching the personal level, is particularly troubling. Almost all of the studies supporting SIDE theory have experimentally manipulated group identity or created contexts in which group identities were especially likely to be salient. This is a reasonable experimental approach, but the generalizability of the findings to a wide range of naturally occurring CMC relationships is unclear. For example, although SIDE theory may explain initial attraction between two users who meet in a topical Usenet group, it is somewhat more difficult to imagine its application when those users move to private e-mail as they pursue dyadic friendship or romance (e.g., Parks & Floyd, 1996). In spite of conceptual efforts to apply SIDE theory to on-line romantic relationships (Lea & Spears, 1995), the theory dictates that all CMC use in which communicators are visually anonymous and geotemporally dispersed must focus on a group level of identification. It clearly differentiates between interpersonal cues and social cues, precluding the former and promoting the latter in its account of on-line attraction.

Individualizing information that might personalize impressions has no role in SIDE theory, except, perhaps, to conform to a possible local norm of personal information sharing (see Walther, 1997). Indeed, according to the theory, interpersonal information should undermine the group-based categorizations upon which attraction is predicated. The implications of these issues for relationships other than groups’ have yet to be addressed by SIDE theory (see Walther, Slovacek, & Tidwell, 2001).

Cues Bent and Twisted

Reports of surprisingly close friendships, rapidly escalating romances, and inexplicably cohesive groups forming on-line cropped up with increasing frequency as Internet use exploded during the 1990s. It was clear that in many cases people were achieving levels of sociality and intimacy in on-line settings that they would never have achieved as rapidly, if at all, in comparable FtF settings. It was also clear that existing theoretical approaches to CMC could not account for these phenomena. In an effort to explain these observations, Walther (1996) pointed to four sets of effects operating in many on-line settings. These sender, receiver, channel, and feedback effects may create “hyperpersonal communication” that goes beyond the interpersonal levels typically achieved in FtF associations.

Receiver and source effects flow from the roles individuals play in the communication process. Although there are individual differences, these effects generally are created when receivers initially engage in stereotypically positive and idealized attributions of on-line
partners. Receivers may overgeneralize based on a common group identity (as in SIDE theory), but they may also make such positive attributions because of anticipated future interaction or because they are deliberately seeking new relational partners (Roberts, Smith, & Pollock, 1996; Walther, 1997). For their part, senders regularly exploit CMC’s absence of nonverbal cues for the purpose of selective self-presentation. CMC users may take advantage of their greater control over message construction to craft messages to reflect preferred characteristics, and they may time self-revelations in order to serve developing relational goals.

The *channel* itself facilitates goal-enhancing messages by allowing sources far greater control over message construction than is available in FtF settings. A CMC user may pause to review and edit during the initial construction of a message and may take advantage of an asynchronous channel to buy time to consider responses. Asynchronous channels also allow users to interject social comments more easily in task-oriented settings, as there is no shortage of time for both dimensions when partners communicate in temporal independence. Moreover, sources are freed from a number of distractions while using CMC and are thus able to concentrate on managing their self-presents. They need not attend to ambient environmental stimuli, to multiple simultaneous cues from their partners, or to their own physical back-channeling.

Finally, hyperpersonal *feedback* effects may create self-fulfilling prophesies among senders and receivers. As idealizing receivers in turn send selective messages, behavioral confirmation processes may be cued (Snyder, Tanke, & Berscheid, 1977) wherein partners rather easily come to behave in ways that meet their partners’ exaggerated interpersonal expectations.

Positive hyperpersonal effects have received the greatest attention, but “hypernegative” effects are possible as well. When coupled with time restrictions and no expectation of future interaction, the relatively effortful nature of CMC may trigger overly negative interpretations on the part of receivers, ill regard and hostile message construction by sources, failure to use the channel’s positive capabilities, and amplifying cycles of disaffiliation (Walther et al., 2001).

The overall hyperpersonal model has been tested in two studies involving students on different sides of the Atlantic. E-mail was used for international communication, although group members local to one another had FtF conversations occasionally. In the first study, student groups were prompted to develop either a group or individual identity and given the expectation that they would have either short- or long-term interaction (Walther, 1997). Surveys conducted at the end of the students’ projects revealed a number of interaction effects that supported the hyperpersonal model. Long-term, group-identity partners rated their CMC-only partners as higher in affectionate communication and as more socially and physically attractive (despite never seeing them) than those in the short-term, group-identity condition. Individual-identity groups scored in the middle range, presumably because they were less sensitive to the cognitive biases suggested by SIDE theory. Moreover, the groups’ self-reported ratings of their efforts on their projects coincided with their relational patterns, suggesting a social facilitation of work by relational states. Ratings of FtF partners, on the other hand, showed no influence of these manipulations.

Several additional aspects of the hyperpersonal framework were addressed in a second study involving international student groups using CMC (Walther et al., 2001). Two factors were manipulated: previous interaction (zero history versus semester-long contact) and visual information (photo versus no photo). As predicted from a social presence approach, providing participants photographs of one another over the Internet tempered negative effects in zero-history, no-future groups.
Conversely, in line with the hyperpersonal perspective, providing photographs dampened positive affect in the long-term, hyperpersonal condition. Long-term groups who saw photographs reported less attraction than did those who communicated without seeing photographs. Across all conditions, short-term, no-photo groups related least positively, as predicted, and the long-term, no-photo groups were most positive, with both of the photo-showing conditions in the middle ranges. Additional analyses indicated that participants generally felt more successful in their self-presentations when they did not have photographs showing. Post hoc analysis further revealed that when no pictures were shown, greater familiarity was associated with more affection, and that subjects’ perceived success at self-presentation predicted how physically attractive they were judged to have been. With actual physical appearance through photos, however, self-presentation was negatively associated with physical attractiveness, suggesting (among other conclusions) that attempts to impress may backfire when physical appearance gets in the way of selective self-presentation. Ultimately, it appears that when virtual partners are given the time and opportunity, and conditions facilitate their getting to know one another, they appear to do so selectively and, ultimately, more positively using CMC and CMC alone.

The hyperpersonal model has been used as an explanatory framework for findings across several different domains. In person perception research, for example, Hancock and Dunham (2001) found that CMC partners evaluated their partners more extremely, albeit on fewer criteria, than did FtF counterparts. Hyperpersonal predictions have been utilized in studies of on-line social support (Turner, Grube, & Meyers, 2001), on-line education (Chester & Gwynne, 1998), and relationship development in on-line settings (Parks & Floyd, 1996; Parks & Roberts, 1998; Wildermuth, 2000).

Perhaps the greatest appeal of the hyperpersonal model is that it accounts for behavior in computer-mediated settings in terms of variations among familiar communication components—the sender, receiver, channel, and feedback. Its utility has been demonstrated across a variety of relational contexts in CMC. Yet the model is open to significant criticism as well. It is not at all clear whether there are any necessary theoretical linkages among and between the four major components and the more detailed processes that the model specifies. In other words, its constructs and propositions are poorly interrelated, and its status as a robust theory is therefore tenuous. The danger of this, as with any theory, is that it is difficult to reconcile either supportive or inconsistent empirical results with the overall model, or to identify which aspect of the model may have been supported or disconfirmed. Furthermore, as the model now offers both hyperpersonal and hyphenegative outcomes and assumptions that users adapt the media to their relational goals, it will be important for researchers to stimulate, specify, or discover the relational goals CMC users bring to their interactions, without which the model may become unnecessarily teleological. Even so, the hyperpersonal approach offers an agenda worth pursuing, not only because of its promise for increasing our understanding of relational processes in a variety of CMC settings, but also for its practical implications for the management of on-line education and virtual work teams.

INTERPERSONAL PROCESSES IN COMPUTER-MEDIATED COMMUNICATION

In this section we consider the role CMC may play in larger interpersonal contexts and processes. Our focus shifts from research on the availability of cues and the structure of messages to research on several broader social uses to which those cues and messages are put in the domains of the social basis of mental