Not all smiles are created equal: the differences between enjoyment and nonenjoyment smiles

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Abstract

What is the meaning of the smile? Recent research has shown that one type of smile — the enjoyment smile — seems to be associated with positive emotion, whereas other types of smiles are not. On the basis of observations made by clinical neurologists on lesioned patients and by Ekman and Friesen (1982) on a large data set from normal subjects, it has been proposed that five distinct markers differentiate the enjoyment smile from other types of smiles: the presence of orbicularis oculi action in conjunction with the zygomatic major (Duchenne's smile), symmetrical action of the zygomatic major on both sides of the face, zygomatic major actions which are smooth and not irregular, duration of zygomatic major action that is consistent from one enjoyment smile to the next, and synchronous action of the zygomatic major and the orbicularis oculi such that they reach maximal contraction at about the same time. The research evidence supporting each of these markers is reviewed, and the advantages and disadvantages of utilizing each of these markers in research are discussed.

> Almost every one recognized that the one represented a true, and the other a false smile; but I have found it very difficult to decide in what the whole amount of difference consists.
> Charles Darwin, *The Expression of the Emotions in Man and Animals* (1872: 359)

We know that an audience has enjoyed a humorous anecdote when they smile and laugh; in fact, smiling has been reported to be the most frequent facial response to humor (Ruch 1990). However, our experience also tells us that not everyone who laughs or smiles in response to humor is actually enjoying themselves; for example, people may smile at a joke to "go

Humor 6–1 (1993), 9–26.

0933–1719/93/0006–0011 $2.00

along" even though they do not necessarily enjoy the humor (LaFrance 1983). It has also been reported that people smile when embarrassed (Kraut and Johnston 1979), uncertain (LeBarre 1947), and sad (Klineberg 1940). If this is the case, then how do we know the difference between someone who is smiling and enjoying some humor and someone who is smiling in response to humor and yet embarrassed, sad, or uncertain?

Recent research has shown that the smile may not be a singular category of behavior. Of the 18 different types of smiles described by Ekman (1985), only one particular type of smile — called the enjoyment smile[1] — accompanies experienced positive emotions such as happiness, pleasure, or enjoyment (Ekman 1989). Thus while many types of smiles may occur in the course of humor experiments, it is the enjoyment smile that seems to manifest true felt enjoyment or happiness.

Why have other studies shown no relationship between smiling and self-report of positive emotion (for instance, Fridlund 1991) if this enjoyment smile is the facial marker of positive emotion? How does one make sense of these seemingly divergent findings? The answer is found in the answers to the following three questions: Why was there controversy over the meaning of a smile? What is the evidence for different types of smiles? And, can an investigator reliably distinguish between different types of smiles?

Why the controversy?

It was the French anatomist Duchenne who in 1862 first described differences between smiles which "obey the will ..." and smiles which are "put into play by the sweet emotions of the soul ..." (Duchenne 1990 [1862]: 72). The former smiles consist solely of zygomatic major action (the muscle which pulls up and back the lip corners), while the latter smiles involve the orbicularis oculi muscle (the muscle that surrounds the opening of the eye and the eye socket) in concert with the zygomatic major.

Even though Darwin noted and discussed Duchenne's observations in his influential book *The Expression of the Emotions in Man and Animals* (1872), the expressive behavior research that ensued did not. It is therefore not surprising that when a smile was defined solely as the action of the zygomatic major muscle — without regard to the orbicularis oculi — researchers found that the smile was not always a facial signal of enjoyment or happiness. For example, empirical work by Landis (1924) showed

that across 16 different situations ranging from listening to popular music to decapitating a live rat, the smile was the most frequent facial expression. Landis reported that people smiled regardless whether they reported feeling anger, disgust, exasperation, revulsion, surprise, or sexual excitement; he eventually concluded that the smile was a misleading and meaningless indicator of any particular inner state or emotion.

Otto Klineberg's later review of the experimental psychology literature reiterated this conclusion:

> Not only may joy be expressed without a smile, but in addition the smile may be used in a variety of situations in a manner quite different from what appears to be its original significance. Even in our own society, we know that a smile may mean contempt, incredulity, affection, and serve also as part of a purely social greeting devoid of emotional significance (Klineberg 1940: 194).

Other influential reviews of the experimental psychology literature echoed this conclusion as well (Bruner and Tagiuri 1954; Hunt 1941; Tagiuri 1968).

Cultural anthropologists also observed that humans from different cultures smiled in situations involving both negative and positive emotion — further buttressing the conclusions of the experimental psychologists (Birdwhistell 1970; LeBarre 1947; Mead 1975). For example, Africans were described as people who smile to express not only amusement but surprise, wonder, embarrassment, and discomfort (Gorer 1935, cited in LeBarre 1947). These anthropologists concluded that the meaning of the smile was culturally determined, that generally speaking, there were no universal facial expressions of emotion, and in particular, there were no facial expressions of enjoyment.

However, because the aforementioned psychologists and anthropologists did *not* make the distinction between smiles which feature just the zygomatic major and smiles which feature both the zygomatic major *and* the orbicularis oculi, they could neither support nor disconfirm Duchenne's original observations. It has only been in the last ten years that Ekman and Friesen (1982) have rediscovered, validated, and elaborated Duchenne's ideas.

What is the evidence for the existence of the enjoyment smile?

Why would enjoyment smiles differ at all from other smiles? The differences between enjoyment and other smiles originate in functional neuro-

anatomy. It appears that there are two distinct neural pathways that mediate facial expressions; one pathway is for voluntary, willful facial actions, and a second for involuntary, emotional facial actions (Meihlke 1973; Myers 1976; Tschiassny 1953). The voluntary facial movements originate in the brain's cortical motor strip and arrive at the face via the pyramidal motor system. Involuntary facial movements, like those involved in an emotional expression, mainly arise from subcortical nuclei and arrive at the face via the extrapyramidal motor system. There are clinical reports that patients who cannot consciously retract both sides of their zygomatic major due to a lesion in the cortical motor strip contralateral to the affected side do spontaneously retract both sides when they find something funny (Brodal 1981). Likewise, patients with lesions of the subcortical nuclei such as the basal ganglia have difficulty showing spontaneous, emotional facial expressions; however, these patients are able to move their facial muscles on command (Karnosh 1945). These facial action observations are so reliable that they serve as diagnostic criteria for pyramidal and extrapyramidal lesions (DeMyer 1980).

Not only do voluntary and involuntary facial actions differ by neural pathway, but the actions mediated by these pathways manifest themselves differently. In a normal person, voluntary pyramidal motor system based movements are limited solely by individual effort. A person can consciously move a facial muscle quickly or slowly and hold that action for a brief or long period of time, depending upon the dictates of the circumstance and individual endurance. However, extrapyramidal motor system based facial actions are characterized by synchronized, smooth, symmetrical, consistent, and reflex-like or ballistic-like actions on the part of the component facial muscles (see Rinn 1984, for a review). Relatively speaking, these actions appear to be less under the deliberate control of the individual.[2]

Given this neuroanatomical foundation, plus Duchenne's observation, as well as their own observations of a large data set, Ekman and Friesen (1982) predicted that the orbicularis oculi/zygomatic major configuration observed by Duchenne would be one among several morphological and dynamic markers that would distinguish smiles which are shown in concert with the emotion of enjoyment from smiles which are shown for reasons other than enjoyment. Specifically, they predicted that enjoyment smiles should feature the following morphological markers: the action of the orbicularis oculi, pars lateralis, in conjunction with the zygomatic

major (the smile that Duchenne observed, or what we will call the *Duchenne marker*), and the symmetrical action of the zygomatic major on both sides of the face (*symmetry marker*).

Consistent with the dynamics of extrapyramidally driven facial actions, the following dynamic markers were also predicted by Ekman and Friesen (1982): onset, apex, offset, and overall zygomatic major actions that are smooth and not as irregular as in other types of smiles (*smoothness marker*); a relatively limited and consistent overall duration of zygomatic major action from smile to smile such that enjoyment smiles are not as long or as short as other smiles (usually somewhere between 1/2 and 4 seconds — this will be called the *duration marker*); and synchronization of action between the zygomatic major and orbicularis oculi such that they both reach the point of maximal contraction (apex) at approximately the same time (*synchrony marker*).

To date, empirical support has been generated for each of these markers, although some markers have received more extensive study than others. In particular, the *Duchenne* marker — the presence of orbicularis oculi activity in concert with the zygomatic major — has been the most replicated and best documented of these markers. This marker has shown the most convergent validity across subject groups and social conditions. For example, laboratory research has shown that the number of smiles with the *Duchenne* marker increases when subjects watch films designed to elicit positive emotion and decreases when subjects feign positive emotion while viewing films designed to elicit negative emotion (Ekman, Friesen, and O'Sullivan 1988). The total number of all smiles considered together did not predict which film the subject was watching.

In psychotherapy settings, smiles with the *Duchenne* marker occur in greater frequency in depressed patients' discharge interviews compared to their admission interviews (Matsumoto 1987). Moreover, when psychotherapy patients are judged to improve, there is a corresponding increase in smiles with the *Duchenne* marker versus smiles without this marker on the part of the patient (Steiner 1986). Furthermore, schizophrenic patients show fewer *Duchenne* marked smiles than normal individuals (Krause, Steimer, Sanger-Alt, and Wagner 1989). Finally, mothers who were receiving counseling for their abusive tendencies showed fewer smiles with the *Duchenne* marker to their more difficult children than did nonabusive mothers to their difficult children (Bugental, Blue, and Lewis 1990). For each of these studies, the number and duration of smiles without the *Duchenne* marker did not predict any therapeutic outcome.

Similar results were found in nontherapeutic settings that examined normal subjects across various age ranges. The frequency of *Duchenne* marked smiles were associated with adults' enjoyment of jokes and cartoons (Ruch 1987). Women showed more smiles with the *Duchenne* marker to responsive rather than unresponsive children (Bugental 1986). Children have been shown to show more *Duchenne* marked smiles when they succeed, compared with when they fail, at a game (Schneider 1987). Even 10-month-old infants show more smiles with the *Duchenne* marker to the approach of their mother compared with the approach of a stranger (Fox and Davidson 1988). Again, in all these situations the number and duration of smiles with the *Duchenne* marker predicted enjoyment or happiness, while the total number and duration of all other smiles did not.

The link between smiles with the *Duchenne* marker and the emotion of enjoyment was strong enough such that not only did the frequency of *Duchenne* marked smiles — but not other smiles — predict when a subject was watching a film designed to elicit positive emotion, but the frequency of *Duchenne* marked smiles predicted which of two positive emotion films the subject reported to have enjoyed more (Ekman, Davidson, and Friesen 1990). All the while, the frequency of all types of smiles, when considered together, did not correlate with subjects' self-reports of enjoyment.

Smiles with the *Duchenne* marker have been linked to the emotion of enjoyment not only through subjects' self-reports across a variety of settings but also by central nervous system (CNS) measures. For example, research has shown that positive emotion has been associated with greater left hemispheric brain activation (Davidson 1984). And, when subjects' EEG is monitored as they watch emotion inducing films, it is only their number of smiles with the *Duchenne* marker — but not other smiles — that have been shown to involve relatively greater brain left hemisphere activation (Davidson et al. 1990; Ekman, Davidson, and Friesen 1990). Moreover, when 10-month-old infants showed smiles with the *Duchenne* marker in response to the approach of their mothers, they also showed a similar pattern of relatively greater left hemisphere EEG activity (Fox and Davidson 1988).

The symmetry marker

The second predicted morphological marker of the Duchenne smile — symmetrical zygomatic major action on both sides of the face — has

received empirical support as well. Both children and adults' spontaneous smiles in reaction to jokes featured much less asymmetry than subjects' deliberate smiles in response to a request from an experimenter (Ekman, Hager, and Friesen 1981).

The smoothness marker

The third predicted marker has received indirect support. Evidence suggests that there are differences in the smoothness of zygomatic major activity in *spontaneous* versus *posed* smiles (for example, Bugental 1986; Weiss, Blum, and Gleberman 1987; Hess and Kleck 1990; Hess et al. 1989). For example, Weiss, Blum, and Gleberman (1987) found longer and smoother onset actions with subjects who were hypnotized to feel happy. Bugental (1986) found that the smiles that abusive mothers directed to difficult children showed more abrupt offsets. However, while instructive, these studies cannot specifically address the question of whether the zygomatic major action of enjoyment smiles are more regular, consistent, and smooth than the zygomatic major action of other smiles because none of these studies — except Weiss et al. (1987) — directly measured orbicularis oculi activity; thus, the number of smiles in the category "spontaneous smiles" that had the best validated marker of the enjoyment smile — the *Duchenne* marker — is not clear.

The duration marker

The fourth predicted marker of the enjoyment smile has also received experimental support. The zygomatic major action of enjoyment smiles tends to have a more consistent duration (usually between 1/2 and 4 seconds) than other smiles (Frank, Ekman, and Friesen 1992; Hess and Kleck 1990). For example, Hess and Kleck (1990) found spontaneous smiles were between 1/2 and 4 seconds in duration, while posed smiles were considerably shorter in duration. Frank et al. (1992) compared subjects' smiles which featured the *Duchenne* marker to their smiles that did not exhibit this marker and found that while those smiles with the *Duchenne* marker did not differ from other smiles in terms of their mean overall duration, the *Duchenne* marked smiles were significantly less variable — thus more consistent and stable — in their duration than the other smiles.

The synchrony marker

There is no published research that has confirmed or disconfirmed Ekman and Friesen's (1982) prediction that the orbicularis oculi and zygomatic major components of the enjoyment smile reach apex at the same time. However, Frank and Ekman (in preparation) have examined a sample of smiles with the *Duchenne* marker and a corresponding sample of smiles without this marker and found that the orbicularis oculi and zygomatic major action exhibited by subjects were more likely to reach apex, to overlap apex, and offset apex at the same time than were the actions of the zygomatic major plus any other facial muscle of the subjects' nonenjoyment smiles.

Thus, the five markers of the enjoyment smile predicted by Ekman and Friesen (1982) have received support either directly or indirectly. It is safe to conclude from the research presented above that the expression called "smiling" should not be classified as a singular category of behavior. There seem to be many different types of smiles, of which the enjoyment smile is just one (again see Ekman 1985 for a more elaborate list of possible smile types). Even across different situations, different subject groups, and different measures, it appears that the facial display of enjoyment is a distinct entity with a specific pattern of morphological and dynamic markers. (These are summarized in Table 1.)

Not only does the enjoyment smile differ in appearance from other

Table 1. *How the enjoyment smile is marked*

Morphology	Marker	Behavioral Manifestation
	Duchenne	Presence of zygomatic major and orbicularis oculi.
	Symmetry	Zygomatic major action produces symmetrical changes on both sides of the face.
Dynamics	**Marker**	**Behavioral Manifestation**
	Smoothness	Onset of action smooth, without irregularities.
	Duration	Total duration of action limited and less variable (usually between 1/2 and 4 seconds); the enjoyment smile is not as long or as short as other smiles.
	Synchrony	Zygomatic major and orbicularis oculi reach apex at the same time.

nonenjoyment smiles, it also differs in social signal value. When groups of observers were shown videotaped clips of women who spontaneously showed both enjoyment smiles (as defined by the presence of the *Duchenne* marker) and nonenjoyment smiles of equal zygomatic major intensity (both types of smiles occurred in response to films designed to elicit positive emotion), these observers were significantly better than chance at distinguishing between which smiles were the enjoyment smiles and which were the other, nonenjoyment smiles (Frank and Ekman 1990; Frank et al. 1992).

The content of the enjoyment smile social signal was also examined in a study where observers were shown the same videotapes as in the aforementioned experiment and then asked simply to rate the personality characteristics of each stimulus subject — both when the subject showed an enjoyment smile and when the subject showed a nonenjoyment smile. Each subject was rated as acting and feeling significantly more pleasant as well as more outgoing, likable, sincere, honest, genuine, and so forth — in other words, generally rated more positive — when she showed an enjoyment smile compared to when she showed a nonenjoyment smile of the same zygomatic major intensity (Frank et al. 1992).

Thus, the enjoyment smile differs from other smiles not only by subjects' self-reports of enjoyment and their EEG measures but also morphologically, dynamically, and by the content of its social signal.

How to distinguish between enjoyment and other smiles

Even though each of the five markers above distinguishes between enjoyment and other smiles, some markers are easier to measure than others. The ease with which these markers can be identified depends upon the method used to measure the smile—for example, whether one attempts to identify a given marker visually, via a system such as FACS (Ekman and Friesen 1978), or mechanically via the placement of electromyographic sensors (EMG) to detect facial muscle movement (for instance, Fridlund and Cacciopo 1986). While there are advantages and disadvantages to each measurement method, the reader is directed to Fridlund, Ekman, and Oster (1987) for a more complete discussion of the relative merits of each technique. However, each marker of the enjoyment smile can be reliably identified with either method. (The reader is also directed

to an earlier chapter by LaFrance 1983 on issues in the facial coding of smiling and laughter.)

As mentioned earlier, the most reliable marker of the enjoyment smile is the *Duchenne* marker. It is also the easiest to measure, either by the placement of EMG electrodes on the orbicularis oculi or visually by FACS. FACS research has shown that in a true enjoyment smile, the skin above and below the eye is pulled in towards the eyeball, and this makes for the following changes in appearance: the cheeks are pulled up; the skin below the eye may bag or bulge; the lower eyelid moves up; crows feet wrinkles may appear at the outer corner of the eye socket; the skin above the eye is pulled slightly down and inwards; and the eyebrows move down very slightly. A nonenjoyment smile, in contrast, features the same movement of the lip corners as the enjoyment smile but does *not* involve the changes due to the muscles around the eyes (Ekman and Friesen 1978).

There is one complication: when there is a very big or broad nonenjoyment smile, the strong contraction of the zygomatic major will produce many of the changes produced by the action of the orbicularis oculi which are listed above, making it seem as if it was a true enjoyment smile. If it is a big smile, the first four clues will be there regardless of whether it is an enjoyment or nonenjoyment smile. In a broad or large smile one must look just for the last two clues; these clues appear only in the enjoyment smile. Thus, which clues are used depends upon whether it is a slight or a broad smile.

The main disadvantage of relying upon the *Duchenne* marker of the enjoyment smile is that up to 20% of the population can consciously contract the outer portion of their orbicularis oculi muscles and thus are capable of producing a false *Duchenne* marker (Ekman, Roper, and Hager 1980). Despite this potential pitfall, the *Duchenne* marker has been shown to reliably predict self-report of enjoyment (see, for instance, Ekman et al. 1990). However, this does not preclude the possibility that smiles without the *Duchenne* marker are not marking enjoyment; it may be the case that zygomatic major action without orbicularis oculi may signal low or weak levels of enjoyment (for example, Ruch 1990). Further research will help elucidate this possibility.

A second disadvantage of visually scoring this marker is that it is very time expensive. To score for this marker among a sample of behavior could take a FACS trained scorer[3] approximately 60 minutes of scoring for each one minute of behavior scored. However, if the scoring is limited

to just the orbicularis oculi and zygomatic major, then the scoring time would be reduced considerably.

To score this marker mechanically using EMG leads is less time-consuming than FACS scoring in that an investigator can measure this marker on line by a simple digital conversion of the facial muscle electrical impulses. However, this method is not without a downside; for example, by attaching electrodes to the face of a subject, an experimenter draws a subject's attention to his or her face. With a visual scoring system the subject's facial actions can be scored surreptitiously. Moreover, an investigator cannot be certain that the electrical muscle impulses that he or she has measured are solely those of the muscle that he or she has intended to measure; this is due to a phenomenon called "crosstalk" (again, see Fridlund et al. 1987, for more problems related to the use of EMG in facial expression research).

The *symmetry* marker is harder and more time-consuming to measure visually than the *Duchenne* marker. While it can be measured reliably by FACS trained scorers, its relationship to enjoyment has not been replicated in more than one study (Ekman et al. 1981). Also, the symmetry marker often will occur in smiles that do not have the *Duchenne* marker. Thus while the zygomatic major action of most enjoyment smiles is symmetrical, so is the zygomatic major action of about half of the other smiles (Ekman et al. 1981). Thus, this marker is probably better seen as an auxiliary marker which will help weed out the smiles with a false *Duchenne* marker and not one upon which to divide smiles into enjoyment and nonenjoyment. This marker is one that probably lends itself to EMG techniques quite readily.

The *smoothness* marker is also very difficult to measure visually via FACS. Given that smiles usually appear on the face in one quarter of a second, any slight irregularity may well be missed visually. To date, only one study has attempted to establish reliability for visually measuring the smoothness marker using FACS experienced coders; however, the agreement between these two coders on their scoring of the irregularities was not reported (Weiss et al. 1987). Here is where EMG would seem to hold a distinct advantage over FACS in the detection of this marker; the on-line impulse readings, depending on how often they were summed to produce the digital readout, should be sensitive enough to record sudden fluctuations in muscle contraction intensity. But again, the mere presence of EMG electrodes upon the face may be enough to cause subjects to be self-conscious about their facial actions such that they may try to manage

their facial expressions, thus artifactually producing irregular, unsmooth facial muscle actions. Finally, like the *symmetry* marker above, the *smoothness* marker may not provide the discriminability that the *Duchenne* marker does. A significant proportion of other smiles are smooth in their onsets, apices, and offsets (Hess and Kleck 1990). Also like the *symmetry* marker above, this marker has been explored in only a few studies (for instance, Bugental 1986; Hess and Kleck 1990; and Weiss et al. 1987).

The *duration* marker is visually easier to measure than the *smoothness* marker because it simply involves recording the point at which the zygomatic major begins to contract and then recording the point at which the particular contraction ends; the difference between these two points is the duration measure. This measurement is reliably scored by FACS-trained scorers at level greater than or equal to +.76 (Frank et al. 1992). The main problem associated with using this marker is that only a sample of smiles can be classified and not really any individual smile. For example, with the *Duchenne* marker it is possible to determine for each smile whether the relevant action (orbicularis oculi activity) is present or absent. Yet the *duration* marker does not specify a feature which can be used to decide about each particular smile, but instead a judgment must be made about the variability in duration shown by a group of smiles. Thus, like the *symmetry* and *smoothness* markers, the *duration* marker appears in many nonenjoyment smiles such that some nonenjoyment smiles will be of about the same length as the enjoyment smiles (see Frank et al. 1992). Also like the *symmetry* and *smoothness* markers, the *duration* marker has been examined in only a handful of studies; and, except for Frank et al. (1992), each one of these studies based its analysis on mean differences in the duration of the smiles and *not* on differences in the variances among these types of smiles (for instance Hess and Kleck 1990; Hess et al. 1989). For this marker, we would suppose that EMG would afford no real advantage over FACS except for speed of data collection.

Finally, the *synchrony* marker also has many of the same properties as the other markers; that is, it is time-consuming to measure visually, and because this marker often occurs in nonenjoyment smiles, it is not as diagnostic as the *Duchenne* marker for classifying smiles as either enjoyment or nonenjoyment smiles. This marker has only been examined in one currently unpublished study as well (Frank and Ekman in prep.). However, it can be measured reliably by FACS-trained scorers (at agreement levels greater than .76; Frank and Ekman in prep.). One simply

measures the beginning of both the zygomatic major action and the orbicularis oculi action, the beginning of their apices, the end of their apices, and their return to neutral. This marker also lends itself quite well to EMG techniques.

Thus, the most reliable, most robust, and most diagnostic marker for an enjoyment smile would seem to be the *Duchenne* marker. It can be relatively easy to measure — both visually and electromyographically — and has shown the most convergent validity with self-reports of enjoyment over a number of subject ages, clinical populations, situations, and measures.

However, the application of more than one marker to classify a given smile as an enjoyment smile does have some utility. For example, smiles with the *Duchenne* marker do appear in situations in which a subject is trying to conceal feelings of revulsion or disgust, albeit rarely (Ekman, Friesen, and O'Sullivan 1988). Is this because the subject is actually enjoying him- or herself — that is, he or she might find the process of hiding feelings of disgust to be humorous — or is it that the subject is fabricating the *Duchenne* marker? It could be the case that the *Duchenne* marked smile which appears while the subject is trying to conceal disgust may have come on quickly, or is irregular in its onset, or its orbicularis oculi and zygomatic major actions are not synchronous, and so on. Thus, the addition of more markers may allow an investigator to distill his or her sample of smiles into a more pure sample of enjoyment smiles. However, given that the application of just the *Duchenne* marker criterion has been shown to reliably predict an individual's feelings of enjoyment, a researcher would have to weigh the cost/benefit balance to determine if the additional time required to score another marker beside the *Duchenne* marker would be worth the effort.

Therefore, except for the *Duchenne* marker, which has demonstrated its utility for marking enjoyment smiles, all the other markers — *symmetry*, *smoothness*, *duration*, and *synchrony* — should be considered necessary, but not necessarily sufficient, indicators of an enjoyment smile.

Conclusion

Not all smiles are created equal. One type of smile in particular — the enjoyment smile — seems to differ from other types of smiles on a number of dimensions. First, the enjoyment smile is related to the internal emo-

tional state of the individual in a way that other smiles are not. This is true on the level of self-report ratings (Ekman et al. 1980; Ekman et al. 1990), behavioral observations (Matsumoto 1987; Bugental 1986; Fox and Davidson 1988, etc.), or CNS measurement (Davidson et al. 1990; Ekman et al. 1990). Second, the enjoyment smiles differ in both form and motion from other types of smiles. Third, the enjoyment smiles have a different social signal than other smiles.

These differences between enjoyment and other smiles hold regardless of whether an individual shows these smiles when alone or when interacting with another person (Ekman et al. 1990; Frank et al. 1992). Thus, the notion that a smile is not related to an individual's inner state (Birdwhistell 1970; Bruner and Tagiuri 1954; Kraut and Johnston 1979; Landis 1924; Smith 1985) was probably based on a failure to observe the morphological and dynamic markers that distinguish enjoyment smiles from other, nonenjoyment smiles. Unfortunately, much current research on the smile still fails to acknowledge markers of the enjoyment smile. For example, a recent study reported no relationship between the amount of zygomatic major activity and self-report of happiness (Fridlund 1991). This study did not report any information about any of these markers of the enjoyment smile even though the research reviewed earlier had demonstrated that it is the amount of zygomatic activity *in conjunction with* orbicularis oculi that predicts a subject's self-report of happiness or enjoyment, and *not* the total amount of zygomatic activity (Ekman et al. 1990). Other studies have also not reported whether or not they have measured the *Duchenne* marker (Hess et al. 1989; Hess and Kleck 1990).

It seems reasonable to conclude that the enjoyment smile is lawful behavior and that its features operate more independent of context than other types of smiles — as Ekman and Friesen (1982) had predicted. Finally, 120 years after Darwin first posed the question, we have the data to confidently conclude that there are numerous differences between smiles that are shown in concert with an inner, emotional feeling of happiness and smiles which are shown for other, social reasons. Humor researchers in particular can benefit from these findings such that with some training, they can reliably distinguish smiles with the *Duchenne* marker from other smiles; given this, they would now be able to more confidently conclude whether or not a subject truly enjoyed some humor or was merely smiling to be polite.

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Notes

1. First, this type of smile was originally called by Ekman and Friesen (1982) the "felt" smile; however, because this term connotes the idea that individuals were aware of this smile and unaware of other "unfelt" smiles, Ekman (1989) has now referred to these smiles as enjoyment smiles. Ekman (1989) has also suggested that the particular configuration of zygomatic major and orbicularis oculi be called "Duchenne smiles" in honor of Duchenne's original observations. However, because the Duchenne smile is only one marker of an enjoyment smile, in this paper we will refer to the Duchenne smile as the *Duchenne* marker of the enjoyment smile, or *Duchenne* marker for short.

   Second, while we used the term *enjoyment* smile, there is no reason — evolutionarily or otherwise — to believe that this particular configuration of smile could not mark other positive emotions such as pleasure, happiness, or relief. Ekman (1992) discusses these reasons in more detail.
2. This is certainly an oversimplification. The face of any given individual does not always show each emotion that he or she is feeling; it often depends upon the strength of the emotion as well as socially convened behavioral display rules (Ekman and Friesen 1969). However, when the emotions that are generated are of sufficient magnitude, they do manifest themselves upon an individual's face, often despite the individual's efforts (see, for instance, Ekman, Friesen, and O'Sullivan 1988).
3. FACS is an anatomically based system for visually scoring 44 different facial muscle action units and not necessarily just those presumed to be relevant to emotion. FACS-trained scorers have taken a self-instructive program of 100 hours of study and then have passed a final test which scores their level of agreement with other FACS-trained scorers. Information on this system can be obtained by writing to Paul Ekman.

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