



Review

The role of emotion in computer-mediated communication: A review

Daantje Derks ^{a,*}, Agneta H. Fischer ^b, Arjan E.R. Bos ^c

^a *Open University of the Netherlands, Faculty of Psychology, P.O. Box 2960, 6401 DL Heerlen, The Netherlands*

^b *University of Amsterdam, Roeterstraat 15, 1018 WB Amsterdam, The Netherlands*

^c *Erasmus University Amsterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands*

Abstract

It has been argued that the communication of emotions is more difficult in computer-mediated communication (CMC) than in face-to-face (F2F) communication. The aim of this paper is to review the empirical evidence in order to gain insight in whether emotions are communicated differently in these different modes of communication. We review two types of studies: (1) studies that explicitly examine discrete emotions and emotion expressions, and (2) studies that examine emotions more implicitly, namely as self-disclosure or emotional styles. Our conclusion is that there is no indication that CMC is a less emotional or less personally involving medium than F2F. On the contrary, emotional communication online and offline is surprisingly similar, and if differences are found they show more frequent and explicit emotion communication in CMC than in F2F.

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* Corresponding author. Tel.: +31 6 51 006727.

E-mail address: Daantjederks@gmail.com (D. Derks).

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1. Introduction

In the last decade, we are witnessing an enormous increase in computer-mediated communication (CMC). CMC includes a variety of electronic message systems and electronic conference systems, which can be supplemented by audio and video links. CMC can be synchronous (e.g., chat) or asynchronous (e.g., email), and the messages are predominantly typewritten (Adrianson, 2001). More and more interactions take place via e-mail and chat, privately as well as professionally. Especially e-mail dominates the office hours of many workers, and makes parts of the work more efficient. In addition, email and chat services also help us to maintain our relationships with friends and colleagues in different locations. When one meets someone interesting in a bar, for example, it is almost as common to exchange e-mail addresses and chat accounts as to exchange phone numbers. Another indication of the increasing use of CMC is the huge success of Internet dating, which makes it possible to get in contact with potential partners, whom you would never have met in daily life. In other words, for most people today it is hard to imagine themselves without a computer and without access to the Internet.

Because computer-based communication has become so common in our daily lives, this raises the question of how different online communication is from face-to-face communication. Do we chat in the same way via computers as in live interactions? Are our conversations shorter, more formal, less intimate in CMC? Do we use different language or different language styles, and do we choose other conversation topics? These questions are not new and have led to passionate debates in the past, where some authors claimed that CMC is a cold and impersonal medium, where emotions are very difficult to express (e.g., Culnan & Markus, 1987; Rice & Love, 1987; Sproull & Kiesler, 1986), whereas others have stated that the differences between CMC and F2F are not that large and even dissolve over time (e.g., Walther, 1992; Walther & Burgoon, 1992; Walther, Anderson, & Park, 1994).

The focus of the present paper is on the heart of this assumed difference, namely on the communication of emotions in CMC and F2F. Although there is an increasing number of studies comparing style and content in the two modes of communication, the role of emotions in these communication patterns is still underexposed (for an exception see Manstead, Lea, & Goh, *in press*) and needs more explicit discussion. This paper aims to fill this gap and reviews research in face-to-face (F2F) and computer-mediated communication (CMC) with respect to emotion communication. We restrict ourselves here to text-based CMC, as this is still the most common type of CMC and because the difference with actual F2F is assumed to be largest.

We define emotion communication as the recognition, expression and sharing of emotions or moods between two or more individuals. We include both explicit and implicit emotion communication, both for practical and theoretical reasons. The range of studies

for this review would become too narrow if we would restrict ourselves to only explicit emotion communication, but we also believe that both types of communication are essential to examine the emotional content and quality of interactions. Explicit communication involves references to discrete emotions, through verbal emotion labels (I am angry), appraisals (this is scary), expressions and tendencies to act (I would like to hit you) or emblems (☹). Implicit emotion communication includes the emotional style of the message, as can be inferred from the degree of personal involvement, self-disclosure, language use, etc.

When comparing the way in which emotions are communicated in CMC and F2F, it is crucial to consider contextual differences in these two communication modes. The most important feature that distinguishes both mediums (see also McKenna & Bargh, 2000) and that is relevant for studying the role of emotions is its different *sociality* or social presence (Short, Williams, & Christie, 1976). Manstead et al. (in press) propose two dimensions of sociality: the physical and the social dimension. The physical dimension refers to the sense of being physically located somewhere, and thus physical co-presence refers to actually being together with someone at the same place. The physical dimension of sociality particularly implies the relative absence of *bodily contact* and of *visibility*, and thus of non-verbal cues in text-based CMC. The role of bodily contact is important for the expression of emotions, both positive (touching, embracing) and negative (hitting). However, there is no research to date that has systematically studied the consequences of this aspect in emotion communication, and therefore we will largely ignore the role of bodily contact in this review. This does not imply that we judge it is as unimportant, though, and we think research in this area should be encouraged. Reduced visibility, which is characteristic for most CMC, except for videoconferencing, and chatting with the use of webcams, may have especially consequences for the decoding or recognition of others' emotions, because we cannot make use of these cues in order to interpret incoming messages. In addition, this feature may also have consequences for the expression of one's own emotions towards others, because the consequences of one's emotion expressions on others are less visible as well.

The social dimension actually is less clearly defined. It generally refers to the extent to which the presence of the other person is salient. This may refer to the fact that one is less aware of the other person, basically because of the reduced visibility. In email exchanges for example, one generally knows one's interaction partners, but their presence is less salient. It may also refer to whether one knows the other person, or not, as is the case in the majority of support lists, or discussion groups. These two meanings both refer to the relative anonymity of the situation, as this increases when one does not know the other person and when one is also less aware of his or her presence. Still another connotation of reduced social presence is its relation with the salience of social norms. According to some authors (e.g., Daft & Lengel, 1986; Short et al., 1976) CMC is characterized by the relative absence of social norms, or social control. On the other hand, researchers embracing a social identity framework, like the Social Identity of Deindividuation Effects (SIDE) model (Lea & Spears, 1991; Lea, O'Shea, Fung, & Spears, 1992; Reicher, Spears, & Postmes, 1995; Spears & Lea, 1992, 1994), have emphasized the social nature of CMC. They have shown that although text-based CMC may filter out many social cues, some of the most important cues, namely those relating to social category membership, often seep through (Spears, Lea, Corneliusen, Postmes, & Ter Haar, 2002). This would imply that reduced social presence makes social norms more rather than less salient in CMC compared to F2F interactions.

These two differences in the salience of social presence and visibility between CMC and F2F are the most important contextual factors in our model (see Fig. 1). It should be noted though, that these features often co-occur, as reduced visibility generally results in reduced social presence. We should also keep in mind that they are highly interrelated with other contextual features that are probably as important for the way in which emotions are communicated, such as the goal and nature of the interaction (formal, informal, task or social oriented, etc.).

We assume that social presence and visibility may influence three distinct aspects of emotion communication—including both explicit and implicit types of communication—namely the overall content and style of the message (emotions as an implicit or explicit topic of conversation), the expression and the recognition of discrete emotions. Because there is little research on this latter aspect (how well emotions are recognized on the basis of texts), we will mainly focus on the first two aspects of emotion communication. We assume that social presence has a similar impact in both channels, such that both aspects of the communication depend on the relationship with and the relative anonymity of the interaction partner. Because social presence is less salient in many cases of CMC, however, it may be easier to express negative emotions towards others because one does not know the other, or because one is less aware of the social effects of one's own expressions. Further, we assume that reduced visibility of emotions strengthens emotional style and content, and makes it easier to express emotions, especially when individuals find it difficult to express them in real life. It may be more difficult to recognize emotions with reduced visibility, however, especially when they are not very intense. Yet, the more explicit nature of text-based emotion displays may make up for this difficulty.

In order to compare emotion communication in these different channels, we review the empirical evidence by comparing research on emotions in F2F and CMC contexts according to the model sketched above (see Fig. 1). We start with the more general issue whether people talk about their emotions in CMC, and then review evidence on the expression and recognition of emotions in both channels. We also address the issue of reduced social presence and visibility in CMC and its consequences for emotion communication.

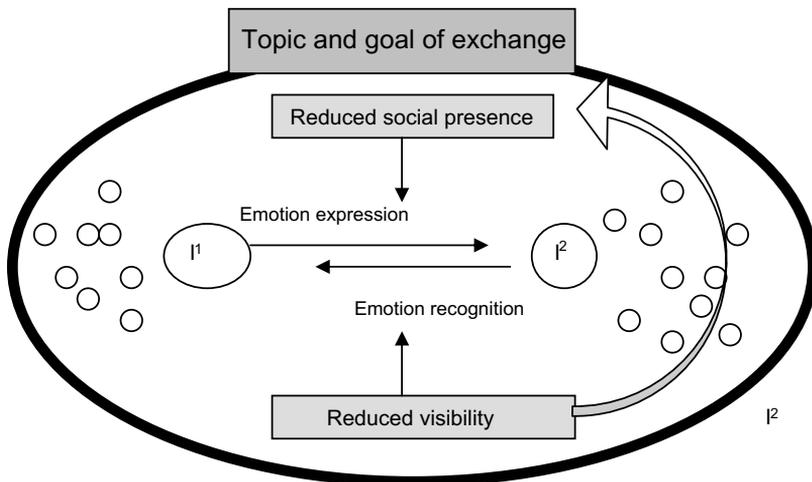


Fig. 1. Model of emotion communication in CMC.

2. Method

In order to review the field of emotion communication in CMC, electronic searches were conducted, supplemented by publications collected through the professional network. The databases included were PsychInfo, Medline and web based databases like Google Scholar. The search was restricted to English-language papers, which were published from 1990 some classic studies excepted. The key terms used in the search were quite diverse because the single terms on emotional communication online were not sufficient to collect all relevant studies. Moreover, the expression of emotion in online settings is a relatively new research field, and the studies that directly compare emotional expression in F2F communication and CMC are relatively few. Therefore we had to extend our scope to studies focusing on implicit emotion communication in CMC, and to studies that focus on emotion communication in F2F settings. The key terms used were: emoticons, flaming, uninhibited behavior, anonymity, and emotion and mood in combination with CMC, F2F, social sharing, Internet, online, self-disclosure, anonymity, gender differences, display rules, mimicry and anonymity.

We included studies that (1) handled the subject of emotion, either explicit or implicit, (2) had a social interaction setting, preferably a focus on dyad communication (romantic relationships were excluded), and (3) were identifiable as social psychological and behavioral in nature. Papers with opposing views and conflicting data were all included.

3. Emotion talk

Individuals have the need to talk about and reflect on their emotional experiences. This phenomenon is referred to as social sharing. The urge to share an emotional experience by talking about it is a very general manifestation. It is elicited as soon as an emotion is experienced, whatever the type of emotion (shame being an exception). From studies in F2F, we know that the more intense the emotion felt, the more we are inclined to talk about the event (Christophe & Rimé, 1997; Rimé, 1989. Rimé, Corsini, & Herbette, 2002; Rimé, Mesquita, Philippot, & Boca, 1991). The extent to which we talk about our emotions may differ depending on the sex of the person. For example, social sharing studies conducted by Rimé et al. (1991) have shown that men are much more likely to talk to women (typically their partners) about their feelings, whereas women share their emotions with a wider range of persons, both male and female. This may be due to the fact that women in our society more often occupy roles that require them to be more emotionally expressive, and concerned with their own and others' feeling states than men are (Eagly, 1987; Eagly & Wood, 1991). The expression of positive feeling in particular is believed to be more characteristic of women than of men (Birnbaum, Nosanchuck, & Croll, 1980; Stoppard & Gunn Gruchy, 1993) and this would explain why men in particular seek women as partners with whom they share their intimate feelings.

Once exposed to the social sharing of an emotion, it is very common that receivers in turn share the episode with a third person (Christophe & Rimé, 1997; Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998). Thus, whereas we assume confidence of the persons with whom we share our emotions, they share it with others in most cases (Christophe & Rimé, 1997), and thus the anonymity of the source is not guaranteed at all. Interestingly, the intensity of the event is related to the way in which emotions are shared. Christophe and Rimé (1997) had subjects recall a situation in which someone shared an

emotional episode with them, resembling one from a list of 20 events. The list included low, moderate and high intensity emotional events. They were instructed to briefly describe a similar situation that someone had shared with them and to answer open questions regarding their non-verbal displays, verbal responses and interpersonal gestures. The results showed that when highly intense emotions are shared, listeners reported to talk less, to de-dramatize their response less, and to manifest more non-verbal comforting behaviors. This suggests that actually sharing intense emotions in F2F settings can decrease the physical distance between interactants. Further, the sharing of emotions also has the function to improve interpersonal relationships and social integration. In a meta-analytic review, [Collins and Miller \(1994\)](#) found that people who engage in intimate disclosures tend to be liked more than those who disclose less. Thus, sharing emotions with people other than our intimates is a useful tool to bond and to strengthen social relationships. Additionally, disclosing emotions is seen as healthy and good for one's well-being ([Pennebaker, 1997](#); [Zech, 1999](#)).

To what extent do we talk about emotions to the same extent in CMC as in F2F communication? Can we satisfactorily share our emotions with others in CMC or is this medium simply not suited to talk about such personal things? In the past some authors (e.g., [Rice & Love, 1987](#)) have claimed that the lack of social and non-verbal cues makes it hard, if not impossible to communicate emotions, which would make CMC principally be less emotional and more impersonal than F2F communication. There is, however, not much evidence to support this view and there is an abundance of indirect evidence that suggests the contrary.

One example of indirect evidence is the huge success of MSN (Microsoft Network messenger service), a chat program through which one interacts instantly with peers. This program creates an interface in which one can form a buddy list, consisting of people one regularly chats with. All over the world people are connected to each other. It is an easy way to stay in touch with friends and family abroad but also to meet new people and it clearly requires emotional involvement. One advantage of this way of interacting is that one has the opportunity to try out new personality aspects that one would ideally like to possess. Moreover, it provides opportunities for those who have difficulty verbally expressing themselves in a F2F situation. In CMC they can express themselves without constraints, taking as much time as they want ([McKenna & Bargh, 1999](#)). Other examples are internet dating and support lists. These Internet interactions also require that emotions are shared and talked about. There would be no successful dating without expressing positive emotions and intimacy, and there would be no support for whatever cause without the communication of positive emotions and empathy. In other words, the assumption that CMC can only entail formal and unemotional interactions is not justified on the basis of these observations.

More direct evidence of the possibility to share emotions online in a satisfactory way is based on the results of computer-mediated therapies. Patients who are afraid to seek F2F therapy, because of anxiety or stigmatization, or people with restricted mobility can be reached by these initiatives. One of these computer-mediated therapies is Interapy, the treatment of for example posttraumatic stress through the Internet ([Lange, Van de Ven, Schrieken, & Emmelkamp, 2001](#)). The advantage of Internet-mediated therapy is that therapists can provide feedback via a computer, tailored to their clients' needs ([Lange, Van de Ven, & Schrieken, 2003](#)). Additionally, some people prefer to reveal their innermost thoughts and feelings to a computer-screen than to a real person (e.g., [Miller & Ger-](#)

gen, 1998; Postmes, 1997). The Interapy treatment consists of 10 writing sessions during a period of 5 weeks, and two 45 minute sessions a week on which the therapist gives feedback. The presence of a virtual therapist does not seem to block the success of the treatment. On the contrary, it seems to contribute to the success of the therapy. Lange et al. (2003) found effect sizes that are considerably larger in a sample of non-student clients in Interapy than those found in F2F experiments (Schoutrop, 2000; Smyth, 1998).

The extent to which emotions are shared in CMC may also be derived from studies on self-disclosure. Various studies have examined self-disclosure by looking at language styles in different gender settings in CMC. Savicki (1996) for example, analyzed messages of Internet discussion groups and found that groups dominated by females tend to self-disclose and avoid or attempt to reduce tension, whereas discussion groups dominated by men, tend to use more impersonal, fact-oriented language. This suggests that women are more emotionally expressive than men, at least in same-sex groups, and with regard to positive emotions. Indeed, Savicki and Kelley (2000) found that women in female-only groups had a more emotional style because of their frequent and explicit self-disclosure, the use of “I” statements and by directly addressing their messages to other group members. On the other hand, men in male-only groups ignored these socio-emotional aspects of group functioning, and they were also less satisfied with the CMC experience. Mixed gender groups fell between these two groups and equally reflected both communication styles (Savicki & Kelley, 2000). Similar results were reported by Herring (2000) who found that women are “more likely to thank, appreciate and apologize, and to be upset by violations of politeness”, whereas men seem less concerned with politeness and sometimes violate expected online conduct. These differences in on-line language style are in agreement with F2F differences in gender style (see e.g., Fischer, in press), which have shown that—although dependent upon the context—women generally seem to be concerned more with expressing positive feelings and avoiding negative affect than are men.

Not all studies examining CMC interactions show these traditional gender differences, however (e.g., Lee, 2003; Rodino, 1997). Huffaker and Calvert (2005) for example studied blogs and concluded that men used more active, inflexible and resolute language than women, but women did not use more passive, cooperative and accommodating language. They explain this equal use of passive, cooperative and accommodating language by men and women by the fact that women who create blogs may be less traditional in their gender roles than the general, offline female population (Huffaker & Calvert, 2005). In sum, the gender differences in online sharing and self-disclosing appear similar to the gender differences found in F2F.

In conclusion, there is no evidence to assume that emotions are absent or even difficult to communicate in CMC compared to F2F. Although there is no evidence directly and systematically comparing conversations on the same topics in F2F and CMC, the indirect evidence with regard to the success of internet dating, support lists and MSN, and the studies on gender differences in language styles online clearly illustrate that emotions are talked about freely in CMC and that they serve similar important functions in CMC-based interactions as in F2F-interactions. CMC makes it possible to find similar others who share specific interests or emotional needs, and it is as convenient to share emotions with these others as it is with friends in real life, resulting in the development of new close and intimate relationships in CMC.

Moreover, the findings with regard to the success of internet therapy suggest that the relative anonymity of CMC creates a safer environment for some people to share emotions

and to facilitate self-disclosure (see also McKenna & Bargh, 1999, 2000; McKenna, Green, & Gleason, 2002). Virtual rather than actual presence reduces the risk of ridicule or of outright rejection (McKenna et al., 2002). Thus CMC seems to reinforce rather than reduce the communication of emotions. Especially in the case of strangers it may be easier to display feelings that otherwise might be embarrassing or even dangerous.

4. Expression of emotion in F2F and CMC

Socially sharing one's emotions and seeking support for one's point of view is not the same as directly expressing emotions to the object of one's feelings. The next question is thus whether the expression of emotions is different and maybe relatively easier in CMC. Would the relative 'safe' environment of CMC reinforce the more explicit or overt expression of emotions? And, how important is reduced social presence and visibility for the expression or inhibition of emotions?

Research on facial expressions in F2F settings has shown that social presence influences the extent to which one displays emotions. For example, Fridlund (1991) has shown that situations in which others are present or only imaginary present (implicit sociality), lead to more smiling, compared to situations in which people are alone. In the same line of reasoning, others have shown that in addition to the social or physical presence of the other person, the identity of the interaction partner, and one's power relation with this partner affect the amount of emotion expression (see Fischer et al., 2004; Hess et al., 1995; Jakobs et al., 2001; Fischer et al., 2004; Parkinson et al., 2005; Tiedens and Leach, 2004). One explanation for this phenomenon is that different social contexts may elicit different display rules, and prescribe which emotions are appropriate to display (not crying when your computer breaks down at work, smiling when your friend is showing her new-born baby, etc.). Not only the type of situation, however, but especially the presence or absence of others, and your relationship with those others makes a difference, because these contexts may elicit different social motives (Fridlund, 1991; Zaalberg, Manstead, & Fischer, 2004). According to Fridlund high sociality contexts are situations where others, preferably friends, are physically present, and these contexts elicit strong motives to communicate (see Chovil, 1991). In low sociality contexts on the other hand, the motivation to engage in communication would be less (e.g., Hess et al., 1995; Wagner & Smith, 1991).

This conclusion, however, specifically applies to the expression of positive emotions. When considering crying, for example, research has shown that people mostly cry when alone (Becht & Vingerhoets, 2002), or when they are with an intimate. This has also been supported by an experimental study in which sadness was evoked in different social contexts, testing Fridlund's theory for negative emotion expressions. The results showed that participants show most intense sad faces in the alone condition, and smile more in the social conditions (Jakobs et al., 2001). This is probably due to the operation of a display rule that prohibits public crying in response to a film shown in a lab.

Low sociality may also enhance negative emotion expressions, however. Evers, Fischer, Rodriguez Mosquera, and Manstead (2005) conducted an experiment in which participants had to express their anger by allocating hot sauce to the person who angered them. They manipulated the social context by creating a social condition in which participants were led to believe that they would meet the person who made them angry, and a non-social condition, in which participants thought they would never meet the person who made them angry. We must note that in the non-social condition there is also no account-

ability for the anger expression. The results showed that in the non-social (anonymous) condition men and women did not differ in their anger expression. In the social condition, however, women allocated less hot sauce than men did. Apparently, it was easier for women to express negative emotions in an anonymous context, so that they did not need to worry about the negative social implications of their anger expression. Women in particular seem to be sensitive for potential negative consequences of their anger expression. One possible explanation is that men and women learn different display rules for the expression of emotion, and from their childhood onwards the emotional reactions of boys and girls are evaluated and reacted to in different ways (e.g., Brody, 1985; Fabes & Martin, 1991; Wallbott, 1988). Therefore, men and women appraise the effects of their own emotions on others differently. These so-called 'social appraisals' are more likely to play an important role when others are present than absent (see also Buck, Losow, Murphy, & Constanzo, 1992).

As may be evident from these studies, the identity of the interaction partner and the relationship between interactants is of significant influence in an interpersonal F2F setting (Wagner & Lee, 1999). When the other person is a friend, one's facial expression is more likely to increase, but when the other person is a stranger, the facial expression generally tends to decrease (e.g., Buck et al., 1992; Wagner & Smith, 1991), basically because it is not appropriate to show intense feelings to strangers. Thus, social context factors influence emotion expressions in F2F interactions through the activation of various social motives or display rules. This may enhance the display of positive emotions, and inhibit negative emotions, at least when the emotion is considered inappropriate, when it reflects a negative impression of oneself, or when one finds oneself in the company of strangers.

How can we extend these findings to emotion communication in CMC, and specifically, are there reasons to expect that the operation of social motives and display rules is different online? On the basis of F2F research on facial expressions, we may predict that overall fewer positive and negative emotions are expressed, at least when interacting with strangers. On the basis of research on anger expressions, however, negative, antagonistic emotions would be more often expressed in more anonymous CMC settings.

One form of negative emotion expression in CMC that has been studied is uninhibited behavior, sometimes also referred to as flaming. Flaming has been defined as the expression of strong opinions, accompanied by the display of negative, antagonistic emotions in the form of insulting, swearing, offending, or hostile comments (Siegel, Dubrovsky, Kiesler, & McGuire, 1986). In an early study of Kiesler, Zubrow, Moses, and Geller (1985), emotions and expressive behaviors were examined in a synchronous computer-mediated and F2F discussion. In this experiment two people met for the first time and discussed a series of questions in order to get to know each other. Self-reports, physiological and behavioral measures, among which self-disclosure and uninhibited behavior, were taken. No differences were found with regard to physiological arousal and self-reported emotions. However, participants in the CMC condition evaluated each other less favorably and showed more uninhibited behavior to the other person, compared to the participants in the F2F condition.

In order to examine which aspect of CMC would be the most important determinant of this difference in uninhibited behavior, Siegel et al. (1986) conducted a series of experiments. They first compared computer conferencing, email and F2F communication. Participants who did not know each other had to participate in discussions about

choice-dilemma problems and were required to reach consensus within twenty minutes. In the first experiment F2F (seated at a table in an office or classroom) and synchronous CMC was compared under conditions of personal anonymity or identifiability (in this condition names were added to their messages). In the computer-linked conditions, subjects were separated physically, and each used a computer terminal with keyboard. The subjects used an interactive software program for online synchronous communication. The content of the transcripts was analyzed. The results showed that uninhibited remarks or flaming, like name-calling, swearing and insults, appeared more frequently in the anonymous CMC group, almost four times more than in the identifiable CMC conditions, whereas no negative remarks were made in the F2F groups. These results suggest that it is the anonymity of the interaction partner that reinforces flaming. In the second experiment, they compared synchronous computer conferencing with asynchronous, sequential, computer conferencing. Flaming occurred in an equal amount in both conditions, implying that flaming is unrelated to synchronicity. In the third experiment simultaneous computer conferencing and email were compared with F2F communication. In contrast to the first experiment flaming was observed in all three conditions. However, when groups used email, the incidence of uninhibited behavior was less than it was in simultaneously communicating computer-mediated groups. This suggests that the opportunity to reflect the messages that are written may reduce deindividuated responses (Siegel et al., 1986). In other words, flaming is found more often in CMC than in F2F settings, and the primary cause of this difference seems the anonymity of the interaction partner.

It should be noted, however, that although flaming has been considered as a specific characteristic of CMC-interactions, various authors have also concluded that flaming is in fact comparatively rare. In the experiments of Siegel et al. (1986) and Kiesler et al. (1985) uninhibited remarks accounted for less than five percent of all remarks and some studies showed even less or no flaming at all (e.g., Lea et al., 1992; Rice, 1990; Sproull & Kiesler, 1986; Thompson & Ahn, 1992). This slight variation in results is probably due to different operationalizations of flaming. Thus, flaming has often been defined as an extreme form of negative emotion expression and the absence of flaming should thus not lead to the conclusion that no negative emotions are expressed, as there may be milder and subtler forms of textual emotion expressions. Jessup, Connolly, and Tansik (1990) for example investigated the expression of critical attitudes in CMC and found that when group members interact anonymously, they tend to be more critical than when each individual's contribution is identified.

Thus, although anonymity seems to reinforce antagonistic displays, it is still somewhat unclear whether it is the reduced visibility of the other(s) or a change in norms that leads to more negative emotion expressions in anonymous settings. Spears and Lea (1992) for example have proposed that it is not the anonymity as such, but rather the norms and values associated with being online that may promote uninhibited behaviors such as flaming. This idea was tested in a study by Orenga Castellá, Zornoza Abad, Prieto Alonso, and Peiró Silla (2000), who randomly assigned subjects to three different communication channel conditions (CMC, F2F, and videoconferencing). Subjects had to execute a rank-ordering problem with a definite solution. There was no time limit to fulfill the task. The results showed that negative emotion expression appeared more often in CMC than in F2F and videoconferencing, suggesting that it is the lack of visible cues that may reinforce an experience of anonymity and explain the results. If flaming would have been mainly promoted by interacting via a computer, the videoconferencing group should show more negative

emotion expressions than the F2F group and less than CMC, and this was not the case (Orenga Castellá et al., 2000).

Finally, negative, antagonistic emotion expressions in CMC may also function to strengthen one's social identity and to provide a medium for communicating social support and coordinating social resistance towards a powerful outgroup (Spears et al., 2002; Reicher, Levine, & Gordijn, 1998). Spears et al. (2002) for example showed that CMC can be responsible for strategic resistance effects and, remarkably, this effect was stronger than any support that was communicated via visual channels (Reicher et al., 1998). Thus, this research shows that the relatively anonymous and invisible context of CMC is an effective means of stressing one's group identity and communicating social support by sharing one's resistance and critical attitudes towards an outgroup.

5. The lack of non-verbal cues

If anonymity is one of the crucial factors in explaining differences in negative emotional displays in the two channels, the question remains of course, how this affects the way in which emotions are recognized and interpreted. Lack of visibility implies a lack of non-verbal cues in CMC. This lack of non-verbal information implies that during an interaction some information will not be fully transferred (McKenna & Bargh, 2000). Non-verbal behavior may support the verbal reports of a person's feelings, but it may also hide or reveal those feelings, for example when the non-verbal signals are contrary to what is explicitly communicated with words (Brehm, Kassin, & Fein, 1999). If no non-verbal information is available, we may infer that the messages typically conveyed by them do not occur (e.g., Burgoon & Saine, 1978; Shaw, 1981; Walther, 1995).

Non-verbal displays have several social functions. One function is that the ambiguity of the intended emotion expression is reduced. For example, a message may have a different meaning when accompanied by a smile or a frown. When e-mail first became popular for example, messages were often misinterpreted—especially when the writer was trying to be funny—because it lacked the non-verbal cues that normally animate and clarify live interactions (Sanderson, 1993).

A second function is that non-verbal cues may intensify or tone down the emotion expression (Lee & Wagner, 2002). Mere words may not be able to carry all the emotional information that someone wants to convey. Sasaki and Ohbuchi (1999) compared emotional interaction in CMC and vocal F2F communication. Participants had to interact with a confederate in two hypothetical conflict situations in which the participant had to accept an unreasonable request by the confederate. They interacted either in CMC or through a vocal intercom system, so they never saw each other during the conversation. In the vocal condition the confederate's voice was manipulated to produce either a positive or a negative tone. After the sessions the participants had to rate which emotions they experienced during the interactions and which intentions the confederate had (positive or negative). The results showed that emotions were as intensely and easily evoked in CMC as through vocal communication. In the vocal condition, however, angry emotions and perceived negative intents prompted aggressive responses, while these effects were absent in CMC (Sasaki & Ohbuchi, 1999). These results suggest that the presence of non-verbal cues, in this case, an angry tone, may have lead to another interpretation of the other person's anger and hostile intentions, which may have resulted in more aggression in turn. The lack of non-verbal signals in CMC would imply that emotional states can

be overestimated or underestimated, which in turn may lead to inappropriate reactions. In the case of conflicts this may more easily lead to an escalation of the conflict. It may also lead to negative judgments of the person, because of an incorrect interpretation of his or her emotion. There is no further research, however, on the potential misinterpretation of the expressor's emotions in CMC, and thus it is unclear whether this is a potential danger. It could for example well be that individuals more clearly and explicitly describe their emotions, in order to make up for the lack of non-verbal information.

Another possibility that we may suggest is that CMC does not completely lack non-verbal information, because it has its own version of non-verbal displays, namely 'emoticons' (emotion icons), or 'relational icons', created with typographical symbols that resemble facial expressions (Walther & D'Addario, 2001). Emoticons can be considered a creative and visually salient way to add expression to an otherwise strictly text-based form. In the same way as non-verbal cues in F2F, emoticons also help to accentuate or emphasize a tone or meaning during message creation and interpretation (Crystal, 2001; Rezabek & Cochenour, 1998). Furthermore, they help to communicate more clearly a current mood or mental state of the author (Constantin, Kalyanaraman, Stavrositu, & Wagoner, 2002), thereby also providing additional social cues about this person (Thompson & Foulger, 1996). Thus, emoticons serve the function of clarifying textual messages (Walther & D'Addario, 2001) which is similar to non-verbal displays in F2F (e.g., Derks, Bos, & von Grumbkow, 2007; Ekman & Friesen, 1969; Harrison, 1973).

Emoticons are used very often, especially in synchronous chat devices such as MSN, but also in weblogs (Huffaker & Calvert, 2005). This implies that individuals at least feel the need to express some of their emotions with short symbols rather than text. In an experiment by Rivera, Cooke, and Bauhs (1996) subjects participated in a simulated remote CMC session. The subjects believed that they were interacting with three other group members, but the comments of these other group members were simulated. Half of the group had access to six emoticon buttons for their use, but the use of these emoticon buttons was optional. All subjects had to complete two different decision-making tasks: a selection task and a survival task. The results indicated that subjects always used emoticons when available. Additionally, the subjects who used emoticons were more satisfied with the system than subjects who had no access to emoticons.

Various authors have also suggested that women's more frequent non-verbal displays, especially smiling, could be reflected in a more frequent use of emoticons (Lee, 2003; Witmer & Katzman, 1997). Wolf (2000) demonstrated, however, that women do not use more emoticons, but they do use them in other ways. As in real life, women tend to use emoticons more frequently to communicate humor or solidarity, whereas men use them to display sarcasm (Wolf, 2000). Another interesting finding of this study lies in the pattern of change that develops for both genders when moving from a male-only or female-only to a mixed group. Rather than women adopting "the offline male standard of *less* emotional expression, the opposite occurs: both males and females display an increase in emoticon use" (Wolf, 2000, p. 831). This may be explained by the fact that both genders think that a mixed group requires more explicit communication of emotions, because the outgroup is seen as different in the way in which they handle their emotions.

Thus, there is no static gender difference in the use of emoticons, because the use of emoticons depends on the specific social context. Some studies suggest that women use fewer emoticons than men, for example when considering blogs. Huffaker and Calvert (2005) analyzed emoticons in men's and women's blogs, and found that males posted more

emoticons than did females. In another study Lee (2003) examined gender differences in instant messaging and showed that men rarely use emoticons in conversation with other men, and use more emoticons when interacting with women. For women there is no difference in the use of emoticons in relation to their interaction partner: they use the same number of emoticons in conversing with men than with other women (Lee, 2003). Gender differences were also absent in a study by Derks et al. (2007) who presented short Internet chats to the participants. These chats varied in type of social context, either task-oriented or socio-emotional, and in the valence of the context (positive or negative). The subjects were asked to respond to the chats. They were free to react with text, with picking an emoticon, or with a combination of text and an emoticon. Results showed that participants used more emoticons in socio-emotional contexts than in task-oriented contexts. Furthermore, participants also seemed to tune the emoticons upon the valence of the situation. In positive contexts they used more positive emoticons and in negative contexts they used more negative emoticons. In negative, task-oriented contexts, participants used the least number of emoticons. An emoticon is apparently not sufficient in a negative situation and more communication is needed to solve a problem. In negative task-oriented situations individuals have to be more accurate, they have more explaining to do, and if possible, they are required to present alternatives, whereas in positive situations a smile to approve can be sufficient. No differences between men and women were found (Derks et al., 2007).

These few studies suggest that emoticons are regularly used and function as emblems for people's feelings, in a similar way as non-verbal behaviors in F2F. Emoticons may be used to emphasize or clarify one's feelings, but also to soften one's negative tone and to regulate the interaction, just as smiles and frowns do in daily life.

There is one important difference, however, between the use of emoticons and actual non-verbal displays. Relative to non-verbal signals in F2F interactions, emoticons can be considered more deliberate and voluntary. Although it is conceivable that emoticons could become habitual and more unconscious over time, it is still unclear when emoticons are used, how they are interpreted, and processed, and what their effects are in different emotional contexts (see also Walther & D'Addario, 2001). The use of emoticons, therefore, does not necessarily tell us that individuals experience an emotion, as it only conveys the conscious intentions and motives of the person using the emoticon.

This brings us to the last and third function of non-verbal displays, namely the fact that non-verbal displays elicit mimicry, that is, the imitation of another person's non-verbal gestures, face, or posture. Recent research (e.g., Dimberg & Lundquist, 1990; Gump & Kulik, 1997; Hatfield, Cacioppo, & Rapson, 1992; Hess, Adams, & Kleck, 2004, 2005; Lundquist & Dimberg, 1995; Stel, 2005; Van Baaren, Maddux, Chartrand, de Bouter, & van Knippenberg, 2003) has shown that people mimic others' faces, gestures and postures, even in response to photos displaying facial expressions. Moreover, the mimicry of non-verbal gestures has shown that this especially occurs when you like someone or feel empathy with someone (e.g., Sonnby-Borgström, 2002). In other words, friends mimic each other more than do strangers. Jakobs, Manstead, and Fischer (1999)'s results from a study on social context effects on smiling confirmed this idea. They manipulated the identity of the interaction partner, friend versus stranger, and the communication channel, tape-recorder versus telephone and F2F. No effects of communication channel on smiling towards strangers were found. For friends, however, a significant increase in smiling was shown in the F2F condition. The strong effects of physical presence of another

person—rather than effects of implicit presence—also suggest the operation of mimicry. Moreover, research has also shown that the effect is bidirectional: more mimicry leads to more liking, but more liking also results in more mimicry.

Mimicry, however, is impossible via text-based CMC, and cannot be fulfilled by the use of emoticons. Since mimicry is especially important in establishing positive relationships, the absence of non-verbal signals raises the question of whether it would be more difficult to create positive and even intimate relationships during CMC interactions. In order to examine the effects of CMC interaction on the development of close relationships, Walther (1995) had uninformed coders rate videotapes of F2F groups and transcripts of CMC groups on members' relational communication. There were no time restrictions for both groups. The coders rated the transcripts as well as the videotapes, including the non-verbal behavior, immediacy/affection, similarity/depth, composure/relaxation, formality, dominance, receptivity/trust, and task/social orientation. The results showed that CMC groups were rated as significantly more positive on several dimensions of intimacy, as well as on social (vs. task) orientation than F2F groups. In addition, CMC groups never expressed less intimacy or more task orientation than F2F groups. In other words, the computer mediated groups outperformed, interpersonally speaking, the F2F groups (Walther, 1995).

This supports (Walther's, 1992; Walther & Burgoon, 1992) social information processing (SIP) theory that states that despite initial differences in relational and social communication between CMC and F2F communication, these differences tend to disappear over time. This is in line with the finding that in field studies, in which user interaction time is not constrained, higher levels of socio-emotional content have been found in CMC compared to laboratory research (e.g., Rice & Love, 1987; Steinfeld, 1986). Walther and Burgoon conclude that the effects of time on the development of relational bonds are stronger than the effects of the medium in general. When CMC and F2F groups are allowed to continue over time and accumulate numerous messages, this continuity has significant effects on groups' relational communication.

Thus, although it remains unclear what the precise role of the absence of non-verbal cues in the development of relationships through CMC is, there is at least no evidence that the absence of visible cues hinders individuals' capability to exchange personal and emotional information. CMC interactants are just as motivated to reduce interpersonal uncertainty, to form impressions, and to develop affinity in computer-mediated environments, as interactants in other settings (Walther & Burgoon, 1992). We may suggest that one of the ways in which the absence of non-verbal cues is taken over, is because individuals more explicitly describe or label their emotions in CMC compared to F2F. There is no research in which this is directly compared, however.

6. Conclusion and suggestions for future research

In this paper we reviewed research regarding potential differences between CMC and F2F interaction with respect to the communication of emotion. Our conclusion is that emotions are abundant in CMC, and there is no indication that CMC is an impersonal medium, nor that it is more difficult to communicate emotions online. This can first of all be inferred from the success of MSN, the presence of blogs and support lists, and the success of online therapy, in all of which emotions about a variety of personal experiences and problems are shared. The analyses of these messages, although not always focused on the communication or expression of specific emotions, clearly show that emo-

tions are communicated, both implicitly and explicitly. Furthermore, studies in which CMC has been compared with other communication channels also show that CMC is not characterized by a lack of emotions, on the contrary, they suggest that positive emotions are expressed to the same extent as in F2F interactions, and that more intense negative emotions are even expressed more overtly in CMC.

In our model we have proposed two contextual features of CMC that would be crucial in the comparison with F2F interactions, namely reduced social presence (anonymity) and reduced visibility. Most studies have shown that the anonymous nature of the interaction is the most important determinant of the relative ease and frequency with which both positive and negative emotions are expressed in CMC. In many studies, however, an anonymous context implies both reduced visibility and a stranger as interaction partner, thus it is often impossible to disentangle the effects of each contextual feature.

We propose that CMC is especially likely to reduce negative social appraisals (Mansstead & Fischer, 2001) both with regard to negative and positive emotion expressions. Negative social appraisals indicate that people are aware of and pay attention to the potential negative consequences of their emotional reactions. As studies by Evers and colleagues (2005) and Fridlund (1991, 1994) have shown, the absence or presence of others in F2F interactions has an impact on the way in which we regulate our emotions. We downplay our anger or sadness when we expect negative consequences from the expression of these emotions, especially in situations in which others are present or in which we expect we have to deal with others. The absence of visible others in more or less anonymous interactions in CMC is therefore assumed to lead to fewer negative appraisals and thus to more overt and explicit negative emotions expression. This may result in more anger expressions, especially in more anonymous settings, but it also explains the success of internet therapy and support lists, as individuals seem to feel less embarrassed or anxious to communicate their feelings. The relative absence of negative appraisals may also result in greater intimacy and closeness, because interactants may be less concerned with the impression they make on others, or with vulnerability they might display. All in all, CMC may create a safer communication context (e.g., McKenna et al., 2002) than many F2F-contexts, especially for the communication of negative emotions.

In conclusion, we argue that emotions can be found as frequently online as offline. Apparently, people have found ways to cope with the restrictions of CMC, for example by the use of emoticons, or by verbalizing emotions in a more explicit way. Given the fact that various studies have shown that people are highly satisfied with online communication, we may conclude that people not only express, share and communicate emotions, but also do this in a way that pleases them. We are able to give support, to express our dissatisfaction, to show our fears and to convey our love towards others, whether friends or strangers.

This brings us to the final question of the differences in emotional communication in CMC and F2F that have not or hardly been considered in research to date and which may form the input of a new research agenda. The first most obvious difference between online and offline emotion communication is the absence of emotional embodiment. We can have our own emotional and bodily experiences in reaction towards messages from others, but we may generally assume that these reactions are generally less intense than when we are confronted with actual persons and situations. Moreover, the fact that we cannot touch, hold or hit others also implies that parts of the emotional impulses are simply inhibited by this medium. This also may lead to a decrease of the intensity of

the emotional experience. In other words, we would argue that emotional experiences in reaction to online others may have the same quality, but have a lower intensity and probably duration than in F2F situations. Research is needed to investigate this issue further.

A second, related difference is the greater controllability of our emotional reactions online. One of the features that have traditionally been conceived of as distinctive of emotion, is its uncontrollable or impulsive nature. Indeed, many traditional theories in both psychology and philosophy have emphasized the irrational and passionate nature of emotions (see e.g., Calhoun & Solomon, 1984). This impulsive nature refers to the fact that emotions are often experienced as hard to control. Moreover, once elicited emotions have the tendency to be overwhelming and to control all thoughts or actions that contradict the emotional tendency. Frijda (1986) has referred to this phenomenon as ‘control precedence’. Interestingly, more recent theorizing and research has focussed on the cognitive, and more rational basis of emotions (see e.g., Scherer, Schorr, & Johnstone, 2001). In these views, emotions are the natural consequence of appraising the event in a specific way. Moreover, research on emotion regulation (e.g., Gross & John, 2003; Gross & Levenson, 1995) has focussed on the consequences of different kinds of emotion regulation, and not on whether or to what extent individuals are able to control their emotions.

One of the characteristics of CMC is its reduced spontaneity. We expect an individual to have more control over the expression of emotion in CMC, because there often is a time-lag and there is therefore room to choose to what extent and how you want to show your emotions to your interaction partner. As messages have to be typed, there is time to think, reflect and the possibility to read them over and change them before sending. CMC may therefore inhibit one’s impulses and lead to more controlled emotion expressions. And, finally, because of the invisibility of your interaction partner, there is no risk of the other noticing your unconsciously leaking non-verbal emotional expressions. We may therefore hypothesize that emotions can be regulated easier in CMC than in F2F, which would imply fewer emotional outbursts. There is no research—to our knowledge—that has examined this issue of emotional control.

All this taken into consideration, we conclude that emotional communication online and in F2F are surprisingly similar and that online communication even seems to reinforce rather than inhibit the expression of emotions. We seem to survive pretty well in our social interactions and accompanying emotional expressions in CMC. We cope with the restrictions by adapting to the restrictions posed by online conversations, we accept that there is more time needed to transfer the same amount of information than in F2F communication, and we fill our conversational gaps with emoticons. All this does not lead to emotionally poor interactions, on the contrary: CMC is crammed with emotions.

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