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Mixed Emotions in Emotion Communication: A Chimera in my Brain

Abstract: This chapter discusses how people perceive and respond to facial expressions that display mixed emotions. The review of the literature suggests that, overall, people seem to prefer “pure” emotion expressions over mixed ones and also perceive individuals who show mixed emotions less positively. This preference might stem from the cognitive difficulty of processing and categorizing complex emotional signals. Notably, emotion knowledge is typically organized around discrete emotion prototypes. This makes mixed emotions cognitively less accessible, requiring more effort for the construction of meaning. In sum, mixed emotion expressions are complex social signals that people tend to simplify, preferring clear, easily categorizable emotional displays.

Keywords: facial emotion expression, emotional mimicry, person perception

... a noise in mine ear, a light in mine eye, an anything, a nothing, a fancy, a chimera in my brain, troubles me in my prayer.

John Donne, *LXXX Sermons (1640) 12 December 1626*
“At the Funeral of Sir William Cokayne”

The communication of emotion is at the core of most human interactions. It is hard to imagine even banal, everyday encounters that are totally bereft of emotion communication, be it only a friendly smile in passing. The emotion expressions we exchange provide a variety of important types of information that humans use to navigate their social environment.¹ Given their importance for human communication, it is not surprising that emotion expressions have been of interest to scholars in psychology since the early days of the field. At that time, the notion that emotion expressions are evolved adaptations proposed by Darwin in 1872 was at the forefront of interest — and in fact this issue is still the topic of an ongoing and lively discussion.² However, as I will outline below, despite its long tradition and extensive contributions, emotion communication research in psychology has largely neglected mixed emotions.

¹ Niedenthal/Brauer 2012.

² See, e.g. Hess 2017.

In what follows, I will briefly define mixed emotions and then summarize from a psychological perspective the (social) functions of emotions and the process of sense-making that underlies our understanding of others' emotions. I will then turn to some empirical evidence regarding mixed emotion expressions and discuss the implications of the mixed nature of these expressions for their role in emotion communication. For this discussion, I will extend the scope of the investigation from simple perception to facial mimicry — the immediate facial reaction of the observer — as well as to the inferences regarding the expresser that people draw from emotion expressions.

Defining mixed emotion expressions

There are in fact several different phenomena that can be considered mixed emotions. First, there are certain emotions, such as nostalgia — the yearning for some (positive) state in the past that is now lost — which by their very nature combine positive and negative valence and as such are mixed with regard to valence but can be considered a pure emotion with regard to their psychological meaning. Surprise has often been studied as an ambiguous emotion,³ because it can have either negative or positive valence, commonly referred to as positive and negative surprise. However, these should be considered separately as positive and negative surprise expressions can often be visually distinguished.⁴

In this chapter, I will focus on mixed emotions that result from the combination of two or more “pure” emotions that are elicited in the same context. For example, if a good friend lets me down in a real emergency, I can be angry due to the resulting consequences, but I can also feel sad because I have discovered something negative about my friend and have to reevaluate our relationship. As far as the expression is concerned, this mixture can be concurrent (i.e. elements of both emotions are visible at the same time) or sequential where one emotion is quickly followed by the other in the same expressive sequence. In these cases, we can assume that the expresser did indeed experience the two different emotions at the same time or in close temporal sequence.

³ E.g. Neta et al. 2011.

⁴ Vrticka et al. 2014.

The meaning and function of emotion expressions

There is broad agreement in psychological theory and research that one of the core functions of emotion expressions is communicative, but there is disagreement on what exactly is communicated.⁵ An especially contentious debate concerns whether specific emotion expressions convey information about internal states, i.e. what the person is feeling, and if they do so universally across cultures.⁶

The scientific study of emotion expressions is usually traced to Darwin's seminal work *The Expression of the Emotions in Man and Animals*, published in 1872. Darwin understood emotion expressions as the visible part of an underlying emotional state. From his perspective these expressions are evolved and (at least at some point in the past) adaptive. The notion that the expressions communicate an organism's state and thereby allow the prediction of the organism's likely behavior was a central point in this argument. Darwin's evolutionary perspective entailed that emotion expressions are shared with other (mammalian) species and universal across humans. Yet Darwin's view has been disputed and rejected by those who considered facial expressions as exclusively or predominantly social or cultural signals, and as such learned rather than linked to specific underlying states. One strong position considers emotion expressions to be purely social signals or social constructions unconnected to any specific underlying state.⁷ Notably, this argument is applied to both production and recognition of emotions. Basically, because the expression is not caused by any specific state, it cannot refer to such a state. From this perspective, authors then argue that emotion expressions are per se ambiguous signals, and their social meaning derives largely or exclusively from context information.⁸

However, in some ways the question of what emotion expressions actually express is less important when considering how they are reacted to and interpreted. Specifically, as is amply demonstrated by the use of facial expressions in the arts, films and literature, people understand emotional facial expressions to express an underlying state, namely the emotion felt by the expresser, and they react in function of this understanding. Thus, people treat emotion expressions as if they express emotions and act in accordance. This is the position I will adopt in this paper — I will assume that emotion expressions communicate useful information, which observers attribute to the emotional state of the expresser and use to navigate their social environment. In fact, this claim has already been made by Hebb who noted that

5 Darwin 1872; Fridlund 1994; Fox et al. 2018.

6 Ekman 1994; Fridlund 1994; Russell 1994.

7 E.g. Fridlund 1994; Barrett 2013; Wierzbicka 1992.

8 E.g. Hassin et al. 2013.

independently of whether emotion expressions (in chimpanzees) express emotions, they nonetheless “have value as summary descriptions and predictions of behavior.”⁹

However, not all communicative functions of emotion expressions are in dispute. Less contentious communicative functions of emotion expressions include that they convey information about what the person might do next, i.e. action tendencies.¹⁰ Emotion expressions also convey what the expresser wants the perceiver to do, i.e. appeals.¹¹ Recent evidence for this appeal function of emotions and its link to specific facial expressions has been provided by Scarantino and colleagues.¹² Notably, one does not have to assume that emotion expressions signal an underlying emotional state to appreciate their informativeness regarding action tendencies and appeals. Rather, these functions of emotion expressions can be dissociated from internal emotional states by positing, for example, that facial displays are “social tools” which “aid the negotiation of social encounters” by declaring “what we will do in the current situation, or what we would like the other to do”.¹³

According to appraisal theories of emotion, emotion expressions are linked to the appraisal of the situation by the expresser.¹⁴ These theories posit that a relevant change in the internal or external environment is evaluated according to a number of dimensions such as whether the event is pleasant or unpleasant or whether the change is in line with the motivational state of the individual or obstructs the individual’s goals.¹⁵ Specific emotions are differentiated by the pattern of appraisals they are the result of. Importantly, the way a person appraises a given situation is specific to the individual and the individual’s current state. Factors such as the personality and skills of a person but also contextual factors (e.g. available resources) determine an emoter’s resources, values, and motivations in that specific situation. These in turn define the outcome of their appraisal of an event. Accordingly, the appraisals that underlie an expression inherently provide information about the emotion eliciting situation, but also about the expresser’s values and motivations, their character, and even the norms and standards relevant to an event.¹⁶

Notably, people’s naïve emotion theories tend to be largely consistent with appraisal theory.¹⁷ Hence, people can — based on their naïve emotion theories that

⁹ Hebb 1946, 89.

¹⁰ Frijda 1987; Frijda et al. 1989.

¹¹ Fridlund 1994; Scarantino 2017.

¹² Scarantino et al. 2022; Hess et al. 2023.

¹³ Fridlund, 1994, 130.

¹⁴ Scherer et al. 2018.

¹⁵ See Moors et al. 2013 for a review.

¹⁶ Hess/Hareli 2019.

¹⁷ Hareli 2014.

represent the appraisals — reconstruct the appraisals that underlie other people's emotion expressions.¹⁸ By reconstructing appraisals based on expressions by a process called reverse engineering or reverse appraisal, the observer gains insights into the expressers' goals, values and motivations and through these into their character.¹⁹ For example, an observer, who sees a person react with anger to an injustice can conclude that the person has values according to which the event in question appears unjust, perceives this injustice as incongruent with their own motivational state (which would be to see justice done) and also feels competent to act accordingly. This means that observers can form first impressions about both the expresser and the situation based on their observation of the emotional reactions of others. This information can then be used to navigate the social environment.

Sensemaking

The discussion about whether and how people can accurately decode emotion expressions has been at the forefront of much of the emotion research of the last century. “Accurately” in this context means that observers can decode the emotional state the emoter is expressing (and presumably feeling).

The issue is rendered complex by the fact that to assess accuracy we need an external criterion that establishes ground truth, i.e. a truth value for the emotional state. However, emotional states are posited to be internal states, qualia, that are by definition not observable.

Hence, some researchers have used self-reported emotions during the emotional event that resulted in the emotional expression to establish the “correct” answer.²⁰ Alternatively, many emotion accuracy tests are based on posed expressions and the criterion is predetermined by the creators.²¹ That is, researchers start with the notion that an expressive pattern X is indicative of a given emotion, e.g. anger, and the test then consists of checking whether a given observer of the pattern X associates this pattern with the predetermined label. This approach very much hinges on whether pattern X is indeed indicative of that specific emotion.

¹⁸ E.g. Hareli/Hess 2010; Manstead/Fischer 2001.

¹⁹ Hareli/Hess 2010; de Melo et al. 2014.

²⁰ Hess et al. 2016.

²¹ Profile of nonverbal sensitivity: Rosenthal et al. 1979; Pictures of facial affect: Ekman/Friesen 1976.

For other tests, ground truth was established through expert judgment²² or through cultural consensus.²³ Notably in all these cases, only one pre-determined criterion label is considered correct. That is, this research is largely based on the implicit theory that emotion expressions typically express one and only one emotion at a time.

This idea matches the traditional view of how emotions are decoded outlined by Buck.²⁴ According to Buck, the decoder makes sense of the sender's expressions using a pattern-matching approach that matches specific features of the expression, such as upturned corners of the mouth to a specific emotion, in this case happiness.

However, in everyday life people also use a second strategy that depends on the knowledge that the perceiver possesses regarding both the sender and the social situation in which the interaction takes place. Specifically, people can take the perspective of the encoder and thereby correctly infer the emotional state that the sender is most likely experiencing using their social knowledge about the sender and the emotion eliciting event. For example, learning that someone received good news allows the prediction that the person is now happy rather than disappointed. Even if the observer has less specific information, they can use their knowledge of emotion eliciting situations to narrow down possibilities. For example, knowing that a person just received a pair of brown socks for their birthday may make the notion that the person is disappointed more plausible than the notion that the person shows genuine happiness. By contrast, given the situation, the observer would be unlikely to assume that the person would experience fear or awe at the sight of the socks.

Hess and Hareli propose that, in most situations, observers use perspective taking and their accumulated emotion knowledge to actively make sense of a given expression in its context.²⁵ Such a process involves social knowledge engagement. That is, to be able to use perspective taking to deduce emotional states based on facial expressive information in context, participants engage in social cognition and use theory of mind.²⁶ Recent research suggests that pattern matching and perspective taking actually draw on different brain areas and result in different types of emotion judgements.²⁷

²² E.g. Reading the Mind in the Eyes Test; Baron-Cohen et al. 2001.

²³ Mayer-Salovey-Caruso Emotional Intelligence Test; Mayer et al. 2003.

²⁴ Buck 1984.

²⁵ Hess/Hareli 2019.

²⁶ Hess et al. 2023.

²⁷ Antypa et al. in press.

The problem of “pure” emotions

As noted above, the way emotion recognition has been traditionally measured assumes that emotion expressions signal one and only one emotion. That is, expressions are “pure” representations of a single state. The main problem with this assumption is that it is often not true. In fact, there is even evidence that people often perceive emotions as mixed even when only a “pure” emotion prototype is shown.²⁸ Thus, rather than perceiving an expression as only angry or only sad, people can perceive an emotion expression as *both* sad and angry to different degrees. This form of misperception may be due to the observer’s personality — for example, individuals higher on insecure attachment tend to over-attribute negative affect to peoples’ facial displays²⁹ — or to the observer’s beliefs about the emotionality of the expressor based on the observed behavior. For example, two boys fighting are perceived as less aggressive than two girls fighting, due to the beliefs about the emotionality of boys and girls.³⁰

Another source of the perception of mixed emotions is age-related facial changes.³¹ The wrinkles and folds that are typical for older faces can by themselves create the impression that an emotion is shown. Thus, Hess and colleagues found that when facial wrinkles and folds accompany neutral facial expressions, these expressions were rated as showing more negative affect than when wrinkles and folds were absent.³²

Further and more importantly in this context, there is evidence that emotion expressions are in fact often mixed. That is, “pure” emotion expressions are not nearly as typical as presumed by early research. Most prominently, Cowen and Keltner provided compelling cross-cultural evidence for a large set of emotions that can be recognized based on different communication channels.³³ This set comprises both categorial or “pure” expressions and “blended” or mixed emotions. For example, the categorial emotions anger and disgust are bridged by gradients of composite blended displays.³⁴

Thus, to be able to detect whether participants perceive an emotion as mixed, the way emotion recognition is measured has to be changed. This has in fact been

²⁸ Russell/Fehr 1987; Yrizarry et al. 1998.

²⁹ Magai et al. 2000.

³⁰ Condry/Ross 1985.

³¹ Hess et al. 2012.

³² Hess et al. 2023.

³³ Cowen/Keltner 2021.

³⁴ Cowen/Keltner 2021.

advocated by my colleague Kafetsios and me.³⁵ Specifically, we propose the use of emotion profiles rather than single labels. Emotion profiles allow participants to indicate for each of several emotions to what degree they discern this emotion in the expression.

Feeling mixed emotions

Before discussing the perception of emotions, it is useful to briefly consider what is known about mixed emotion feelings. Theories of emotions that are based on a dimensional view of emotions, such as those proposed by Russell and colleagues,³⁶ assume that emotion or core affect can be fully described by two dimensions: valence and arousal. This model makes mixed emotional states that combine positive and negative, or high and low arousal states (such as for example, anger and sadness) impossible. Constructivist theories such as proposed by Barrett would allow for mixed emotions through the influence of internal and external contextual factors.³⁷

Although appraisal theories of emotion do not usually emphasize mixed emotions, the theory does allow for mixed patterns which by definition would then result in mixed emotions. Nonetheless, based on the logic of the theory, these would then be again considered specific discrete states — for which no common language label may exist. Based on Appraisal Theory, Kreibig and colleagues provide evidence for an emergence account positing that mixed emotions indeed combine appraisal outcomes and physiological patterns typical for their constituent emotions.³⁸

In sum, there is evidence that people experience mixed emotions and that these can be described by considering the expressive patterns associated with the constituent emotions. In the present context, I will however, focus on how mixed emotion expressions are perceived and reacted to. This implies three processes, emotion perception, person perception and emotional mimicry.

³⁵ Kafetsios/Hess 2023; Hess/Kafetsios 2022.

³⁶ Russell/Barrett 1999; Russell 1980.

³⁷ Barrett 2017.

³⁸ Kreibig et al. 2015, 2013.

Perceiving mixed emotions

As noted above, emotion perception is usually assessed by showing photos or videos to participants who then are asked to label these expressions. This poses problems for the assessment of mixed emotions, as — with few exceptions, such as nostalgia and distress — most emotion terms in the English language do not specifically refer to a mixed emotion. And even these terms are not necessarily used in this way. Thus, early mentions of nostalgia in the psychological literature refer to a psychiatric condition related to homesickness.³⁹ The Merriam-Wester definition also only implicitly acknowledges the mixed nature of the emotion: “a wistful or excessively sentimental yearning for return to or of some past period or irrecoverable condition”. It leaves it to the reader to assume that one would be more likely to yearn for something positive and experience its absence as something negative. Distress refers to an undifferentiated emotion that can include anxiety and depression.⁴⁰ The literature on infant expressions refers to undifferentiated — or at least difficult to differentiate — expressions that include components of crying or grief (sadness) and other emotions including anger.⁴¹ The discussion around this expression points to the possibility that very young children may not actually experience these emotions differently.

Kreibig and Gross make a number of suggestions on how to assess the presence of mixed emotions in the emoter.⁴² Based on the emergence theory mentioned above,⁴³ one option to assess perception is to use scalar emotion profiles⁴⁴ that include the constituent emotions of the mixed expression.

Facial mimicry

Emotion communication includes not only the sending, decoding and interpreting of expressions but also the observers’ own reactions to the observed expression. One such reaction is emotional mimicry — the imitation of the emotional behavior

³⁹ McCann 1941.

⁴⁰ Matthews 2016.

⁴¹ Mesman et al. 2012.

⁴² Kreibig/Gross 2017.

⁴³ Kreibig et al. 2013, 2015.

⁴⁴ Kafetsios/Hess 2023; Hess/Kafetsios 2022.

of others.⁴⁵ The Mimicry as Social Regulation Model⁴⁶ posits that emotional mimicry serves an important regulatory function for interacting dyads. Importantly, mimicry fosters positive affiliative interactions. For example, people who are mimicked are more likely to help others.⁴⁷ This relationship is not unidirectional, because emotional mimicry also serves to increase perceived similarity and liking of the mimicker.⁴⁸ As a social signal, mimicry indexes a benign interpersonal stance and thereby creates the basis for social warmth. On the other hand, when people do not mimic, they send a subtle but potent signal of social rejection and negativity. Importantly in this context, the Mimicry as Social Regulator Model⁴⁹ further posits that people do not mimic specific muscle movements but rather what they understand about the emotions of the other. Yet, if people mimic what they understand, then the interpretation of the signal by the perceiver becomes crucial to mimicry. That is, the mimicry of mixed emotions should be linked closely to the perception of mixed emotions.

Inferences from mixed emotions

People rapidly and spontaneously make judgments about the personality of others based on appearance cues.⁵⁰ One classic study found that varying only one aspect of a photo (for example, adding glasses) impacts on the perceived personality of the depicted person.⁵¹ But appearance also sends signals regarding the social group membership of the person, including such aspects as gender, age, and ethnicity, all of which impact on emotion perception. Much of the research on person perception focuses on such facial appearance cues,⁵² but, as noted above, emotion expressions are another potent signal, which through reverse engineering can provide insights into a person's character.⁵³ In what follows, I will discuss research from my laboratory that addresses these issues.

⁴⁵ Hess/Fischer 2013.

⁴⁶ See Hess/Fischer 2013.

⁴⁷ Fischer-Lokou et al. 2011; Van Baaren et al. 2004.

⁴⁸ Stel et al. 2008; Yabar/Hess 2007.

⁴⁹ Hess/Fischer 2013, 2022.

⁵⁰ See, e.g. Kenny 2004; Todorov/Uleman 2003, 2002.

⁵¹ Thornton 1943.

⁵² See e.g. Sutherland/Young 2023; Hess et al. 2023.

⁵³ Hareli/Hess 2010.

Perceiving and mimicking mixed emotion expressions

As noted above, the perception and mimicry of emotion expressions are closely related. Hence, I will discuss these two processes together to present pertinent results from several studies on mixed emotion expressions.

An initial study used an extreme form of a mixed emotion expressions – facial chimeras.⁵⁴ To create these, faces showing different emotions are cut in half length-wise and recomposed (see Figure 9). Interestingly, research on chimeric faces suggests that most people will focus on the expression shown on the left side of the chimeric face. Thus, a happy/sad chimeric face like the one on the left side of Figure 1 will be perceived as happier than the reverse chimera, which will be perceived as sadder even though the same information is provided in both cases.



Fig. 9: Happy-Sad and Sad-Happy chimeras.

⁵⁴ Mauersberger et al. in preparation a.

In our study, we used real faces to create the chimeras. Participants used a continuous scale from sad to happy. Thus, a balanced mix would be indicated in the middle. As expected, chimeras with a happy left face were rated as happier than chimeras with a sad left face.

In line with theory, mimicry of the expression varied with the rating, such that participants showed a happy expression when they had rated the chimera as happy and more so, the happier they had rated the chimera. Conversely, they showed a sad expression when they had rated the chimera as sad and more so, the sadder they had rated it.

These findings seem to suggest that mimicry is driven by the specific discrete label that participants applied to the expression. That is, once participants had perceived the expression as either more sad than happy or more happy than sad, they reacted to the expression as if it was simply a weaker or stronger version of a “pure” happy or sad expression.

This is in line with the mimicry as social regulation model proposed by Hess and Fischer which posits that emotional mimicry depends on sensemaking — people mimic the emotion they attribute to the expresser.⁵⁵ Since they quite definitely were able to see the other emotion as well, this also supports the notion that people do not simply mimic what they see. Granted, it would be somewhat difficult to produce expressions that match chimeras, but an alternative could have been to not mimic at all.

Importantly, these findings also seem to suggest that participants might strive for a discrete answer. In fact, a histogram of the emotion ratings shows a clear bimodal distribution with a dip in the range around zero. That is, fewer participants indicated that they perceived a balanced mix of happiness or sadness, but rather they tended to indicate one of these emotions as the dominant one.

One may argue that the chimeras are extreme examples of mixed emotions, and that people strive for a clear answer because such expressions cannot occur in nature. This issue was addressed by a second study.⁵⁶ Here we used avatars which showed either happiness, sadness or a “miserable smile”, that is, a smile combined with a sad frown. We used avatars because these allowed us to control the mixed expressions better. People generally react to avatars in the same way that they react to human faces.⁵⁷ Participants rated the avatar expressions on a series of separate emotion scales — that is, they could indicate whatever mix they perceived. In this study, however, we added contextual information. Specifically, participants either

⁵⁵ Hess/Fischer 2013.

⁵⁶ Mauersberger et al. in preparation a.

⁵⁷ Likowski et al. 2008.

saw scenes, heard music, or read a text that indicated that the expression occurred either in a wedding or a funeral context. It turned out that this contextual information impacted on all expressions, that is, happy, sad and mixed expressions were all rated as somewhat sadder in the funeral context and somewhat happier in the wedding context, but in all cases, this effect was small (that is, the context did not determine the emotion rating but just caused a small change in intensity).

However, context in combination with the perception of the stimuli as more or less happy versus sad had a striking effect on mimicry. To assess the dominant perception, we created a variable that subtracted sadness from happiness ratings. It turned out that participants who rated mixed expressions as predominantly happy in the wedding context also showed happiness, whereas participants who rated the exact same mixed expressions as sad in the funeral context showed sadness. In all other cases no mimicry was found.

In a further study we combined two types of mixed emotion expressions.⁵⁸ First, we created avatars that appeared either old or young. As noted above, the wrinkles and folds of the aging face tend to appear “emotional” and interact with emotion expressions to create mixed expressions.⁵⁹ Both young and old avatars were shown with either a “pure” positive emotion (happiness) or a distress expression blended from sad and anger components. We investigated these mixed expressions with regard to both emotion perception and emotional mimicry.

For this, Mauersberger and colleagues asked participants to rate the expressions using emotion profiles.⁶⁰ They found that joy expressions shown by old-appearing avatars compared to young-appearing avatars were rated as showing more negative affect. Further, to the degree that a given joy expression was perceived as also showing negative affect (that is a mixed emotion), joy was mimicked less. For distress — the blended expressions with features of both sadness and anger — participants rated expressions by old-appearing avatars as showing more anger. Further, expressions with a higher anger content were mimicked more.

These findings illustrate, on the one hand, the powerful impact of facial wrinkles on emotion communication. On the other hand, as with the findings in the study of chimeras, we found that the specific emotion that dominates the attribution of emotions to the emoter seems to drive mimicry. This suggests that mimicry relates to an implicit categorization that participants perform when they see a blended expression. As such, this also hints at the notion that naïve emotion theories

⁵⁸ Mauersberger et al. in preparation a.

⁵⁹ Hess et al. 2012.

⁶⁰ Mauersberger et al. in preparation b.

may be based around discrete emotions and thus blends are “sorted” into discrete categories.

This idea, that blends are sorted into “simpler” categories, was also supported by a study focusing only on emotion perception. Hess and colleagues created mixed expressions by using morphing software to create blends between sad and angry expressions of the same person.⁶¹ Expressions were morphed to contain 0, 30, 40, 60, 70 and 100% anger mixed with an expression of sadness in proportion to these percentages. Participants then rated the expression on an emotion profile. We subtracted the anger from the sadness rating to assess which expression was more dominant.

Participants essentially sorted the expression into sad (0-40% anger), mixed (60 and 70% anger) and angry (100% anger). Notably the sorting was not balanced. That is, only expressions that were 100% angry were seen as predominantly angry. But expressions with up to 40% anger admixture were seen as predominantly sad. Expressions with 60 or 70% anger were rated as about equally sad and angry. These findings not only support the notion that participants try to “sort” mixed expressions into simpler categories but also suggest that this sorting might be biased. Given that anger signals threat, one might have anticipated that observers would be especially sensitive to this information, but contrariwise, they only considered the expression as clearly angry when in fact it did not contain any other information. This might point to the possibility that blended anger is considered comparatively less threatening.

Another possibility for observers to “simplify” perception is to assign a different label to mixed emotions. That is, a label that does not settle on one or the other constituent emotion labels but rather on a different one altogether. To explore this option, we conducted a study in which participants in one condition had to choose a single label and in the other used an emotion profile like the ones above.

In this unpublished study, we combined different upper and lower facial expressions similar to the “miserable smile” used by Mauersberger and colleagues.⁶² In this case, we combined upper face sadness and lower face anger or the converse. Such expressions can be observed when individuals cry when they are angry and hence evidence of both sadness and anger is visible.

When presented with single labels, participants chose most of the time a label that matched one of the constituent expressions and in particular the one that matched the upper face expression. Similarly, in the emotion profiles sadness was rated most intensely when upper face sadness was combined with lower face anger.

⁶¹ Hess et al. in preparation.

⁶² Mauersberger et al. in preparation a.

By contrast, anger was rated more intensely when the upper face showed anger, even though this difference was less pronounced. However, in about 30% of the cases, a different emotion label such as disgust, contempt, or surprise was chosen.

As we can see, it is possible that participants will use an emotion label that does not correspond to either of the constituent expressions. Further research on this phenomenon is needed, but the label chosen most likely depends on specifics of the mixed expressions and the facial morphology of the expresser.

In sum, mixed emotion expressions are complex signals that may be difficult to interpret. The studies reported above suggest that observers typically settle on one of the constituent emotions when they label mixed expressions and facial mimicry is strongly driven by this choice. That is, participants will react with the expression that matches their choice of label for the mixed expression. Together, this seems to suggest a preference for emotion expressions that can in fact be labelled. I will discuss this notion in the next section.

Inferences from mixed emotion expressions

As noted above, people tend to draw inferences about a person based on their facial appearance and specifically their facial expressions. Most of the studies reported here also included questions that assessed how close participants felt towards the expresser or how much they liked them. If people prefer pure emotions over mixed emotions, then we would assume that people like expressers less when they show mixed emotions.

To assess this notion, we went back to some of our studies and calculated bias scores.⁶³ These scores capture the degree to which participants perceive a given facial expression as expressing more than one emotion. That is, the higher the bias score the more mixed the emotion appears to be. In three studies using mixed emotion expressions we found the higher the bias score, the lower the liking and the less close the observer felt towards the expresser.⁶⁴ That is, people seem to prefer individuals whose expressions they can readily label over those who show mixed emotions.

It is interesting to speculate why this is the case. The emotions we perceive in others provide information about the other's planned actions in the form of action tendencies, what the other may want us to do (in the form of appeals) as well as the

⁶³ Kafetsios/Hess 2023; Hess/Kafetsios 2022.

⁶⁴ Mauersberger et al. in preparation a, in preparation b; Kastendieck et al. forthcoming.

other's character. We use this information to navigate our interactions. In the introduction, I noted that the research on these phenomena has focused on “pure” emotional states. However, it is noteworthy that research using free labeling and/or large numbers of natural (and therefore in part at least also mixed) expressions does not seem to point to action tendencies or appraisals that are specific to mixed states.

Notably, even though there is good evidence that emoters experience and show mixed emotions, neither the English nor the German language (which were used in these studies) has many emotion labels that describe mixed emotional states. In fact, there are very few (such as “miserable smile”) and they are not very commonly used. Yet, research on emotional intelligence emphasizes the importance of emotion knowledge and indeed the ability to label emotional states.⁶⁵ The underlying idea is that good labeling ability will allow us to store similar events and their outcomes in memory and learn to cope better with such events in the future. Notably, retrieving emotion knowledge seems to require an emotion label.⁶⁶ In this vein, Lindquist concludes that emotion category labels may serve as a form of context that helps disambiguate the meaning of others' affective behaviors.⁶⁷ Mixed emotions do not lend themselves to any simple form of labelling.

Perhaps observers recur to pure emotions when reacting to the emotions of others, to simplify the situation. As suggested by Hess and colleagues this simplification may take such issues as perceived threat into consideration.⁶⁸ For example, perceivers may use an implicit rule such as *I can ignore this anger because there is so much sadness that it will make no difference*. They can then deal with the situation according to this simplified reasoning. From this perspective, people who show mixed emotions make life difficult for the observer and this may be why they are liked less.

Conclusion

The present overview shows that mixed emotion expressions are complex social signals. Previous research on “pure” emotion expressions shows that observers use them to draw conclusions about an interaction partner's internal state and based on this the likely personality of the expresser, which influences how they react to

⁶⁵ Salovey/Mayer 1989–1990.

⁶⁶ Shaver et al. 1987.

⁶⁷ Lindquist 2021; Barrett et al. 2007; Lindquist/Gendron 2013; Lindquist et al. 2015.

⁶⁸ Hess et al. in preparation.

the expression. These processes also occur for mixed emotions. Notably however, to do this, observers base themselves on their emotion knowledge, that is, the cognitive scripts that they have for each emotion; for example, that a happy expression suggests that something positive happened or conversely that someone who has experienced something positive will likely show a happy expression. This type of knowledge, which relates to the antecedents and consequences of emotions as well as to ways to regulate them, is part of the concept of emotional intelligence⁶⁹ and is the foundation of socially adaptive behavior.

Influential research on the organization of emotion knowledge proposes that this knowledge is organized by prototypes with a generic or core form of the emotion determining the common elements.⁷⁰ An example could be anger which shares core appraisals and outcomes with related words such as rage, scorn or resentment.

Given that European languages have very few labels for mixed emotions, this raises the question of how mixed expressions are related to emotion knowledge. Shaver and colleagues propose that what they call blended emotions would share core elements of the constituent emotions.⁷¹ They discuss the example of feeling hurt which shares with anger the element of a feeling that an injustice was done and with sadness the lack of ability to redress the situation. This proposal echoes the emergence account by Kreibig and colleagues discussed above, which also proposes that mixed emotions combine elements of the constituent emotions. To the degree that appraisals directly predict facial expressive elements⁷² this would then also apply to facial expressions.

This, however, suggests that knowledge about mixed emotions is cognitively less accessible. In fact, unless the same mixed emotion is encountered on a regular basis, it really means that to a certain extent mixed emotions have to be constructed in the moment as proposed by some neo-constructionist theories.⁷³ Yet it has been suggested that perceptual fluency enhances evaluations, presumably reflecting a (mis)attribution of the affect elicited by the easiness of the task to the target. Based on this idea, a fluency effect on person perception ratings based on pure versus mixed emotions has also been suggested.⁷⁴

Altogether, this suggests that when faced with mixed emotion expressions, participants may want to go “the easy route” by labeling the emotion in line with one

⁶⁹ Salovey/Mayer 1989–1990.

⁷⁰ Shaver et al. 1987.

⁷¹ Shaver et al. 1987.

⁷² Kaiser/Wehrle 2001.

⁷³ Barrett 2017.

⁷⁴ Winkielman et al. 2015.

dominant emotion perception. This in turn would explain, why in such cases mimicry will reflect only this one emotion component. The lack of fluency then would explain why individuals who show such emotions are perceived less positively. In short, mixed emotions are burdensome to the perceiver and disliked for that reason.