

Felt, False, and Miserable Smiles

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ABSTRACT: Theoretically based distinctions linked to measurable differences in appearance are described for three smiles: felt smiles (spontaneous expressions of positive emotion); false smiles (deliberate attempts to appear as if positive emotion is felt when it isn't); and, miserable smiles (acknowledgements of feeling miserable but not intending to do much about it). Preliminary evidence supports some of the hypotheses about how these three kinds of smile differ.

Smiling is one of the simplest, most easily recognized, and yet confusing of facial expressions. Only one muscle need be involved to produce a smile—the zygomatic major which reaches down from the cheek bone to the lip corner. By contrast, the expressions for anger, fear, sadness, or distress require the action of two to four independent muscles (Ekman & Friesen, 1978a; Hager & Ekman, 1982). This simple expression is easy to identify. When a tachistoscope limits exposure to just a fraction of a second, smiles are recognized far better than any other expression (O'Sullivan, Ekman & Friesen, Note 1). Smiling faces are matched only by surprise faces in being distinguishable from other emotions when seen from a distance of 45 meters (Hager & Ekman, 1979).

One of the confusing issues about the smile is its origin; how it came to be that lip corners go up rather than down with a positive affective state. Darwin (1872-1955) could not explain the origin of smiling by either of the principles—serviceable habits or discharge of the nervous system—he had devised to explain the origin of the other emotional expressions. Noting how different the smile is from the expressions of all the negative emotions, Darwin offered

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his principle of antithesis smiling became the expression for positive feelings because it contrasted most with the expressions of all the other emotions! Argument continues today about the origin of smiling. Van Hooff (1972) suggested that human smiles evolved from what is a fear expression in other primates. Ekman (cited by Redican, 1982) disagreed, arguing that fear and smiling are distinct expressions, involving different muscles, in other primates as well as humans.

Perhaps the greatest confusion about smiling arose in the argument about whether facial expressions are universal or culture specific. The cultural relativists (Klineberg, 1940; LaBarre, 1947) cited smiling in adverse circumstances as the strongest evidence for their contention that expressions, as language, vary in meaning from culture to culture. Birdwhistell said: "Early in my research on human body motion, influenced by Darwin's *The Expression of the Emotions in Man and Animals*, and by my own preoccupation with human universals, I attempted to study the human smile. Not only did I find that a number of my subjects 'smiled' when they were subjected to what seemed to be a positive environment but some 'smiled' in an aversive one. It became evident that there was little constancy to the phenomenon." (1970: p. 29-30).

We (Ekman & Friesen, 1969a; Ekman, 1973) proposed a model of emotional expression in which smiling and other facial actions are considered to be both universal and culture specific. With Darwin and Tomkins (1962) we saw expressions as evolved, biologically based, involuntary signs of felt emotion, which are universal. With our concept of "display rules" we incorporated the cultural relativists' view that each culture has its own norms about who can show which emotion to whom and when. People learn when to interfere, at first voluntarily and then by habit, with the involuntary emotional expressions. We also noted that cultures vary in how they deploy these expressions to serve other social functions, providing signals quite apart from emotion. We (Ekman, 1972; Friesen, 1972) obtained support for our model in an experiment which demonstrated that Japanese and Americans showed the same facial expressions when experiencing fear, disgust and distress if they were alone. When they were in a social situation in which they would follow different display rules, however, quite different expressions were evident. The Japanese covered the facial expressions of negative emotions with a smiling mask much more than did the Americans.

Still another confusing matter is the role of smiling when people lie about their feelings. Can the true smile be distinguished from the false? Or, are people misled by smiling expressions, unable to tell how someone really feels because of smiling? While this might seem to be an either/or matter, we believe that there is a positive answer to both questions. There are measurable differences, we believe, between felt and false smiles, and other kinds of smiles as well. But, most people don't know about these differences and so are misled. Before explaining how smiles differ, let us first consider the theory and evidence about why most people, including most scientists who have measured smiling, are misled by the smiles shown when someone lies.

MISLED BY SMILES

We (Ekman & Friesen, 1969b) reasoned that children learn that others hold them accountable for their facial expressions more than for most of their body movements. Because of that when people lie they usually expend effort censoring and disguising their face more than their body. Yet, some of the involuntary, spontaneous facial expressions of emotion are not easy to conceal completely. These ideas led us to hypothesize that when people lie about their emotions the face often is a confusing source of information, containing true, false and disguised expressions, while body movement conveys a more accurate picture. Study of a few psychiatric patients who were lying about their feelings, showed that observers who judged the face were misled more than those who saw the body. In experiments in which normal subjects were asked to lie about their feelings, we (Ekman & Friesen, 1974) obtained further evidence that observers are misled by facial expressions. Observers who saw just the facial expressions judged people to be *most* truthful when they were, in fact, lying.

In discussing facial lies, we (Ekman & Friesen, 1975 Chapter 11) suggested that smiles were probably the chief culprit responsible for such misunderstandings. Smiles help to conceal and distract observers from the clues to true feelings. Smiles are not just concealment masks, but false smiles convey incorrect information that people are happy when they are not. While our previous work had established that observers are confused by facial expressions when people lie, another study was necessary to show that smiles when lying are misunderstood. O'Sullivan, Ekman, Friesen and

Weiss (Note 2) found that when viewing just the first smile shown by someone describing felt or unfelt positive feelings, observers' judgments about whether the person was lying or truthful were no better than chance

A number of investigators found no difference in how often people smile when they are lying or being truthful (Finkelstein, 1978; Hemsley, 1977; Hocking & Leathers, 1980; Knapp, Hart, & Dennis, 1974; Krauss, Geller, & Olson, 1976; Kraut, 1978; Kraut & Poe, 1980; McClintock & Hunt, 1975; Mehrabian, 1971; O'Hair Cody, & McLaughlin, 1981). We believe that felt and false smiles do differ, not in frequency but in kind. These studies may have made the same mistake in measurement that we believe observers make when judging smiles—treating all smiles as the same. If the measurement of smiling was sufficiently precise it could determine whether people smile differently when they lie.

MEASURING FACES

Interest in being able to discover how facial expressions might differ when people lie was one of the motives which led us to spend nearly a decade developing a fine-grained and comprehensive facial measurement technique. We abandoned our Facial Affect Scoring Technique (FAST) (Ekman, Friesen, & Tomkins, 1971) for this job reasoning that if observers were misled by lying facial expressions, an incomplete, and macro level measurement technique like FAST, would not be likely to succeed (Note 1).

Our Facial Action Coding System (FACS) (Ekman & Friesen, 1976, 1978b) allows for measurement of all visible facial behavior, not just actions known or presumed to be relevant to emotion. Five aspects of facial movement can be measured:

1. Classification: FACS distinguishes 44 *action units*. These are the minimal units that are anatomically separate and visually distinguishable. Any facial movement can be described in terms of the particular action unit that singly, or in combination with other units, produced it.

2. Intensity: The strength of any action unit involved in a facial movement can be scored on a five-point scale, from barely noticeable to maximum intensity.

¹For the same reasons Izard's (Note 6) MAX technique of facial measurement, which is similar to FAST, would not be likely to differentiate felt from false expressions.

3. Laterality: Each action unit may be scored for whether it is bilateral, unilateral, or asymmetrical. If asymmetrical, the extent of asymmetry may also be scored on a six-point scale.

4. Location: The precise moments in time when each action unit begins and ends can be identified.

5. Timing: Onset time, the span between the start of each action unit and when it reaches apex; apex time, the period of maximum excursion; and offset time, the span between the end of apex and the disappearance of the appearance changes produced by an action unit, can all be measured. Additionally, whether the onset, the apex, and the offset are smooth or irregular can be scored. All of the action units which appear to make up a single expression do not always have the same onset, apex, and offset timing.

An investigator may score all five aspects of facial behavior, or limit measurement to just certain ones. We have hypotheses, and some evidence, for how smiles differ in all five regards.

DISTINGUISHING AMONG SMILES

Felt Smiles

These include all smiles in which the person actually experiences, and presumably would report, a positive emotion. These positive emotions include pleasure from visual, auditory, gustatory, kinesthetic, or tactile stimulation; amusement and delight; contentment and satisfaction; beatific experiences; relief from pain, pressure or tension; and enjoyment of another person. We hypothesize that the common elements in the facial expression of all such positive experiences are the action of two muscles: the zygomatic major pulling the lip corners upwards towards the cheekbone; and the orbicularis oculi which raises the cheek and gathers skin inwards from around the eye socket. We further hypothesize that different positive emotional experiences are reflected by variations in the intensity and in the timing (onset, apex, offset) of just the zygomatic major and orbicularis oculi actions.

Table 1 explains in more detail the changes in appearance produced by these muscles, describing also how two different parts of the orbicularis oculi muscle may act independently. Table 1 also provides the FACS numbers for the actions of these muscles, which we will use hereafter when it becomes too cumbersome to use the Latin muscle names.

Table 1
Facial Movements Involved in Felt Smiles

<u>Muscle</u>	<u>FACS Action Unit</u>	<u>Appearance Changes</u>
Zygomatic Major	12	Lip corners pulled up towards cheekbones; when extreme produces same changes as action unit 6.
Orbicularis Oculi, Pars Lateralis	6	Raises the cheek; gathers skin inwards around the eye; bags skin below eye; narrows eye aperture; produces crows-foot wrinkles.
Orbicularis Oculi, Pars Medialis	7	Tightens the upper and lower eye lids; raises the lower eye lid; wrinkles or bulges skin directly below lower eye lid.

Three other facial muscles can produce an upward tilt to the lips—risorius, buccinator, and caninus—but we predict these muscular actions are relevant to unfelt smiles and particular negative emotions, not felt positive emotions. The addition of these or almost all other facial muscular actions to zygomatic major and orbicularis oculi signifies that it is no longer simply a felt smile.

The idea that zygomatic major is central to positive emotional experience came from Darwin, many authors before him, and everyone after him who described facial expressions of emotion. Darwin also should be credited with noting the importance of orbicularis oculi in the felt smile and the absence of this muscle in the false smile. Our idea that the smiles produced by buccinator, risorius and caninus are not expressions of positive emotion has four bases: informal observations; introspection about our own subjective experience when we performed these actions; theory (Ekman & Friesen, 1975, 1978a) about the role of these muscles in other negative emotions; and some evidence.

In our study with Ancoli (Ekman, Friesen, & Ancoli, 1980) we utilized FACS to measure the facial behavior shown by adult females when viewing motion picture films. The subjects were alone and did not know a camera was recording their behavior. After viewing each of a series of films they reported their subjective experience on unipolar emotion rating scales. Two of the films showed amusing material. In one a puppy played with a flower

larger than it was, and in another a gorilla danced in a circle in a moat of water. The mean rating on happiness—unfortunately an amusement scale was not furnished—was almost exactly in the middle of the scale on each film. The frequency, duration, and intensity of zygomatic major actions was significantly correlated with the amount of happiness reported to each positive film, and these measures also differentiated which of the two positive films the subjects rated as enjoying most.

This experiment also suggested that there may be some boundaries to the usual duration of a felt smile. None were extremely brief nor were any very long. In other situations we also observed that most smiles were between two-thirds of a second and four seconds in length if they were felt. Within this span the exact duration, as well as the intensity of the muscular contractions, and the frequency of smiling all appear to vary with the strength of the positive emotion. When positive feelings are weak the smile involves only slight muscular contractions, which are infrequent and short, but rarely less than two-thirds of a second. When positive feelings are very high, the smile involves very strong muscular contractions, which happen often and are long, but rarely more than four seconds.

While supporting the hypothesized importance of zygomatic major and the relevance of intensity and durational measures in distinguishing the extent of positive emotion experienced, this study has two major limitations. First, it could not determine whether qualitatively different positive emotions produce different facial behavior, since it examined only amusement, and only the kind of amusement felt when viewing films of animals playing. Second, it did not test the hypothesized role of orbicularis oculi and the value of onset, apex, and offset measures in distinguishing among positive emotion experiences.

False Smiles

These smiles are deliberately made to convince another person that positive emotion is felt when it isn't. There are two kinds of smiles. In a *phony* smile nothing much is felt but an attempt is made to appear as if positive feelings are felt. In a *masking* smile strong negative emotion is felt and an attempt is made to conceal those feelings by appearing to feel positive.

Sometimes people may succeed in producing a false smile which is indistinguishable from a felt smile. Phony smiles are likely to be more successful than masking ones, since no conflicting expressions will interfere. False smiles are more likely to be perfectly performed if: the person is highly practiced in deceitful behavior; the person, like a Stanislavski actor, remembers a felt experience from which the smile emerges, or, the person happens to be an unusually good facial performer. These matters and others which influence when people don't make mistakes when they lie are discussed further by Ekman (1981, Note 3).

We believe there are a number of ways in which false smiles differ from the felt smiles they pretend to be. False smiles can be marked by differences in the muscles involved, and in their laterality, location, and timing of the actions.

The orbicularis oculi (action units 6 and 7) usually is absent in a false smile. This is easy to recognize or measure if the action of the zygomatic major muscle (action unit 12) is not extreme, for without 6 or 7 a moderate or slight action of 12 will not raise the cheeks, bag the skin below the lower eyelid, narrow the eye aperture, or produce crows-feet wrinkles. Just the smiling lips will appear without the involvement of the eyes. As noted in Table 1, if the smiling action produced by 12 is extreme, 12 will produce these changes in appearance almost as if 6 or 7 also had acted. Therefore we hypothesize that it will be harder to distinguish felt from false smiles when the smile is extreme, and easier when the smile is slight or moderate in intensity.

While the presence of 6 or 7 marks a felt smile, and their absence implies that a smile is false, there are occasions when a false smile will have a 6 or 7. This complication occurs because the orbicularis oculi muscle is involved not just in felt smiles, but in other felt emotions as well. When distress or sadness or pain is felt, the outer part of orbicularis oculi, action unit 6, is usually involved. If someone were trying to conceal those feelings with a false smile, action unit 6 might still occur. The inner part of orbicularis oculi, action unit 7, occurs with anger and with fear. If a false smile were to cover those emotions, there might still be evidence of action unit 7.

Another source of confusion is that 6 or 7 may sometimes accompany false smiles, making them look more genuine, for reasons unrelated to the person's attempt to mislead by smiling.

Squinting, because of bright light or difficulty focusing, produces a 6 or 7. Sometimes concentration, perplexity, and attempts to remember something or find a word will produce action unit 7. We consider the absence of 6 or 7 to be strong evidence that a smile is not felt. If 6 or 7 is present in the smile, the expression may be a felt smile or a false masking smile, and other clues are needed to help make the differentiation.

A second marker of a false smile is the likelihood that it will tend to be slightly asymmetrical, generally stronger on the left side of the face if the person is right handed. We came upon this idea serendipitously (Ekman, 1980). We noted in Sackeim, Gur and Saucy's (1978) report about emotions being expressed more intensely on the left side of the face, that this effect was evident for all but the happy faces they evaluated. We had supplied Sackeim et al. with the faces and knew that only the happy ones were expressions of felt emotions, having occurred spontaneously as we joked with the models. We had produced all of the other expressions by asking our models to deliberately move a specified set of facial action units. This difference between voluntary and involuntary facial movements, recalled the literature from clinical neurology about how lesions may differentially affect either voluntary or involuntary expressions leaving the other intact (Miehlke, 1973; Myers, 1976; Tschiasny, 1953). If the lesion is in the pyramidal system, (for example, the precentral gyrus), the patients can not smile deliberately, but will do so when they feel happy. Lesions in the nonpyramidal systems produce the reverse pattern; patients can smile on request, but will not smile when they actually feel a positive emotion. The pyramidal or voluntary motor pathways are more recent phylogenetically than the extrapyramidal or involuntary pathways. We reasoned that deliberately made facial expressions, such as false smiles, would require more cortical involvement and thereby be more likely to show asymmetry because of cerebral specialization, than uncontrolled, spontaneous, felt emotional expressions. Searching the literature on facial asymmetry we found support for this hypothesis in Lynn and Lynn's (1938, 1943) reports that asymmetries were rare for spontaneous smiles.

A third marker that a smile is false is if it appears to be too early or too late. Such deviations in the location of a smile can be measured only in those situations in which there is a definable moment when a positive emotion should come forth; for example, certain jokes have a precise and sudden funny moment. A listener

who puts on a false smile may err by doing it too soon or too late. Only casual observation and anecdotes suggest this hypothesis.

False smiles differ from felt ones also in apex, onset, and offset timing: 1. The apex duration is usually too long. While the duration of a felt smile varies with the situational context in which the positive feeling is experienced, we have rarely observed felt smiles lasting more than four seconds. 2. The onset time is too short, giving an abrupt appearance to the smile. While this can happen with felt smiles, more often it will mark a false smile. 3. The offset is not smooth but is either abrupt or appears to be in other ways irregular rather than smooth. These hypotheses about timing are based on observation, in particular of videotapes taken of people while they lied.

The next markers that a smile is false are found only in the masking smiles which conceal negative emotions, not in the phony smiles when no emotion is felt. Signs of the felt emotions the masking smile is intended to conceal may persist and provide evidence that the smile is false. Such signs of negative emotions are likely to persist, despite a masking smile, in the upper face more than in the lower part of the face. The zygomatic major smiling action directly changes the lower facial appearance, but does not cover any action in the upper eyelid or eyebrow. Thus we predict that when smiles mask negative emotions, *leakage* of negative emotions may still be evident in action units influencing the upper eyelids, eyebrows and forehead. If the felt negative emotion is strong, other lower face actions in addition to the smile may be recruited to aid in concealment. The lips may be pressed, the lower lip pushed up, or the tightening of both lip corners may be added to the masking smile to help cover the expression of negative emotions in the mouth area. Such actions could provide *deception clues*, revealing that an attempt at concealment has been made, but they don't leak the nature of the felt emotion. (See Ekman and Friesen, 1969b and 1975 for other examples of the distinction between leakage and deception clues.)

Another different kind of smile must be briefly mentioned which could be confused with this masking smile. In a *dampened* smile a person actually does feel positive emotions but attempts to appear as if those feelings are less intense than they actually are. The felt smile is dampened by the very same actions which are added to a masking smile when there is a struggle to conceal very strong negative emotions—lip pressing, pushing up the lower lip and tightening both lip corners. While dampened smiles resemble

masking smiles in this one respect, in all other ways dampened smiles appear similar to felt smiles.

There is evidence for some of our hypotheses about false smiles. A few studies support our reasoning that asymmetries, particularly ones in which the action is stronger on the left side of the face if subjects are right-handed, are more common in deliberate as compared with spontaneous smiles. Ekman, Hager and Friesen (1981) found more asymmetry when children smiled on request than in their spontaneous smiles in response to a joke. Among just those smiles which were asymmetrical, it was only the deliberate smiles which were usually stronger on the left side of the face with right-handed subjects. The smiles shown by the subjects who subsequently reported enjoyment while watching the puppy and gorilla films were mostly symmetrical. Hager (Note 4) has replicated these findings on deliberate and spontaneous smiles with adults.

Data on the smiles shown by psychiatric patients (Ekman & Friesen, Note 5) supports, although it does not test, our hypotheses about the relationship between the duration of a smile and the involvement of the muscle around the eyes in distinguishing felt from false smiles. We predicted that if a smile is felt it will have the involvement of orbicularis oculi, either action unit 6 or 7, and rarely would be briefer than two-thirds of a second or longer than four seconds. Eighty-six percent of the smiles with 6 or 7 did indeed fall into this durational span. Smiles which do not have either 6 or 7 are probably not felt; therefore less should fall into this durational span. Only 36 percent of the smiles without 6 or 7 were between two-thirds and four seconds in duration.

Miserable Smiles

Misunderstandings of smiling may not only involve a failure to distinguish felt from false smiles but also to distinguish both of them from miserable smiles. In a miserable smile the person does not experience any positive emotion and does not attempt to appear as if positive emotion is felt. Instead the miserable smile acknowledges feeling unhappy, making clear to the self and to others that the response to the misery is, at least for the moment, contained. Most often miserable smiles occur when someone is distressed, and the miserable smile signals that tears and screams

will not occur. If the misery is fear, no escape will be attempted; if it is anger, no attack will be made

Miserable smiles unlike false smiles are not meant to convey incorrect information; they do not convey the impression that the person is happy. In the miserable smile the negative feelings are apparent; in a masking smile there is no sign of negative feelings if it is performed well.

Since they are deliberate, as are false smiles, we hypothesize that miserable smiles will usually be asymmetrical, stronger on the left side of the face if the person is right handed. Like the false smile they may be longer than four seconds, but unlike false smiles they may also be very brief, lasting two-thirds of a second or less. Unlike the masking variety of false smiles, miserable smiles are not deployed to cover negative emotion expressions. Instead, miserable smiles often are superimposed upon a clear negative-emotion expression, or follow a negative-emotion expression. If they are superimposed on a negative expression they in no way cover it. If they come after a negative expression, signs of that expression often will persist. Even if there is no sign of negative feelings within the miserable smile, the miserable smile contains the misery message by being attached at the end, or immediately after an expression of negative emotion.

We first began to think about miserable smiles when we noted (Ekman, 1972) that some subjects smile when watching films intended to induce stress. Since they were alone, and did not think anyone was watching or recording their facial expressions, it seemed unlikely that these could be masking smiles. The smiles did not look at all convincing. The people looked unhappy while they smiled. In the Ekman, Friesen and Ancoli (1980) study, after the subjects saw the puppy and gorilla films, they saw an industrial accident film. Some subjects showed miserable smiles during or after bloody scenes. The action of zygomatic major, was, as predicted, asymmetrical, usually stronger on the left side of the face, and a variety of the facial actions associated with negative emotions were clearly apparent. Many of these miserable smiles occurred immediately following a negative emotion expression. Since timing was not precisely measured, we can not test our hypotheses about how the duration may distinguish the miserable from the felt smile.

NEXT STEPS

All of the hypotheses described here need more testing, and work is in progress on many of them. Felt, false and miserable smiles do not exhaust the repertoire of smiles. Elsewhere (Ekman, Note 3) sixteen other kinds of smiles have been described. (Also, see Tomkins, 1975 for a description of other distinctions among voluntary facial expressions.) We expect that those who observe facial behavior, without doing any measurement, will remain confused by smiling, unless they understand how all these other kinds of smiling differ from felt and false smiles. It may turn out, however, that observers can not distinguish felt from false smiles even with such knowledge. This too is an empirical question.

Regardless of what observers can do, those wanting to learn about an individual's emotional and other experiences can distinguish among these many kinds of smiling, and FACS provides them with a tool to do so. Our measurement of smiles and other facial behavior reveals an extraordinary variety of different facial expressions, many more than we or anyone else had imagined. The research now needs to be done to learn the extent to which these expressions are mapped onto variations in individual and social experience.

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