



UvA-DARE (Digital Academic Repository)

Do we mimic what we see or what we know?

Hess, U.; Houde, S.; Fischer, A.

DOI

[10.1093/acprof:oso/9780199659180.003.0007](https://doi.org/10.1093/acprof:oso/9780199659180.003.0007)

Publication date

2014

Document Version

Submitted manuscript

Published in

Collective emotions

[Link to publication](#)

Citation for published version (APA):

Hess, U., Houde, S., & Fischer, A. (2014). Do we mimic what we see or what we know? In C. von Scheve, & M. Salmela (Eds.), *Collective emotions* (pp. 94-108). (Series in affective science). Oxford University Press.

<https://doi.org/10.1093/acprof:oso/9780199659180.003.0007>

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Running Head: DO WE MIMIC WHAT WE SEE OR WHAT WE KNOW?

Do we mimic what we see or what we know?

Ursula Hess

Humboldt-University, Berlin

Stephanie Houde

University of Quebec at Montreal

Agneta Fischer

University of Amsterdam

To appear in: von Scheve, C. & Salmela, M. (Eds). *Collective Emotions*. Oxford University Press

Author Note

Preparation of this manuscript was supported by a visiting scholar grant from the Dutch National Science Foundation (NWO) and Grant LX0990031 from the Australian Research Council to Ursula Hess. Correspondence concerning this article should be addressed to Ursula Hess, Department of Psychology, Humboldt-University, Berlin. Email: Ursula.Hess@hu-berlin.de

Abstract

Facial mimicry—the imitation of the facial expressions of others—has been regarded as one of the underlying mechanisms that may explain the rise of collective emotions. At least two possible functions of mimicry have been described. First, mimicry facilitates the process of emotion recognition, and second, it serves to signal understanding and acceptance of others' emotional state. The goal of the present chapter is to clarify the different terms related to or associated with facial mimicry and to outline the specific functions of mimicry in a social context. There are different views with regard to the question to what degree mimicry is an automatic motor reaction or a reaction modulated by social context. We argue that social context information is crucial for the elicitation of mimicry and that mimicry predominately serves to signal affiliation between individuals or group members. Facial mimicry therefore reflects not what the observer sees, but rather the observers' knowledge of others' emotional state.

Keywords: Facial Mimicry, Social Context, Affiliation

Do we mimic what we see or what we know?

Collective emotions are often identified by shared emotional expressions, such as angry faces, panic gestures, but also laughter. The expression of similar emotions can be seen as a characteristic of collective emotions. Yet, the question remains how people come to express the same emotions at the same time. Crowds react in similar emotional ways, because they respond in the same way to a shared emotional event, such as for example, their unfair treatment or the threat of a tornado. Yet, at the same time such a shared reaction is likely also due to the contagious nature of emotions (LeBon, 1995/1896). However, despite the scholarly interest in the processes that lead individuals to show similar emotions, there is still much confusion about the characteristics of this process and the distinction between the related concepts of mimicry, emotional contagion, perspective taking and empathy. In the present chapter we first describe the characteristics of mimicry, and distinguish it from the related processes that are often associated with mimicry. We will then describe the functions of mimicry, which will show how it is implemented in the occurrence of collective emotions.

The defining characteristics of emotional mimicry

Mimicry is usually defined as the tendency to imitate facial, vocal or postural expressions of individuals with whom we are interacting (Hess, Philippot, & Blairy, 1999). We mimic not only individuals we interact with (e.g., Hess & Bourgeois, 2010), but also persons we see in photos (e.g., Dimberg, 1982; Dimberg, 1990) or films (e.g., Hess & Blairy, 2001; Van der Schalk et al., 2011). Mimicry is not restricted to a mature age, and can be observed in newborns as young as several hours after birth, who tend to imitate aspects of facial expressions such as the sticking out of the tongue (Meltzoff & Moore, 1977).

There is evidence that individuals mimic a variety of behaviors such as foot tapping and face touching (Chartrand & Bargh, 1999), and bodily postures in general (Bavelas,

Black, Lemery, & Mullett, 1986; Bernieri & Rosenthal, 1991). Importantly, we also mimic emotional displays (Dimberg, 1982; Hess et al., 1999).

When considering mimicry as one possible factor facilitating collective emotions, it is useful to distinguish between *emotional mimicry*, the imitation of the emotional expressions of others and *behavioral mimicry*, the imitation of non-emotional behaviors, such as face touching or foot tapping. The distinction is useful because emotional behaviors generally are intrinsically meaningful. Emotions are based on an appraisal of the emotion-eliciting event (Scherer, 1987), which are based on the emoters' preferences, values and motivations. Thus, information about the person's interpretation of the event and his or her behavioral intentions is implied when emotions are observed. Emotion displays may also provide information about a person's dispositions such as dominance and affiliation (Hess, Blairy, & Kleck, 2000; Knutson, 1996). By contrast, behaviors such as foot tapping or face touching generally do not carry such information about the expresser's appraisals, intentions or dispositions.

The first defining characteristic of *emotional mimicry* is that two people show the same nonverbal expression of emotion, shortly after each other, such that one facial display is a reaction to the other facial display. Yet, there are occasions when two people show the same emotion expressions but where this is not the result of mimicry. First, individuals may show the same expression because the same emotion was elicited in both of them at the same time. For example, two people may both witness an unfair event and both react with righteous anger. In this form of *parallel* emotion elicitation, the individuals would share a perspective—they both appraise the event in the same way, yet, their emotional reactions are not linked, and they need not even be aware of each other.

Second, similar emotion expressions may also be due to *social referencing*. In this case, the observed emotions of others are used as a cue to the appropriate responding in an ambiguous situation (see e.g., Klinnert, Campos, Sorce, Emde, & Svejda, 1983; see also

Bruder, Fischer, & Manstead, this volume). As a consequence, the person who searches for information will then show the same emotion as the “model,” but the resulting affect can be best described as primarily event-based, and thus as parallel emotion elicitation. In short, emotional mimicry is different from parallel emotion elicitation and social referencing, because these processes are a more direct result of shared exposure to an emotional event, rather than a reaction to the facial display of the other person.

Finally, a facial expression can also be an emotional reaction to the expression of the other—for example, being confronted with a person who looks angry may elicit irritation and anger, because of the implied insult, but also fear if the angry other is in a position to cause harm. Such reactions could be referred to as a *reactive* emotion *to* the anger (see also, Hess & Fischer, in press). In these cases, the facial reaction can be either congruent (in the case of anger) or incongruent (in the case of fear). This observation has also implications for our understanding of mimicry *per se* as it implies that the simple congruency between facial reactions is not a sufficient indicator for mimicry.

Hess and Fischer (in press) argue that most research on emotional mimicry has been a-contextual and does not allow disentangling a reactive facial response from a mimicry response. This is partly the case because a majority of studies has focused on expressions of anger versus happiness, and both emotional displays can elicit congruent frowns and smiles, which may either be reactive emotions or mimicry reactions. On the basis of studies in which only faces are presented, without any information, it is impossible to conclude whether the frowning in response to an angry face is mimicry or merely a negative reaction evoked by an unpleasant stimulus, or whether the smile in response to a smile is mimicry or merely a positive reaction to a pleasant stimulus. A last important characteristic of mimicry is that it only occurs spontaneously when there is a minimal form of similarity or affiliation between

observer and target (Bourgeois & Hess, 2008; Likowski, Mühlberger, Seibt, Pauli, & Weyers, 2008).

In fact, in social relations that are perceived by the interaction partners as negative in any form, mimicry would be dysfunctional. We do not mimic the pride of our competitor who won the contest, nor do we mimic the fear of spiders of our enemy. This means that in order for spontaneous mimicry to occur in social interactions, the affiliative goals or inferred intentions of the interaction partners should be minimally neutral, and preferably positive. Thus, mimicry is not a “blind” imitation of any given emotional display, but rather a social process that depends on the interactional context (see Hess & Fischer, in press).

Emotional mimicry, emotional contagion and empathy

Emotional contagion is the term that is most often equated with mimicry. Some authors even refer to mimicry as “motor contagion” (e.g., de Gelder, 2009; Spengler, Brass, Kühn, & Schütz-Bosbach, 2010). Hatfield and colleagues broadly defined emotional contagion as: “The tendency to automatically mimic and synchronize expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally” (Hatfield, Cacioppo, & Rapson, 1992, p. 153). They also refer to this process as the tendency to “*catch*” another person’s emotions. Thus, Hatfield and colleagues include mimicry in their definition and also refer to mimicry as ‘primitive emotional contagion’ and one of the routes via which we “catch” others’ emotions. However, we propose to demarcate contagion from mimicry.

One way to differentiate between mimicry and contagion is that emotional contagion only refers to the matching subjective emotional experience, whereas mimicry refers to the matching nonverbal display. Even though many studies on emotional mimicry also find evidence for a matching subjective experience in the same experiment (e.g., Hess & Blairy, 2001; Lundqvist, 1995), these two do not necessarily co-occur. We use the term emotional

contagion to refer to the *outcome* of any interactional process in which individuals come to catch another's emotion (which may not necessarily involve expressive behavior), whereas emotional mimicry refers to the imitation of expressive behavior, which may be one of the processes leading to emotional contagion.

Another view of the relation between mimicry and contagion considers both not as part of the same process but as causally related, such that mimicry is said to elicit contagion. Lipps (1907) was the first to suggest that mimicry facilitates the understanding of others' emotions through emotional contagion. He assumed that the observer will automatically mimic a perceived behavior and this mimicry will then—through feedback processes—produce the corresponding state. This internal state will then be one source of information about the state of the other. This view therefore associates mimicry with both empathic accuracy and emotional contagion and presages the current simulationist accounts of face based emotion recognition (e.g., Gallese & Goldman, 1998; Goldman & Sripada, 2005).

Both emotional contagion and mimicry have been considered to be forms of empathy (Hoffman, 1984). Empathy has been defined as the ability to understand and respond to the emotional messages of others (Decety, 2004). Generally, two forms of empathy have been distinguished: cognitive empathy (Ickes, 1997) and affective empathy (Decety, 2004). Cognitive empathy emphasizes the ability to accurately infer another person's feelings.

The second form of empathy, affective empathy, more often leads to confusions with mimicry and contagion. Affective empathy is defined as a process during which the perception of another's emotional state generates a matching state in the perceiver (see e.g., de Waal, 2008). This matching state may also generate matching expressions. More recent research on affective empathy, which draws on research on mirror neurons, also emphasizes mimicry as part of the empathic process (Decety, 2004; Goldman & Sripada, 2005). Indeed,

in an extensive review on empathy, Preston and de Waal (2003) consider emotional contagion as just one of the phenomena that are included in the broad category of empathy.

Most research on empathy has focused on empathic distress and its implications for prosocial behavior, and thus empathy is generally *operationalized* as personal distress (see also Preston and de Waal, 2003, who consider personal distress to be synonymous with emotional contagion). It should be clear from this account, that even though mimicry may be implicated in the empathic process, it is not by itself a form of empathy and does not require congruent emotions. For example, a person may cry out of helpless frustration, whereas the empathic observer shows pity with this person.

In sum, both affective empathy and emotional mimicry refer to processes that may lead to catching others' emotions (emotional contagion). In both cases one has a connection with the other person, and one shares the emotional appraisal of the event, for example the unfairness or threat of a situation. In addition, more intimate emotional bonds lead to more affective empathy and mimicry. Both processes are thus highly similar, and the distinction is mainly that affective empathy often focuses on persons in distress, and not necessarily involves matching emotional displays (see also Table 1 for a summary). Another useful differentiation is that whereas mimicry (Dimberg, Thunberg, & Grunedal, 2002) and emotional contagion (Hatfield, Cacioppo, & Rapson, 1992) are typically automatic and unconscious such that individuals are not aware of their reaction, empathic individuals are typically aware of the other as source of the emotion they experience (Coplan, 2004).

In conclusion, we define emotional mimicry as the conscious or automatic imitation of a nonverbal emotional display of another person, with whom one has an affiliative link. This imitation does not necessarily lead to an accompanying subjective state. We define emotional contagion as a matching emotional reaction between two or more individuals.

<insert Tab. 1 here >

The functions of mimicry

Affiliation

Lakin, Jefferis, Cheng and Chartrand (2003) posit that the function of behavioral mimicry has evolved as a mechanism enhancing social coordination through affiliation between interaction partners. This notion that mimicry improves the quality of interactions is well established (Chartrand & Bargh, 1999; Hess et al., 1999). However, not all interactions allow for mimicry, because the occurrence of mimicry crucially depends on whether the situation affords affiliative intent. This may at first seem in contrast with the idea that mimicry is a strictly automatic and unconscious motor response (Chartrand & Bargh, 1999; Lakin et al., 2003). There is evidence, however, that although emotional mimicry may be automatic, it still varies with how the emotional signal is interpreted in a specific social context (Bourgeois & Hess, 2008; Hess & Bourgeois, 2010). In this sense mimicry is not different from many social cues that lead to automatic behavior in function of the social context. Specifically, different emotional and social cues relating to the interpretation of affiliative goals affect whether mimicry will be shown in a specific context.

One relevant cue is the type of emotion that is displayed, because, as mentioned above, different facial emotion expressions signal different degrees of affiliation. Thus, happiness is mimicked more readily, because smiling persons are seen as more affiliative than, for example, individuals who show anger or disgust (Hess, Blairy, & Kleck, 2000; Knutson, 1996). The expression of happiness therefore signals affiliative intent. A facial display that signals anger, such as a frown, on the other hand, is likely understood as a signal that one is the target of the other's anger, and this would not fulfill the affiliation goal that is normally served by emotional mimicry. This is nicely illustrated in a study by Hinsz and Tomhave (1991) who observed people in shopping centers, stores, or the library and found that 53% of smiles, but only 7% of frowns were responded to with a matching expression.

More explicit social cues that may influence mimicry are contextual goals, for example, whether the relationship with the other is cooperative or competitive (Lanzetta & Englis, 1989; Weyers, Mühlberger, Kund, Hess, & Pauli, 2009), or whether one identifies with the expresser as a member of a specific group (Bourgeois & Hess, 2008). For example, when we are watching a funny movie with friends, we laugh more than if we see the same movie alone (Hess, Kappas, & Banse, 1995). Yet, when anger is perceived as directed at a common foe mimicry may again signal common understanding and affiliation (Bourgeois & Hess, 2008; Study 1). By contrast, in a competitive or hostile interaction, facial reactions are likely to be a reaction *to* rather than *with* the emotion displayed by the other person. These relationships cause a decrease or absence of mimicry (Lanzetta & Englis, 1989; Weyers et al., 2009) or may even elicit facial displays that are incongruent with the observed expression, such as smiling when seeing the pain or fear display of a competitor or a disliked out-group member (Lanzetta & Englis, 1989).

More generally, a negative attitude towards the target may inhibit emotional mimicry and increase the interpretation of the emotional signal as hostile (e.g., Hutchings & Haddock, 2008). Interestingly, Likowski, Mühlberger, Seibt, Pauli, and Weyers (2008) demonstrated that this is the case even when attitudes are newly formed by narratives about a specific character. In line with similarity at the individual level, similarity at the group level may also foster mimicry. Thus, we expect that individuals are more likely to mimic the emotional reactions of in-group members than those of out-group members (Bourgeois & Hess, 2008; Van der Schalk et al., 2011). The idea that mimicry is meaningful and only occurs when it increases affiliation, is also supported by the fact that Van der Schalk and colleagues (2011) found divergent facial reactions as well, especially contempt in reaction to outgroup fear.

In conclusion, there is ample evidence that mimicry is sensitive to the emotional and social context and depends on various contextual cues, such as type of the emotional signal,

the identity of the target, the emotional state or disposition of the observer, and the relationship between observer and target. The results of these studies show that emotional mimicry generally occurs when it reinforces social bonds or rapport, and not or only in a limited way if the relationship is negative or when one appraises the emotional signal as having a negative consequence for oneself. In turn, mimicry increases perceived similarity, liking, smoothness of the interaction, and prosocial behavior (cf. Hess et al., 1999; Lakin & Chartrand, 2003). This seems to be especially the case if the relationship is already positive, or at least neutral (see also, Stel et al., 2010). Thus, these findings support the presumed function of emotional mimicry to reinforce social bonds, which makes emotional mimicry a likely mechanism in the elicitation of collective emotions.

Emotional understanding

The second purported function of emotional mimicry (either mediated through contagion or by its own) is emotional understanding, or more basically, the accurate recognition of others' emotions. This idea has been forwarded by different theorists (e.g., Goldman & Sripada, 2005; Lipps, 1907) and implies that when we see an emotional display shown by another person, this more or less automatically evokes mimicry, which subsequently helps us to recognize the original display as an emotion through a bodily feedback system.

Thus, participants who are prevented from mimicking are slower in recognizing briefly presented emotion expressions or changes in emotion expressions (Niedenthal, Brauer, Halberstadt, & Innes-Ker, 2001; Stel & van Knippenberg, 2008). Also, respondents who were free to mimic an avatar's smile were better in differentiating true smiles from fake smiles than respondents in whom mimicry was blocked (Maringer, Krumhuber, Fischer, & Niedenthal, 2011). Conversely, contextual cues (is the smile appropriate in this context) were

more important for judging whether the smile was fake or not, when mimicry was blocked than when respondents were free to mimic.

Yet, mimicry does not seem to be necessary for emotion recognition. In their studies of facial reactions to emotional faces, Blairy and colleagues (Blairy, Herrera, & Hess, 1999; Hess & Blairy, 2001) found no evidence of a relationship between emotional mimicry and decoding accuracy. Further, a study by Bogart and Matsumoto (2010) on individuals with Moebius syndrome, a condition characterized by congenital bilateral facial paralysis, also showed that the adults with Moebius syndrome did not differ from the matched control group on a facial expression recognition task.

These studies indicate that mimicry is not a necessary condition to recognize an emotional expression. Moreover, the fact that mimicry also varies with social context, suggests that we do not mimic the emotions of our enemy – but any system that would prevent us from recognizing the antagonistic emotions of others would be counter-productive in the long run. Still, these restrictions in the role of mimicry do not exclude the possibility that mimicry facilitate the recognition process and may therefore be particularly useful in fast recognition processes (see also Stel & van Knippenberg, 2008) or in recognizing ambiguous emotional signals. In addition, in studies comparing different types of judgments of faces, mimicry spontaneously occurs when participants are specifically asked to make an emotional rather than, for example, make color judgments of emotional faces (Cannon, Hayes, & Tipper, 2009). Overall, we may conclude that individuals mimic in contexts where they attempt to understand the emotional state of another individual. However, we are still able to recognize emotions even when mimicry is impaired or experimentally impeded (for a related idea see Niedenthal, Mermillod, Maringer, & Hess, 2010).

Mimicry and contagion as different forms of simulation

The idea that both mimicry and contagion tend to occur in contexts in which individuals are motivated to understand others, is in line with some simulationist accounts (Niedenthal, 2007) suggesting that we seek emotional meaning and understanding through emotional simulation. The research reviewed above shows that mimicry is not necessary for emotion recognition, yet it sometimes facilitates recognition. According to the above cited research it seems possible that it is not mimicry per se, but rather emotional contagion (which often accompanies mimicry, see (Hess & Blair, 2001; Lundqvist, 1995) that has a facilitative effect on emotion recognition. Thus, when trying to understand what another person feels, we may (implicitly) re-enact or simulate the emotional experience. One line of research supporting this assumption shows that emotion or mood congruence facilitates emotion recognition (see e.g., Terwot, Kremer, & Stegge, 1991).

The idea that both mimicry and contagion may operate independently when we recognize and understand an emotional experience is in line with those simulationist accounts, that dispense with the need for overt motor action (see Goldman & Sripada, 2005). Instead, these accounts argue that the role of mirror neurons is to enable the observer to match the observed movements onto their own motor repertoire in something like an “as if” loop, which does not lead to overt motor action, but only involves the sending of efferent copies from the involved motor neurons.

It is also possible that when an emotional display cannot be clearly observed but the observer knows what the other person experiences (e.g., via a verbal account), he or she tries to imagine what this person is feeling and thus simulates the other’s emotional state. Alternatively, contextual knowledge about the situation or the person can be used to take the perspective of the other and to simulate the emotion (Kirouac & Hess, 1999).

Finally, it is possible that the emotional display spontaneously leads to perspective taking. This route has been nicely illustrated in a recent study by Hawk, Fischer and van Kleef (2011) which showed that watching an embarrassed person may elicit perspective taking in the observer. At the same time, however, such an embarrassment expression may also evoke mimicry. In this line of reasoning, emotional mimicry, emotional contagion, and perspective taking may all be forms of simulation, of re-enacting the emotional state of the other person. Such re-enactment may then be helpful in understanding the other's emotional state.

Mimicry as a communicative act

In sum, two different functions of mimicry have been proposed: reinforcing social bonds and improving emotion understanding. There is excellent evidence for the first function showing that emotion mimicry can indeed lead to enhanced liking of another person. There is also qualified support for the second function, although we have shown that emotion mimicry is not a necessary requirement for emotion recognition. Nonetheless mimicry, as well as emotional contagion and perspective taking, may be one of the processes that allow us to simulate another emotional state and hence allow us to better understand the other.

Hess and Fischer (2012) have recently proposed that mimicry functions to regulate our relations with others. Mimicking less is then a means to take distance. This may sometimes be a conscious decision, for example in some professional settings, but it is more likely to be part of an automatic response. Emotion mimicry thus functions as social regulator: emotionally mimicking others can create social warmth, but also social cold when we do not mimic. Emotion mimicry is thus a function of interaction goals and the social affordances of the situation.

However, this still raises the question as to why we imitate others to achieve these goals. We propose that mimicry is actually less about imitation and more about simulating

what we know about the others' feelings. That is, mimicry is a communicative signal that tells others that we know how they feel. This notion was first proposed by Bavelas (Bavelas et al., 1986) in an article appropriately titled "I show you how you feel: Mimicry as a communicative act." However, this idea has had little echo in mimicry research.

If indeed emotional mimicry serves primarily as a communication signal, then facial reactions should not be restricted to situations where a facial expression is actually observed. All that would be required would be the knowledge that a person feels a given emotion. Evidence that there is no requirement to actually visually perceive an emotion expression to show facial mimicry comes from cross-modal mimicry, where facial expressions are shown in response to vocal stimuli (Hawk, Fischer, & Van Kleef, 2012; Verona, Patrick, Curtin, Bradley, & Lang, 2004). However, emotional sounds and emotion words (Velten, 1968) can both elicit emotional states as well. Thus, congruent facial expressions may also be elicited by emotion induction. We therefore conducted a study to assess whether facial mimicry can be elicited by emotion knowledge, that is, the verbal information that a person experiences an emotional state and that this mimicry occurs without an emotion being elicited.

Do we mimic what we know about other's emotions?

Sixty female participants were shown neutral facial expressions of men and women and were told for each person which emotion (anger, sadness or happiness) this target person experienced. The participants' task was simply to indicate the intensity with which this emotion was shown. To assess the participants' emotional state they were asked once for each type of expression to report their current state using a 'well-being' questionnaire. The majority of the scales related to physical symptoms likely to occur in an experimental context (i.e., tense muscles, dry eyes). Four items designed to unobtrusively measure emotional state were included: feeling good, feeling irritated, feeling aggressive and feeling melancholic. The labels corresponded to the emotional content of the labels used to describe the stimulus

person's emotion without using the same terms as those employed there. Participants typically report that the scale serves to assess stress and are not aware that emotional state is assessed as well. For the analyses difference scores from baseline were calculated.

Participants only reported a slight overall reduction in feeling good from baseline to trial, no significant difference emerged for any emotion as a function of the emotion label. That is, being told that the person they saw was happy, angry or sad did not elicit a corresponding emotion in the participants. Yet, did they show mimicry?

Facial mimicry was measured using facial EMG at the Corrugator Supercilii, Orbicularis Oculi and Zygomaticus Major sites. Electrode placements were chosen according to Fridlund and Cacioppo (1986). Corrugator Supercilii is the muscle that pulls the eye-brows together in a frown, Orbicularis Oculi produces the crow-feet wrinkles around the eyes, and Zygomaticus Major pulls the lips up in a smile. Facial expressions of anger and sadness are characterized by increased activity of the Corrugator Supercilii muscle and relaxation of the Orbicularis Oculi and Zygomaticus Major, whereas happy expressions are characterized by the reverse pattern. Hence to assess whether a participant shows a muscle activation pattern that corresponds to an expression of anger, sadness or happiness contrasts comparing activation of Corrugator Supercilii on one hand with activation of the Orbicularis Oculi and Zygomaticus Major on the other hand were conducted. For the analysis differences from a baseline period directly preceding the stimulus presentation were within-subject z-transformed as EMG measures are not normally distributed and a mimicry index based on the contrast described above was calculated separately for each of the 4 seconds that the stimulus was shown (see Figure 1).

< insert Fig. 1 here >

No significant mimicry pattern emerged for anger. This finding is congruent with the notion that if mimicry serves to foster affiliation, we do not necessarily expect the mimicry of

an antagonistic expression. For happiness and sadness the mimicry index differed significantly from 0 in a one sample t-test. For happiness this was the case for the first two seconds, $t(59) = 2.22, p = .030$ and $t(59) = 3.10, p = .003$ respectively, and for sadness for the last two seconds, $t(59) = 3.50, p = .001, t(59) = 3.35, p = .001$, respectively. Thus, the reaction to the information that the person was happy was shorter than the reaction to the information that the person was sad. The difference may be related to the observation that representations of basic expressions of emotion see, to encode information about dynamic as well as static properties suggests that sadness has a slower dynamic overall (Kamachi et al., 2001).

In sum, these data show that individuals who know that someone is sad or happy, show a facial action that is congruent with the information they received, even when there is no facial action present. The participants did not report experiencing a congruent emotional state, nor did the faces they rated show any discernable expression. Thus, these facial reactions are not a function of an emotional state induced by the labels, nor are they an automatic reaction to a perceived facial expression.

In a control condition 60 women performed the same general task, however, they were told that the person in the photo had one of three characteristics (hesitant, conscientious, tranquil) and were asked to rate to what degree these labels matched them. No indication of facial expressive reactions emerged. That is, people do not generally react facially when evaluating a person with regard to a disposition. Thus, these data best fit the explanation that participants signaled their understanding of the other's emotional state, supporting the notion that mimicry serves to improve understanding.

Conclusion

We propose on the basis of the reviewed evidence that mimicry primarily functions to regulate social affiliation: emotionally mimicking others may create social warmth, and not

doing so may create social cold. As such, mimicry is a communicative act and it communicates to the other that we know how they feel. In this sense mimicry can be said to serve a function in the larger context of affective empathy. To the degree that mimicry signals both affiliative intent and social approval (Yabar & Hess, 2007), it is a process that requires an initial affiliative relation between interaction partners or at least the absence of an antagonistic state. Whereas mimicry may be a form of “social glue” that binds people together (Lakin et al., 2003), it is not superglue and emotional mimicry only works if the relational surface is not too rough.

We therefore believe that mimicry may play an important role in the constitution of collective emotions. Because collective emotions occur in situations in which a group of persons shares an emotional perspective (i.e., fear of a fire) or has a collective emotional goal (i.e. to protest) all the requirements for mimicry are present. Affiliative links between individuals enhance the likelihood of mimicry and more specifically, there is evidence that ingroup members mimic each more than outgroup members. Furthermore, even if some individuals in the collective do not show any specific emotion, their faces may still be interpreted as emotional in the presence of situational information, and thus further reinforce the collectiveness of the emotion. Facial mimicry can thus be considered as one of the processes that may initiate and reinforce collective emotions.

References

- Bavelas, J. B., Black, A., Lemery, C. R., & Mullett, J. (1986). "I show how you feel": Motor mimicry as a communicative act. *Journal of Personality and Social Psychology*, 50, 322-329.

- Bernieri, F. J., & Rosenthal, R. (1991). Interpersonal coordination: Behavior matching and interactional synchrony. In R. S. Feldman & B. Rimé (Eds.), *Fundamentals of nonverbal behavior* (pp. 401-432). Cambridge: Cambridge University Press.
- Blairy, S., Herrera, P., & Hess, U. (1999). Mimicry and the Judgment of Emotional Facial Expressions. *Journal of Nonverbal Behavior*, *23*, 5-41.
- Bourgeois, P., & Hess, U. (2008). The impact of social context on mimicry. *Biological Psychology*, *77*, 343-352.
- Cannon, P., Hayes, A., & Tipper, S. (2009). An electromyographic investigation of the impact of task relevance on facial mimicry. *Cognition & Emotion*, *23*, 918 – 929.
- Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, *76*, 893-910.
- Coplan, A. (2004). Empathic Engagement with Narrative Fictions. [10.1111/j.1540-594X.2004.00147.x]. *The Journal of Aesthetics and Art Criticism*, *62*(2), 141-152.
- de Gelder, B. (2009). Why bodies? Twelve reasons for including bodily expressions in affective neuroscience. *Philosophical Transactions of the Royal Society London B*, *364*, 3475–3484.
- de Waal, F. B. M. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Review of Psychology*, *59*, 279-300.
- Dimberg, U. (1982). Facial reactions to facial expressions. *Psychophysiology*, *19*(6), 643-647.
- Dimberg, U. (1990). Facial electromyography and emotional reactions. *Psychophysiology*, *27*, 481-494.
- Dimberg, U., Thunberg, M., & Grunedal, S. (2002). Facial reactions to emotional stimuli: Automatically controlled emotional responses. *Cognition and Emotion*, *16*, 449-472.

- Fridlund, A. J., & Cacioppo, J. T. (1986). Guidelines for human electromyographic research. *Psychophysiology*, *23*, 567-589.
- Gallese, V., & Goldman, A. (1998). Mirror neurons and the simulation theory of mind-reading. *Trends in Cognitive Sciences*, *2*, 493-501.
- Goldman, A., & Sripada, C. S. (2005). Simulationist models of face-based emotion recognition. *Cognition*, *94*, 193-213.
- Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1992). Primitive emotional contagion *Emotion and social behavior* (pp. 151-177). Thousand Oaks, CA, US: Sage Publications, Inc.
- Hawk, S. T., Fischer, A. H., & van Kleef, G. A. (2011). Taking your place or matching your face: Two routes to empathic embarrassment. *Emotion*, *11*, 502-513.
- Hawk, S. T., Fischer, A. H., & Van Kleef, G. A. (2012). Face the noise: Embodied responses to nonverbal vocalizations of discrete emotions. *Journal of Personality and Social Psychology*, *102*, 796-814.
- Hess, U., & Blairy, S. (2001). Facial mimicry and emotional contagion to dynamic emotional facial expressions and their influence on decoding accuracy. *International Journal of Psychophysiology*, *40*, 129-141.
- Hess, U., Blairy, S., & Kleck, R. E. (2000). The influence of expression intensity, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior*, *24*, 265-283.
- Hess, U., & Bourgeois, P. (2010). You smile - I smile: Emotion expression in social interaction. *Biological Psychology*, *84*, 514-520. doi: 10.1016/j.biopsycho.2009.11.001
- Hess, U., & Fischer, A. (in press). Emotional mimicry as social regulation. *Personality and Social Psychology Review*.

- Hess, U., Kappas, A., & Banse, R. (1995). The intensity of facial expressions is determined by underlying affective state and social situation. *Journal of Personality and Social Psychology, 69*, 280-288.
- Hess, U., Philippot, P., & Blairy, S. (1999). Mimicry: Facts and fiction. In P. Philippot & R. S. Feldman (Eds.), *The social context of nonverbal behavior. Studies in emotion and social interaction.* (pp. 213-241). Cambridge, UK: Cambridge University Press.
- Hinsz, V. B., & Tomhave, J. A. (1991). Smile and (Half) the World Smiles with You, Frown and You Frown Alone *Personality and Social Psychology Bulletin, 17*, 586-592.
- Hoffman, M. L. (1984). Interaction of affect and cognition on empathy. In C. E. Izard, J. Kagan & R. B. Zajonc (Eds.), *Emotion, cognition, and behavior* (pp. 103-131). Cambridge: Cambridge University Press.
- Hutchings, P. B., & Haddock, G. (2008). Look Black in anger: The role of implicit prejudice in the categorization and perceived emotional intensity of racially ambiguous faces. *Journal of Experimental Social Psychology, 44*, 1418-1420.
- Ickes, W. (1997). *Empathic accuracy*. New York, NY: Guilford.
- Kamachi, M., Bruce, V., Mukaida, S., Gyoba, J., Yoshikawa, S., & Akamatsu, S. (2001). Dynamic properties influence the perception of facial expressions. *Perception, 30*(7), 875-887.
- Kirouac, G., & Hess, U. (1999). Group membership and the decoding of nonverbal behavior. In P. Philippot, R. Feldman & E. Coats (Eds.), *The social context of nonverbal behavior* (pp. 182-210). Cambridge, UK: Cambridge University Press.
- Klennert, M. D., Campos, J. J., Sorce, J. F., Emde, R. N., & Svejda, M. (1983). Emotions as behavior regulators: Social referencing in infancy. In R. Plutchik & H. Kellerman (Eds.), *Emotions in early development*: Academic Press.

- Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behavior, 20*, 165-182.
- Lakin, J. L., Jefferis, V. E., Cheng, C. M., & Chartrand, T. L. (2003). The Chameleon Effect as social glue: Evidence for the evolutionary significance of nonconscious mimicry. *Journal of Nonverbal Behavior, 27*, 145-162.
- Lanzetta, J. T., & Englis, B. G. (1989). Expectations of cooperation and competition and their effects on observers' vicarious emotional responses. *Journal of Personality and Social Psychology, 56*, 543-554.
- LeBon, G. (1995/1896). *The crowd*. Piscataway, NJ, US: Transaction Publishers.
- Likowski, K. U., Mühlberger, A., Seibt, B., Pauli, P., & Weyers, P. (2008). Modulation of facial mimicry by attitudes. *Journal of Experimental Social Psychology, 44*, 1065–1072.
- Lipps, T. (1907). Das Wissen von fremden Ichen. In T. Lipps (Ed.), *Psychologische Untersuchungen (Band 1)*. Leipzig: Engelmann.
- Lundqvist, L. O. (1995). Facial EMG reactions to facial expressions: A case of facial emotional contagion? *Scandinavian Journal of Psychology, Junl Vol 36(2)*, 130-141.
- Maringer, M., Krumhuber, E. G., Fischer, A. H., & Niedenthal, P. M. (2011). Beyond smile dynamics: Mimicry and beliefs in judgments of smiles. *Emotion, 11(1)*, 181-187. doi: 10.1037/a0022596
- Meltzoff, A. N., & Moore, M. K. (1977). Imitation of facial and manual gestures by human neonates. *Science, 198*, 74-78.
- Niedenthal, P. M. (2007). Embodying emotion. *Science, 316*, 1002-1005.
- Niedenthal, P. M., Brauer, M., Halberstadt, J., & Innes-Ker, A. H. (2001). When did her smile drop? Facial mimicry and the influences of emotional state on the detection of change in emotional expression. *Cognition and Emotion, 15*, 853-864.

- Niedenthal, P. M., Mermillod, M., Maringer, M., & Hess, U. (2010). The Simulation of Smiles (SIMS) Model: Embodied simulation and the meaning of facial expression. *Behavioral and Brain Sciences*, *33*, 417-433
- Preston, S. D., & de Waal, F. B. M. (2003). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, *25*, 1-20.
- Scherer, K. R. (1987). Towards a dynamic theory of emotion: The component process model of affective states. *Geneva Studies in Emotion and Communication*, *1*, 1-98. Retrieved from http://www.unige.ch/fapse/emotion/publications/pdf/tdte_1987.pdf
- Spengler, S., Brass, M., Kühn, S., & Schütz-Bosbach, S. (2010). Minimizing motor mimicry by myself: Self-focus enhances online action-control mechanisms during motor contagion. *Consciousness and Cognition*, *19*, 98–106.
- Stel, M., Blascovich, J., McCall, C., Mastop, J., van Baaren, R. B., & Vonk, R. (2010). Mimicking disliked others: Effects of a priori liking on the mimicry-liking link. *European Journal of Social Psychology*, *40*(5), 867-880.
- Stel, M., & van Knippenberg, A. (2008). The Role of Facial Mimicry in the Recognition of Affect. *Psychological Science*, *19*, 984 - 985.
- Terwot, M. M., Kremer, H. H., & Stegge, H. (1991). Effects of children's emotional state on their reactions to emotional expressions: A search for congruency effects. *Cognition & Emotion*, *5*, 109 — 121.
- Van der Schalk, J., Fischer, A. H., Doosje, B. J., Wigboldus, D., Hawk, S. T., Hess, U., & Rotteveel, M. (2011). Congruent and incongruent responses to emotional displays of ingroup and outgroup. *Emotion*, *11*, 286-298.
- Velten, E. (1968). A laboratory task for the induction of mood states. *Behavior Research and Therapy*, *6*, 473-482.

- Verona, E., Patrick, C. J., Curtin, J. J., Bradley, M. M., & Lang, P. J. (2004). Psychopathy and Physiological Response to Emotionally Evocative Sounds. *Journal of Abnormal Psychology, 113*, 99-108. doi: 10.1037/0021-843x.113.1.99
- Weyers, P., Mühlberger, A., Kund, A., Hess, U., & Pauli, P. (2009). Modulation of facial reactions to avatar emotional faces by nonconscious competition priming. *Psychophysiology, 46*, 328-335.
- Yabar, Y., & Hess, U. (2007). Display of empathy and perception of out-group members. *New Zealand Journal of Psychology, 36*, 42-50.

Tables

| | Similar emotional display | Affiliative link | Shared event appraisal | Similar subjective experience |
|--------------------|---------------------------|------------------|------------------------|-------------------------------|
| Mimicry | Yes | Yes | Yes | No |
| Contagion | Yes | Yes | Yes | Yes |
| Affective empathy | No | Yes | Yes | Yes |
| Social referencing | Yes/No* | No | Yes | Yes |
| Reactive emotion | Yes | Yes | No | Yes |
| Parallel emotion | Yes | No | Yes | Yes |

* Not as an initial reaction

Table 1. Similarities and differences between related phenomena.

Figure Captions

Figure 1. Mean mimicry indices as a function of emotion label and time