Chapter 9
Why the Same Expression May Not Mean the Same When Shown on Different Faces or Seen by Different People

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> A man's face is his autobiography. A woman's face is her work of fiction.
> Oscar Wilde

Abstract This somewhat sexist quote by Oscar Wilde points nonetheless to two important issues about faces. First, faces seem to tell us about who the other person is, and second, we may be misled by them. The present chapter has the goal to present some findings about the importance of faces in the context of emotion communication. Most research on emotion considers the face as if it were a blank canvas with no meaning of its own. However, as we show, faces convey information relevant to the interpretation of emotion expressions and they have a meaning of their own which interacts with the facial expression shown.

Because faces tell us about who the other person is, we may also not use the same cues when interpreting the facial expressions of different people. That is, when it comes to interpreting emotional facial expressions it really matters who shows what to whom and in which context (Hess, Beaupré, & Cheung, 2002). This in turn has relevance for the use of emotion expressions in human–machine interfaces. Agents are made to express emotions so as to facilitate communication by making it more like human–human communication (Koda & Maes, 1996; Pelachaud & Bilvi, 2003). However, this very naturalness may mean that an agent may fail to convey the intended message because of the way it looks and the biases in perception and interpretation that this may entrain. It is therefore important to not only focus on creating believable expressions but also to keep in mind that the face on which these expressions appear is not an empty canvas. In what follows we present two examples of

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how faces interact with emotion expressions and how information transmitted by faces may change the way facial cues are interpreted.

9.1 What Information Do Faces Provide?

Research on personality judgments at zero levels of acquaintance suggests that overall people can and do draw conclusions about a person's personality from no more information than provided by the face, even though accuracy varies widely and is dependent on both encoder and decoder personality (e.g., Ambady, Hallahan, & Rosenthal, 1995). However, more important in the present context, faces tell us who our interaction partner is. If we do not know the person we interact with, faces tell us the sex, age, and race of the other person. This information is important for the decoding of facial expressions. Specifically, the decoding of emotion displays can be based on either or both of two important sources of information: the sender's emotion displays and knowledge about the sender. It is with regard to this second source of information that the information that faces provide becomes relevant.

If the sender and the receiver know each other well, the receiver usually is aware of the sender's personality, beliefs, preferences, and emotional style. This knowledge permits the receiver to take the perspective of the sender and to deduce which emotional state the sender most likely experiences in the given situation. For example, a given expression of happiness in a person we know to be very gregarious may be interpreted as suggesting less happiness than would the same expression when shown by a person known to be very timid.

This may indeed be the most effective approach to the decoding of emotion displays in many situations (see e.g., Wiggers, 1984) and studies on emotion communication between interaction partners who know each other well, for example, in marital interactions, underscore the importance of previous knowledge for emotion communication (e.g., Guthrie, & Noller, 1988). Yet, when interaction partners do not know each other this knowledge can be replaced with knowledge and beliefs about the groups to which the interaction partners belong (Karniol, 1990; Kirouac & Hess, 1999). In fact, we have very strong beliefs about the likely emotional reactions of others, based simply on their ethnic background, gender, and age.

9.2 Beliefs About Emotions

9.2.1 Beliefs About the Emotions of Members of Different Ethnic Groups

People in fact hold beliefs about the emotionality of a variety of members of other cultures. In a questionnaire study we found, for example, that people from Quebec consider members of their own group to be not very likely (21%) to react with antagonistic emotional behaviors to a negative emotional event, but they consider

North-African women to be even less likely (12%), whereas South-American men are perceived to be more likely (46%) to do so.

Beliefs about different ethnic groups' emotional behavior have been most consistently studied in the context of research on decoding rule differences between collectivist Japanese and individualist U.S. American decoders (Matsumoto, 1992; Matsumoto, Kasri, & Kooken, 1999; Matsumoto & Kudoh, 1993; Yrizarry, Matsumoto, & Wilson-Cohn, 1998). Decoding rules (Buck, 1984) are the flip side of display rules. Display rules in turn are culturally learned rules that define when to show what emotion and how to show it (Ekman & Friesen 1971). Conversely, people who are aware of such rules will adjust their interpretation of the emotional expressions of others in function. For example, U.S. Americans are usually encouraged to show emotions, especially positive emotions and tend to show emotion more intensely than warranted by the underlying feeling state. This is not the case in Japan. Consequently, U.S. Americans attribute less intense underlying emotions to expressions of the same intensity than do Japanese (Matsumoto et al., 1999); that is, they "correct" their estimate of a person's feeling state based on the decoding rule that people are likely to exaggerate their expressions.

9.2.2 Beliefs About the Emotions of Persons of Different Age

People also have beliefs about age and emotionality. In a recent study we showed participants photos of individuals from four different age groups (18–29; 30–49; 50–69; 70+) and asked them to indicate how likely they thought it that the person shown in the photo would express each of four emotions (happiness, sadness, anger, and fear) in everyday life. The responses differed with regard to both sex and age. Thus, as they get older, men were perceived to be less likely to show anger whereas the reverse was the case for women. Men were also perceived as more likely to show sadness as they get older.

9.2.3 Beliefs About Men's and Women's Emotionality

As mentioned above, beliefs about emotionality are strongly influenced by the sex of the expresser. In fact, one of the best-documented gender stereotypes regards men's and women's emotionality. Thus, women are generally believed to be more expressive of all emotions except anger, which is perceived to be more typical for men (Fischer, 1993). These expectations are socialized early and can have dramatic consequences for the perception of emotion in others. For example, even children as young as five years tend to consider a crying baby as 'mad' when the baby is purported to be a boy but not when it is purported to be a girl (Haugh, Hoffman, & Cowan, 1980). Thus, the 'knowledge' that the baby was a boy or a girl biased the perception of the otherwise ambiguous emotion display.

These beliefs can also lead people to expect different emotional behaviors from men and women, even when they do not expect them to actually feel differently about a situation. For example, when presented with a vignette that describes a person who just learned that his or her car was vandalized, participants rated the person as very likely to be angry, regardless of whether the person was described as a man or a woman (Hess, Adams, & Kleck, 2005). Yet, whereas a man is then expected to show this anger, a woman is expected to show sadness instead.

However, in this case we also found a second – and opposite – stereotype at work: a stereotype based on the perception of the person as high versus low dominant. Specifically, if the woman was described as highly dominant she was expected to show anger to the same degree as a man. In a similar vein, men are expected to show less happiness unless they are described as high in affiliation, in which case they are expected to smile even more than women. In sum, the judgement of the appropriateness of showing anger or happiness was heavily dependent on the perceived dominance and affiliation of the protagonist, and not just the product of gender category membership per se.

This latter observation is very relevant to the present argument because one important source of information about a person's dominance and also affiliativeness is the human face (Hess, Adams, & Kleck, 2004; Keating, 1985; Senior, Phillips, Barnes, & David, 1999). That is, just seeing a person's face provides information on dominance, affiliation, age, and gender, all of which moderate expectations as to how the person will react in a given situation and may thereby bias the perception of ambiguous expressions (Kirouac & Hess, 1999). This can have a pervasive influence on interaction with quasi-strangers because most spontaneous facial expressions tend to be somewhat ambiguous (Motley & Camden, 1988) and only group-based additional information is available.

9.2.4 Facial Expressions Signal Dominance and Affiliation

However, the situation is further complicated by the fact that emotional facial expressions also are powerful signals of dominance and affiliation. Specifically, drawing the eyebrows together in anger leads to increased attributions of dominance, whereas smiling leads to increased attributions of affiliation (Hess et al., 2000a; Knutson, 1996). At the same time, anger expressions are perceived as threatening (e.g., Aronoff, Barclay, & Stevenson, 1988), whereas smiles are perceived as warm, friendly, and welcoming (see, e.g., Hess, Beaupré, & Cheung, 2002). Similarly, it has been argued that fear expressions elicit affiliative reactions in conspecifics (Bauer and Gariépy, 2001; Marsh, Adams, and Kleck, 2005). Recent work using connectionist modeling also provides evidence for a perceptual overlap between the physical cues of babyfacedness versus maturity and the meanings derived from them along the dominance and affiliation continua on one hand and facial expressions. In fact, objective indices of babyfaceness partially mediated impressions of the emotion expressions (Zebrowitz, Kikuchi, & Fellous, 2007). For a review of related work using principal components analyses see also Calder and Young (2005).

This suggests that emotional expressive behavior can serve to mimic or simulate certain morphological traits linked to size or juvenescence that are important for social species including humans and thus confer an evolutionary advantage (Marsh et al., 2005). Consistent with this line of reasoning, there is evidence that humans tend to confuse morphological with expressive traits (Malatesta et al. 1987a,b).

9.3 Functional Equivalence Hypothesis

Darwin (1872/1965) first noted the equivalence between certain emotional behaviors in animals and more enduring morphological appearance characteristics. Importantly in the present context, he proposed that piloerection and the utterance of harsh sounds by 'angry' animals are 'voluntarily' enacted to make the animal appear larger and hence a more threatening adversary (see, e.g., pp. 95 and 104).

Taking up this notion, Hess, Adams, and Kleck, (2007) proposed that some aspects of facial expressive behavior and morphological cues to dominance and affiliation are equivalent in both their appearance and their effects on emotional attributions. Such a functional equivalence between morphology and expression also implies that there are important interactions between facial expressions and facial morphology in the decoding of expressions of emotion. Specifically, persons with dominant-appearing faces may not only be perceived as particularly capable of anger but also when anger is expressed on such a face it should be seen as quite intense. Likewise a more affiliative-appearing face displaying happiness may be seen as happier than would a less affiliative face displaying the identical facial movement.

We initially tested the functional equivalence hypothesis by examining differences in the attribution of emotions to men and women (Hess et al., 2004, 2005). As mentioned above, individuals attribute higher levels of emotional expressivity to women than to men with the exception of anger, which is seen as more frequent in men (see, e.g., Fischer, 1993). This pattern is also found when participants are presented with vignettes describing a specific emotion-eliciting event (Hess et al., 2000b). These stereotypical expectations regarding men and women's emotionality seem to be strongly normative (Hess et al., 2005).

And indeed men's and women's faces differ in ways that make men appear more dominant and women appear more affiliative. As mentioned above, we postulate that facial expressions can also make faces appear more dominant and affiliative and thereby more or less male or female. This is because smiling enhances the appearance of the roundness of the face, a female sex marker and a marker of babyfacedness, which signals warmth and affiliative intent. Conversely, those aspects of the face that make a face appear both dominant and masculine are made more salient by anger expressions. Specifically, the tightening of the lips in anger makes the mouth region appear more square and the drawing together of the eyebrows enhances the apparent thickness of the eyebrows. Thus, these expressions resemble both the morphological markers for the perceived behavioral intentions of dominance and affiliation. In addition, they are among the markers for sex.

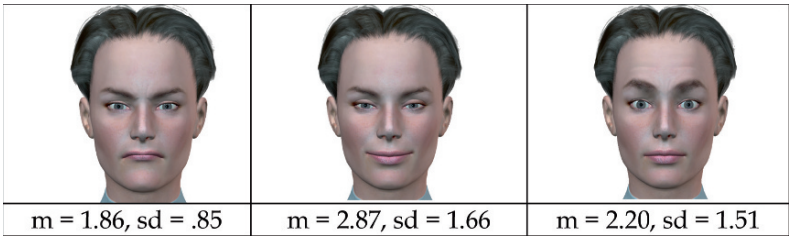

Fig. 9.1 Rated likelihood that 'this person is a woman' for an avatar showing anger, smiling, and a fearful expression.

In fact, this relation among emotion expression, dominance and affiliation, and gender is so strong that it can reverse bias; that is, the facial expression shown by an androgynous face can bias the assignation of gender to this face, such that in a recent study we found that an avatar who shows a happy or fearful expression is perceived as more likely to represent a woman and an avatar who looks angry is considered to be less likely to represent a woman (see Figure 9.1).

And in fact, this perceptual overlap seems to explain the beliefs that people have about men's and women's emotionality. Specifically, Hess et al. (2005) asked separate groups of participants to rate men's and women's neutral faces either with regard to how dominant or affiliative they appeared or with regard to the likelihood that the person in the photo would show a series of emotions in everyday life. They found that as expected, actor sex was related to dominance and affiliation such that men were perceived as more dominant and women as more affiliative. After statistically controlling for the influence of actor sex, perceived dominance was significantly positively related to the disposition to show anger, disgust, and contempt, and significantly negatively related to the actors' perceived disposition to show fear and sadness. However, perceived dominance was not related to the disposition to show surprise or happiness. Conversely, and again after controlling for the effect of actor sex, perceived affiliativeness was significantly positively related to the perceived disposition to show happiness, surprise, and fear and significantly negatively related to the perceived disposition to show anger, disgust, and contempt.

Mediational analyses showed that the tendency to perceive women as more likely to show happiness, surprise, sadness, and fear was in fact mediated by their higher perceived affiliation and lower perceived dominance, respectively. The tendency to perceive men as more prone to show anger, disgust, and contempt was partially mediated by both their higher level of perceived dominance and their lower level of perceived affiliation (see Figure 9.2). That is, if men and women were perceived to be equal on these dimensions, then we would not expect observers to rate their emotionality differently.

More recently, we could show that this also is the case for the beliefs about age and sex mentioned above. That is, the notion that men are less prone to anger as they get older and women more so, with the converse for happiness, is mediated through the fact that as they get older men appear less dominant and more affiliative, whereas women appear more dominant and less affiliative.

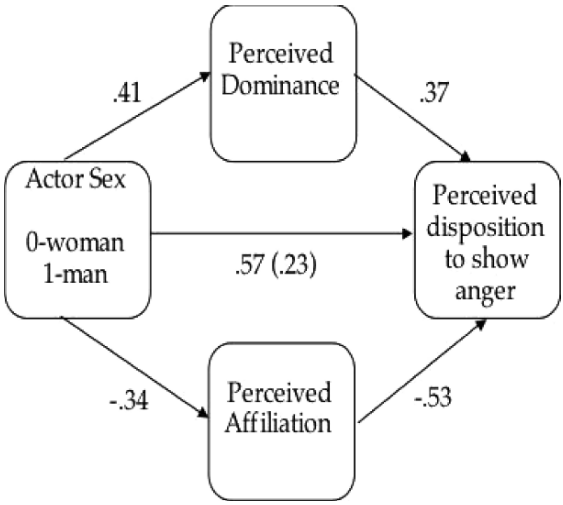

Fig. 9.2 Mediation of expectations regarding men's and women's emotionality via perceptions of facial dominance and affiliation.

Fig. 9.3 Changing hairstyles to change perceived gender.

With regard to gender this notion could also be tested experimentally. Specifically, the interior of the face contains markers of dominance and affiliation (i.e., square jaw, heavy eyebrows), whereas hairstyle is a very potent marker of sex but not of social motives. Thus, by combining androgynous interior faces with male and female hairstyles, apparent men and women with identical facial appearance can be created (see Figure 9.3).

For both neutral faces and posed emotion displays (Adams et al., 2007, Study 4; Hess et al., 2004, Study 2) parallel findings obtained such that for ratings of anger and happiness, a pattern opposite to the gender stereotypical pattern was found. That is, when equated for facial appearance, apparent women were seen as more likely to show anger and less likely to show happiness than were apparent men. Similarly, expressions of anger by apparent women were rated as more intense and their expressions of happiness as less intense than when the identical expressions appeared on the faces of apparent men.

This reversal demands an explanation as it suggests that intrinsically, facial appearance being equal, women are perceived as more anger prone and less likely to be happy than are men. We propose that this reversal is due to the equivalence between morphological and expressive cues of dominance and affiliation, which leads to an interaction between these two sets of cues. That is, anger expressions emphasize some of the features that make a face appear dominant (e.g., the mouth region often appears especially square, and frowning reduces the distance between eyebrows and eyes). Conversely, smiling enhances the appearance of roundness of the face that is associated with perceived affiliation motivation and babyishness.

Due to the manner in which the present stimuli were constructed, the expressive cues for anger and happiness were not 'compensated for' by gender typical appearance (the faces were chosen specifically because they were androgynous and were credible as either male or female). In some ways one could say that by depriving the interior of the face of clear gender cues we actually amplified the expressive cues to anger in women and happiness in men, which are normally 'obscured' or reduced by the gender typical facial appearance which also conveys dominance and affiliation. This notion that anger on a male face presents a clearer and less ambiguous anger signal than anger on a female face and the converse, that happiness on a female face, is a clearer signal of happiness has recently been confirmed by Hess, Adams, and Kleck, (2007).

To reiterate, we are arguing that facial morphology and certain emotional expressions are parallel messaging systems with regard to the emotion inferences they generate. However, to the degree that both morphology and expression have to use the same 'canvas' to communicate, there is a possibility of perceptual interference. Specifically, some of the same facial features that signal dominance and affiliation are used in expressive behavior and hence change appearance. In this process the facial appearance cues can either enhance or attenuate the perceived intensity of the expression. The implications of these findings for more general person perception processes should be obvious.

Hess, Adams, and Kleck, (2007) also report the results of an experiment designed to assess the relative contributions of gender, the gender role stereotype, and facial appearance on men and women's perceived emotionality. The findings suggest that even though both of the latter do influence these perceptions, gender per se does not. This implies that knowledge about gender roles and the perceptual effects of facial morphology combine to make men appear more anger prone and their expressions more angry whereas women are seen as more likely to smile and their smiles to be indicative of greater happiness.

In sum, emotional facial expressions via their shared signal value with morphological trait cues signal behavioral intentions to perceivers. In turn, the morphological cues contained in the face tend to bias the decoding of emotion expressions in a manner consistent with those cues. Thus, men's anger and women's smiles are stronger signals for these specific affects because they are supported by an underlying facial morphology consistent with each of those expressions. Conversely, women's anger and men's smiles are partially veiled by the morphological context in which they are shown.

The research by Hess et al. (2004, 2005, 2007) serves to highlight the influence of facial morphology on the perception and interpretation of emotional facial expressions. In a similar vein, Marsh, Adams, and Kleck, (2005) found evidence for functional equivalence between mature versus babyfacedness and the signal value of angry versus fear faces. Yet, it is clear that not all traits that may be attributed to a person on the basis of facial appearance have a functional equivalence in expressive displays. There is no evidence, for example, that facial expressions lead to such trait attributions as trustworthiness or conscientiousness even though these are also traits of great relevance to a social species.

Overall the research presented above outlines the impact that a face has on the perception of facial expressions. This applies also to the avatars and agents used in human–computer interfaces. Thus an agent with a very square masculine face may not be a good choice if warmth and care are to be transmitted.

However, as mentioned above, the face on which an expression appears may also determine the cues that are used for the interpretation of the expression. In what follows we present data suggesting that the authenticity of a smile is evaluated differently depending on who shows the smile.

9.4 Authentic Smiles

In Western society smiling is a highly valued behavior. People who smile are generally perceived more positively. This effect was first reported by Thornton (1943) who found that smiling individuals tend to be rated higher in kindliness, honesty, and sense of humor. Numerous studies have found similar effects for other positive personality traits. For example, people who smile are perceived as more pleasant (Mueser, Grau, Sussman, & Rosen, 1984), sincere, sociable, and competent (Reis, Wilson, Monestere, & Bernstein, 1990) as well as more honest (Ruback, 1981). According to Deutsch, LeBaron, and Fryer, (1987) smiling individuals are perceived not only as happier, but also as more carefree, more relaxed, and more polite. Furthermore, the frequency of smiling by an individual affects the amount of warmth perceived by others (Bayes, 1972; Deutsch et al., 1987; Lau, 1982). In addition, smiling increases ratings of attractiveness (McGinley, McGinley, & Nicholas, 1978; Mueser et al., 1984; Reis et al., 1990). Sandow (1997) found that eight- to ten-year-olds draw both 'nice people' and 'clever people' as smiling. Smiling also elicits greater leniency towards an individual accused of an academic transgression, even

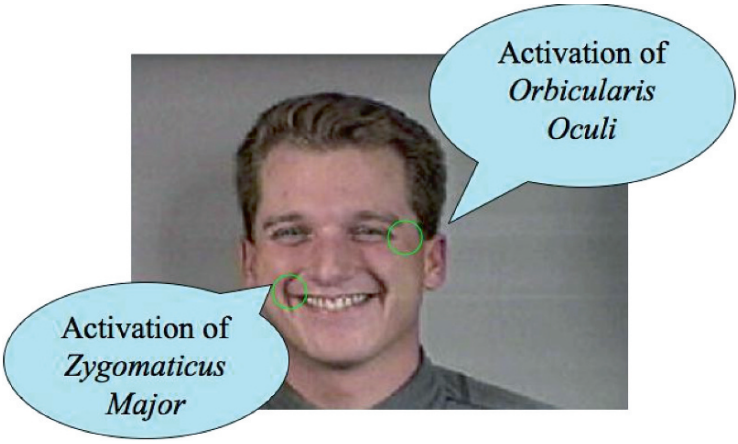

Fig. 9.4 Duchenne smile.

though the smiling transgressor is not judged as less guilty than the nonsmiling transgressor (LaFrance & Hecht, 1995). By contrast the absence of smiling is often perceived as hostile or indicative of negative intent.

However, for a smile to have these positive effects it has to be perceived as authentic (Bugental, Kaswan, & Love, 1970). Research on smiles has shown that smiles that are perceived as authentic or "felt" differ systematically from smiles that are not so perceived (Duchenne, 1862/1990; Ekman, Davidson, & Friesen, 1990; Ekman, Hager, & Friesen, 1981; Frank, & Ekman, 1993) Authentic and inauthentic smiles differ in terms of timing parameters (Hess, Kappas, McHugo, Kleck, & Lanzetta, 1989; Hess & Kleck, 1990, 1994), degree of left–right asymmetry (Ekman et al., 1981) and in particular, the presence and absence of the so-called Duchenne marker, the activation of *Orbicularis Oculi*, which creates wrinkles around the eye, in addition to *Zygomaticus Major*, which pulls up the corners of the mouth (Duchenne, 1862/1990; Ekman et al., 1990) (see Figure 9.4).

However, recently Thibault, Thibault, Levesque, Gosselin, and Hess, (2007) noted that the research on smile authenticity had been restricted to Western countries and questioned whether the same cues would be used in other cultural contexts. This notion was based on nonverbal dialect theory, which proposes the presence of cultural differences in the use of emotional expressions that are subtle enough to allow accurate communication across cultural boundaries in general, yet substantive enough to result in a potential for miscommunication (Elfenbein, & Ambady, 2002, 2002; Marsh, Elfenbein, & Ambady, 2003).

Thibault et al., (2007) showed smiles that differed in intensity as well as in the presence and absence of the Duchenne marker shown by individuals from Quebec, Gabon, and Mainland China to members of these same three groups and asked them to specify how authentic each smile appeared to them. The results were most interesting. In what follows we focus on the perception of three types of smiles, a weak smile without Duchenne marker and medium intensity smiles with and

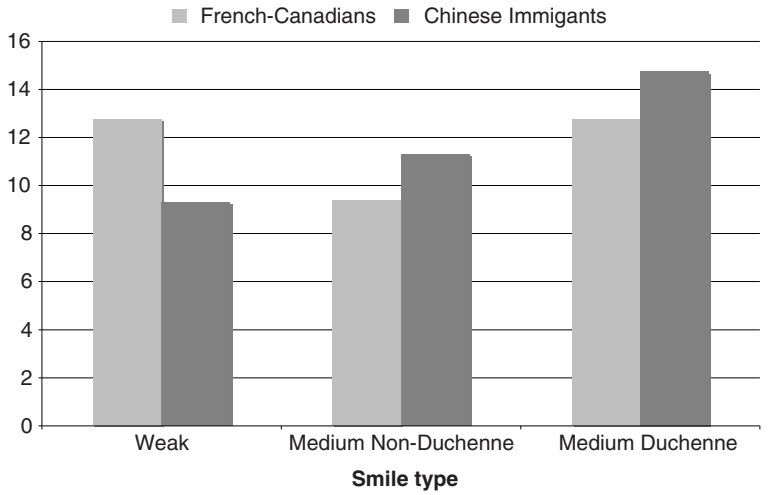

Fig. 9.5 Perceived authenticity of smiles shown by Quebeçois models as a function of decoder ethnicity.

without Duchenne marker shown by members of a western culture and evaluated by members of the same culture or by immigrants from Mainland China.

As Figure 9.5 shows, the two groups did not evaluate the smiles in the same way. French Canadians rate a medium intense smile without a Duchenne marker as quite inauthentic compared to either a weak smile or a medium intense smile with the marker. In other words they penalized for the absence of an authenticity marker. By contrast, the Chinese immigrants rated a smile as more authentic to the degree that it showed the authenticity marker. This use of the Duchenne marker is closer to how this marker is usually referred to when people talk about the twinkle in the eyes, or laughing wrinkles as signs of true enjoyment and seems therefore suggestive of the application of a culturally transmitted rule.

In fact, the degree to which the Duchenne marker was used as a marker of the authenticity of smiles shown by the members of the host cultures was correlated with the perceivers' length of stay in the culture. Interestingly, when rating the smiles of Chinese models, the Chinese immigrants did not use the Duchenne marker as a sign of authenticity at all; in fact, they rated the Duchenne and the non-Duchenne smiles as exactly equal in authenticity.

This study shows that the impact of one of the most commonly used facial expressions in humans and most commonly implemented features in facial animation is dependent on the ethnicity of both observer and actor. That is, within a Western cultural context, smiles of a certain intensity must include the Duchenne marker in order to be perceived as authentic, and this generalizes to immigrants from other cultures who will quite rapidly learn to use this marker as well (albeit in a subtly different way). However, members of other cultures seem to base their perception on other indices; the Gabonese participants as well did not use the Duchenne marker

as a cue to authenticity. Hence there may be the danger that a smile is recognized but perceived as inauthentic and hence does not have the hoped-for positive effect on the interaction when used in non-Western contexts.

9.5 Conclusion

In sum, ample research has shown that human interactions are generally accompanied by emotional facial expressions. Humans also translate this into human–machine interactions by reacting facially to computer agents (King, 1997). Hence a believable agent needs to show believable emotion expressions. (Pelachaud & Bilvi, 2003). The present manuscript had the aim of pointing to some recent findings from research on human–human interaction, which suggest that this may require more than just the implementation of believable movement patterns. Rather it seems important to consider the appearance of the agent and the types of beliefs that people unconsciously associate with the appearance and that may bias their perception.

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