Mimicking emotions

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Emotional mimicry refers to the tendency to mimic other's emotions in order to share minds. We present new evidence that supports our Contextual Model of Emotional Mimicry, showing that emotional mimicry serves affiliative goals that vary across social contexts. This also implies the opposite, namely that we (unconsciously) refrain from mimicking others' emotions if we want to keep emotional distance. Facial mimicry of emotions is further suggested to be a largely top-down process, based on goals and representations, rather than on mere watching others' facial movements.

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Introduction

Mimicry is defined as the imitation or matching of the nonverbal behaviors of others. These behaviors can consist of discrete emotion expressions [1], but also body movements [2], or even pupil dilation [3]. In a previous review of the literature on the mimicry of emotional faces [1,4], we distinguished between the mimicry of neutral (behavioral mimicry) and emotional postures, gestures or facial expressions. Although behavioral and emotional mimicry are correlated [5], the demarcation between emotional and non-emotional behaviors is not categorical. There is one crucial difference, however, namely that emotional behavior itself is a meaningful, social signal. Thus, emotion expressions provide us with information about the expressers' appraisal of the event, their behavioral intentions and dispositions [6,7]. This information about the expresser in turn impacts on mimicry. By contrast, behaviors such as foot tapping or face touching generally do not carry such information about the expresser, unless they are interpreted as signaling nervousness or irritation, that is, interpreted as emotion signals in their own right.

Importantly, not all instances of congruent facial reactions necessarily reflect emotional mimicry. Congruent emotional responses may result from other processes, such as the joint observation of an emotional stimulus or a complementary reaction to the other's expression rather than an empathic response to another's emotion. In order for a congruent emotional response to reflect mimicry, it has to be based on a shared understanding of the emotion of the other person. In this vein, we [4] concluded that the extend literature suggest that mimicry is often valence based rather than a matching of specific muscle movements. As an alternative to views in which mimicry is seen as a matched motor response based on the matching of observed behaviors, we proposed a Contextual Model of Emotional Mimicry.

The model is based on two key assumptions. *First*, the basis of emotional mimicry is a shared mind [8]. This implies that people only mimic emotions if there is a minimal potential of affiliation, specifically, when the expresser and mimicker share the perspective that gave rise to the emotion in the first place. *Second*, we do not mimic facial features per se, but the meaning of these movements, which are related to an emotional or social signal. Emotional mimicry thus is goal driven, rather than stimulus driven. While mimicry is automatic, it only occurs in the presence of an affiliation goal, which in turn depends on the emotional meaning of the situation. Therefore, facial movements are interpreted on the basis of prior knowledge grounded in social interactions, in a top-down rather than bottom-up process. In what follows, we will first review more recent evidence in relation to each of these assumptions as well as contrast our theoretical model with other recent theories and models in the field of mimicry and contagion.

Affiliation goals, social context and emotional signals

Affiliation goals

The central assumption of our model is the requirement of some level of emotional connection between mimickee and mimicker that satisfies a basic need of shared understanding. This idea has also been emphasized in Affective Process Theory [9•], which covers a large range of mental states and behaviors that can constitute emotional linking between persons and groups. According to Elfenbein [9•], the Shared Vantage Point (SVP) is the main determinant of the nature of affective linking. As emotional mimicry forms the non-verbal and often unconscious basis of

affective linkage processes, we predict that a low SVP, that is being in competition or in conflict, would not lead to mimicry. Indeed a recent study showed [10•] showed that participants under cognitive load mimicked smiles of individuals who had been described in positive terms (likable, nice) automatically, whereas they did not mimic the smiles of individuals described in negative terms (aggressive, deceitful) or neutral terms (serious, neat). Without cognitive load the smiles of neutral others were mimicked as well. Thus, we have an automatic tendency to mimic people who seem friendly and nice and obviously are desirable social targets. With sufficient cognitive resources, we also mimic people who seem less desirable, but who do signal affiliation. This latter situation demands more cognitive resources to discern potential affiliative intent and to decide whether this person should be affiliated with. The importance of the goal to affiliate is further underlined by a study showing that participants tend to mimic more if they feel socially excluded [11], as social exclusion leads to a strong desire to re-affiliate and mimicry is one means to reach that goal.

Several other reviews and models [12–14] have also emphasized that mimicry depends on a number of factors related to the social context and emotional connection between two persons. Pre-existing social bonds, goals to affiliate, similarity, positive mood, a pro-social orientation or empathy have been shown to increase the tendency to mimic. In fact, research on both emotional and behavioral mimicry emphasizes characteristics of the mimickee, such as ingroup membership (e.g., [15••]), similarity [16], or characteristics of the mimicker, such as a pro-social orientation or empathy [17], personality traits such as affiliation, extraversion, or agreeableness [18••,19••,20], or situational affordances, such as power [21•], which is predictive of the mimicker's affiliative intent.

The reverse of these characteristics by contrast, tends to inhibit mimicry [22], and this applies to both behavioral and emotional mimicry. All these factors reflect a variation in emotional distance and affiliation goals that affect the tendency to mimic the target. Interestingly, the reverse relationship has also been shown, especially with studies using explicit mimicry instructions [23]. Thus, Inzlicht, Gutsell, and Legault [24•] showed that participants who were instructed to mimic water drinking behavior of black actors in a video — in comparison with merely watching the video — had lower scores on implicit prejudice measures. In this case, deliberate mimicry has the effect of increasing a more positive attitude, which is in line with an affiliation goal. In addition, mimicry can be used to communicate a preferred social distance to potential romantic partners [25]. These studies provide support for our argument that emotional mimicry serves social regulatory purposes.

The absence of an affiliation goal may also explain why people in a sad mood are less likely to mimic. Sadness implies withdrawal from the environment [26] and therefore a tendency to temporarily not socially engage with the world. This blocks affiliation goals and consequently decreases the tendency to mimic [27]. On the other hand, from the perspective of the observer, the mimicry of the sad expression would serve an affiliative goal, namely to show understanding and empathy with the sad person and to signal support or help.

The emotional signal

Affiliative intent may also be reflected in the specific emotion shown [28]. In this study, participants who felt pride were less likely to mimic others' foot tapping than participants who felt merely positive, or no emotion at all. This lack of behavioral mimicry was explained in terms of the social functions of pride, which implies more distance than if one feels merely positive. This felt distance is reflected in reduced mimicry. Although this study focused on behavioral mimicry, in which the mimicked behavior was not related to the pride signal, we would predict on the basis of our Contextual Model that for the same reason, individuals would also be less likely to mimic pride expressions than happy expressions, especially when it would be a form of hubristic, that is more arrogant, pride.

More generally, if emotional mimicry serves affiliative goals, then smiles and sadness — which signal affiliation — should be mimicked preferentially, whereas emotions such as anger or disgust — which signal a non-affiliative stance — should not [19••]. Mauersberger and colleagues showed that social competence, which was assessed though self-reports of social interactions in a diary study following the mimicry assessment, was related to the mimicry of affiliative signals, such as sadness, whereas social incompetence was associated with congruent facial responses to disgust, predicting negative social interactions. In the other words, congruent responses to non-affiliative signals also reflect a reverse function of emotional mimicry, namely an increase in social distance.

In short, the first main assumption of our Contextual Model was further supported by new evidence, showing that affiliation goals are associated with tendencies to mimic the others' emotions. Because we implicitly or explicitly use emotional mimicry to serve these goals, (abstaining from) emotional mimicry has an important social regulatory function [30].

Bottom-up or top-down?

A second important assumption in our model is that facial (and other non-verbal) signals are interpreted on the basis of prior knowledge grounded in social interactions. This is in line with newer theoretical approaches that empathize top-down processing, for example, for social cue processing [31••], mimicry in social interaction [32••], and the mirror neuron system [33]. Adams and Kveraga [31••]

argue that while traditional theories posit distinct pathways and modules for different cues that are combined later in the process, there is more support for a functional approach to compound social cue processing, which is more adaptive in a complex environment. This functional approach assumes that at a very early processing stage, the meaning of several social and facial cues are combined in terms of their relevance for the observer. For this, we rely on previous experiences that link information from incoming senses to some concepts in the brain. This view is congruent with our model that considers mimicry as heavily influenced by top-down processes rather than a simple perception driven process. A recent review of neuroscience research with regard to mimicry supports such top-down contextual influences [34]. In this vein, Aragon and colleagues [35] using mu-suppression as an index of mirror neuron activity could show that after being unfairly treated by a confederate (which induced a desire to not further connect with this person), participants ceased to mirror purely kinematic but continued to mirror goal-directed hand movements, while those treated fairly continued to mirror all movements.

We argue that the mimicry of emotional signals requires the integrated processing of emotional and other relevant social cues to discern affiliative intent. Other evidence comes from Hess and colleagues [36], who showed that simply stating that a person is happy or sad, will lead to congruent facial responses, even if the face itself is neutral. These studies thus support the idea that emotional mimicry is the result of an interpretative act and thus a top-down, rather than a bottom-up process. This view converges with the STORM model (social top-down response modulation [32••], which is based on automatic imitation. In support of their model the authors cite research showing that people increase mimicry toward those who are important for their social welfare.

All top-down models assume a representation of another's actions or emotions that is grounded in prior experiences on the basis of which we formed associations. This basic principle is nicely demonstrated by Aguado and colleagues [37]. Participants first saw video in which neutral faces that changed into either a smile or a frown. Individuals who had reacted with frowns to the frowns or with smiles to the smiles, later showed a similar facial response to the corresponding neutral faces. In other words, people learn associations between specific faces and their positive or negative expressions, and tend to mimic the affective associations with those faces, even if the face is neutral.

These learned associations between specific faces and their positive or negative expressions have been experimentally studied by manipulating rewards. Heerey and Crossley [38] for example showed that genuine smiles are more rewarding than social smiles, and that rewarding a response with a genuine smile leads to more smile mimicry, as well as faster learning than rewarding with polite smiles. This suggests that more rewarding facial behavior elicits more mimicry. Other studies [39–41] have also shown that mimicry reactions are modulated by the reward value of the face.

New routes to emotional mimicry within and beyond dyads

The research on mimicry is also taking exciting new directions, such as the extension of (emotional) mimicry to groups and even crowds [42••,43•]. For example, Dezecache and colleagues [43•] studied emotional mimicry by a third person (C), who had not seen the initial emotional reaction (of person A), but only the mimicked expression of person (B). This can be seen as a form of secondary mimicry, which could be conceived as a basis of the transmission of emotion expressions in groups — or as a form of collective mimicry (see also [44]). In a similar vein, new research on behavioral synchrony [45,46] may also appear to be an interesting approach for studying emotional mimicry. Other new lines of research focus on the extension to other nonverbal channels, research on cross-modal mimicry [47,48], and non-humans [49–51]. Together with studies that focus on the antecedents [51], consequences [19••] and neurocognitive basis [51,52] of mimicry in social contexts, a clearer picture of the role of mimicry in social regulation is emerging.

Conflict of interest statement
Nothing declared.

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In this study, the Big Five is measured, and the instruction to compete or cooperate is manipulated in a very novel and interesting natural role play setting. After the interaction, liking of the other person is measured and performance was measured on the basis of points allocated after each task. Mimicry was found for 8 of 12 nonverbal behaviors, and was larger for positive than negative behaviors, and for facial than non-facial behaviors. In addition, the mimicker's personality influenced mimicry such that neuroticism predicted mimicry of negative behavior, whereas affiliation and agreeableness enhanced mimicry of positive behaviors.

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