CHAPTER 6

The Argument and Evidence about Universals in Facial Expressions of Emotion

Paul Ekman
University of California, San Francisco

ABSTRACT

Theory and evidence support the conclusion that there are some universals in facial expressions of emotion. New findings on different forms of smiling are reviewed, arguments about the origin of expressions are considered, and a proposal is put forward about the type of information provided by a facial expression of emotion.

Are facial expressions of emotion the same for all people? When someone is angry, for example, will we see the same movements appear regardless of that person's race, culture, social class, age, or sex? Is it true that we can understand a foreigner's facial expressions of emotion if we observe his or her facial expressions, that we need no special facial language school, tutoring us as to what these expressions mean in each culture? Are gestures universal too? And if facial expressions of emotion are universal is that the result of evolution?

In this chapter I shall summarize the evidence which allows answers to some of

Paul Ekman's work is supported by Research Scientist Award MH 06092 from the National Institute of Mental Health.

Handbook of Social Psychophysiology, Edited by H. Wagner and A. Manstead,

these questions. I will review more than 75 years of research on this topic. Much of what is covered I have reviewed before [I draw most heavily on my and Oster's earlier review chapter on facial expression (Ekman and Oster, 1979), an earlier review (Ekman, 1973), and the most recent article on this topic (Ekman *et al.*, 1987)]. However, some of the evidence and interpretations that I present here is new, and some of the evidence has just been published or is still in press.

After a brief historical introduction I will summarize the views and evidence of those who argued that facial expressions are socially learned and culturally variable. Then the evidence for universality will be described, including new findings on how the judgement of emotional intensity manifests both universals and cultural differences. A special section will review very recent research on different forms of smiling. Theoretical arguments about the origins of facial expression and the issue of what type of information is signaled by a facial expression of emotion will be discussed.

Before beginning, a few words about the terms of discourse. Nearly 20 years ago in a review of research on facial expression Ekman, Friesen and Ellsworth (1972) chose to avoid

> The phrase 'facial expressions of emotion,' since it implies that some inner state is being manifest or shown externally, or that the behavior is intended to transmit information. Instead we have used the more awkward phrase 'face and emotion' or 'facial behavior'. (p. 3)

The alternative term 'display' is even more theoretically loaded with a particular view about the origin and function of facial activity. I have reverted to 'facial expression' because it is a more felicitous phrase than 'facial behavior' or 'face and emotion.' In doing so I have not changed my earlier rejection of the theoretical views this term might imply to some. To be explicit, facial expressions of emotion are, in my view (Ekman, 1977), as central to emotion as are the physiological changes or subjective feelings, and thus it would be mistaken to view one as the expression of the other. Also, while people do make facial expressions deliberately to transmit information, most facial expressions of emotion occur, I believe, without such deliberation. That is not to deny their importance as social signals, in either their development or current function.

HISTORICAL INTRODUCTION

More than a century ago Charles Darwin published his work on *The Expression of the Emotions in Man and Animals* (1872). It was published 13 years after his revolutionary *On the Origin of Species* (1859). Darwin claimed that we cannot understand human emotional expression without understanding the expressions of animals, for, he argued, our emotional expressions are in large part determined by our evolution. His expression book was a best-seller in its time. On the day of its publication 5267 copies were sold, more than most academic monographs today sell in their entire life in print.

Amazingly, Darwin's book had very little influence, up until 20 years ago. I have (Ekman, 1973) suggested five factors that may explain why Darwin's work on expression was ignored for so long. first, he used anthropomorphic terms, which particularly offended those students of animal behavior who are unwilling to say that animals have emotions. Second, Darwin used a great deal of anecdotal, rather than systematic, data. (We should note, however, that he was exemplary in his use of multiple data sources—observations of infants, animals, the mentally ill, and the blind. And, Darwin was the first to use a systematic method for gathering cross-cultural observations of expressions, the most commonly used method employed today.) The third reason why Darwin's work on expression was rejected was his emphasis on the innate basis of at least some emotional expressions. This did not fit the emphasis on behaviorism in psychology and on relativism in anthropology. A fourth factor was Darwin's adoption of Lamarck's theory that learned characteristics could be inherited. Finally, Darwin's emphasis on the deductive method lessened his impact on present-day ethologists who are committed to an inductive approach.

Empirical research on facial expressions of emotion has been quite episodic in the century following Darwin's expression book. Between 1920 and 1940 this topic drew the attention of many well-known psychologists: Allport, Boring, Goodenough, Guilford, Hunt, Klineberg, Landis, Munn, Titchner, and Woodworth. Interestingly, their work on expression was a minor digression in their own careers; none focused on it for long. (Goldstein, 1983, presents an interesting historical analysis of why few scientists focused for long on facial expression). The knowledge accumulated during this period was meagre. In the opinion of influential reviewers (Bruner and Tagiuri, 1954; Hunt, 1941; Tagiuri, 1968), there were no consistent answers to questions about the accuracy of information provided by facial expressions, their universality and possible innateness. During the next 20 years there were comparatively few studies of facial expression, with the exception of Schlosberg's reports (Schlosberg, 1941, 1952, 1954) that categorical judgements of emotion could be ordered in terms of underlying dimensions.

A number of recent trends have contributed to the resurgence of interest in facial expression in the last 20 years. Tomkins (1962, 1963) provided a theoretical rationale for studying the face as a means of learning about personality and emotion. He also showed that observers could obtain very high agreement in judging emotion if the facial expressions were carefully selected to show what he believes are the innate facial affects (Tomkins and McCarter, 1964). Tomkins greatly influenced both myself and Izard, helping each of us to plan our initial cross-cultural studies of facial expression. The resulting evidence of universality in facial expression rekindled interest in this topic in psychology and anthropology.

The evidence for universals in facial expression not only fit with Tomkins's theory, but also with the newly emerging interest in applying ethological methods and concepts to human behavior. Interested in the biological bases of behavior, human ethologists welcomed evidence of commonalities in social behavior across cultures. Human ethologists provided the first detailed 'catalogs' describing

naturally occurring facial behavior (Blurton Jones, 1972; Brannigan and Humphries, 1972; Grant, 1969; McGrew, 1972). In the last decade, developmental psychologists investigating attachment, mother–infant interaction, and the development of emotion, have also begun to study facial expression.

Interest in facial expression also benefited from the popularity of research on nonverbal communication in the 1970s. While most of the research done under this rubric focused on hand and body movement, gaze direction, or posture, some studies included a few facial measures or used a judgement approach to assess the face.

Very recently, psychophysiologists interested in emotion have become interested in facial expression. Davidson, Ekman, Saron, Senulis, and Friesen (1988) for example, utilized the incidence of facial expression to dictate sampling points to examine EEG activity during positive and negative emotions. Ekman, Levenson, and Friesen (1983) found that voluntarily performing certain facial expressions generated emotion-specific autonomic nervous system activity.

A last factor responsible for the growing volume of research on facial expression is the development of systematic methods for measuring facial behavior. Ekman and Friesen's (1976, 1978) FACS provided the first objective, comprehensive, technique for describing facial movement in muscular terms. Izard afterwards (1979) developed an approach for describing the occurrence of selected facial behaviors that he proposed are relevant to emotion. There has also been progress in utilizing electromyography to measure facial activity (Fridlund and Cacioppo, 1986). [See Ekman (1982) for an analysis of 14 methods of measuring facial behavior.]

A number of recent reviews have covered the literature on facial expression. Ekman *et al.* (1972) reanalyzed many of the experiments conducted from 1914 to 1970. They found, contrary to Bruner and Taguiri's (1954) assessment, that the data yielded consistent, positive, answers to fundamental questions about the language used to describe facial expression, the influence of context on judgements of facial expression, the accuracy of judgements, and similarities across cultures. For other reviews of facial expression see: Charlesworth and Kreutzer (1973) on infants and children; Chevalier–Skolnikoff (1973) and Redican (1975, 1982) on nonhuman primates; Ekman (1973) on cross-cultural comparisons; Izard (1977) on theories of emotion; Ekman and Oster (1979) for a review of the research from 1969 to 1979, and Fridlund, Ekman, and Oster (1987) for an expansion and update of that review.

THE CULTURE-SPECIFIC VIEWPOINT

THEORISTS

Three theorists were extremely influential in anthropology and psychology for a number of decades, arguing that the information signaled by facial expressions is

specific to each culture. None provided much evidence, but their views merit consideration for historical reasons and also to elucidate theoretical issues which they ignored but which are relevant to understanding the phenomenon.

'What is shown on the face is written there by culture.' Klineberg says he never made that statement although it was attributed to him. However, he did argue, in a more tentative way, for that view. Commenting on an anthropologist's account of how people arriving in a village wore a fierce look rather than a smile, Klineberg said:

> Not only may joy be expressed without a smile, but in addition the smile may be used in a variety of situations... a smile may mean contempt, incredulity, affection... [quoting from Lafacadio Hearn's observation of the Japanese] Samurai women were required, like the women of Sparta, to show signs of joy on hearing that their husbands or sons had fallen in battle. (Klineberg, 1940, pp. 194–5)

Birdwhistell, an anthropologist with training in linguistics, dance, and dance notation, was another influential advocate of this view. He claimed that facial expressions are part of what he termed *kinesics*, which can be best viewed as another language, with the same type of units and organization as spoken language.

> Early in my research on human body motion, influenced by Darwin... 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... [Birdwhistell, 1970, pp. 29–30].

> ... this search for universals was culture bound... There are probably no universal symbols of emotional state.... We can expect them [emotional expressions] to be learned and patterned according to the particular structure of particular societies. [p. 126].

Klineberg and Birdwhistell's observations highlight both a methodological and a conceptual problem. Let us consider first the methodological problem, which is due to the use of imprecise behavioral description. The term *smile* unfortunately covers too many different facial expressions. Ekman and Friesen (1976) distinguished dozens of such smiling expressions, which involve the deployment of different sets of muscle actions. Each of these smiles differs in appearance, although in each the lip corners are drawn upwards. The evidence I will describe later about smiling shows that when different forms of smiling are distinguished, they are found to occur in quite different circumstances. Two forms of smiling occur in other than pleasant situations, another occurs when politeness is called for, and another when enjoyment is experienced.

It is confusing to call these all *smiling*, implying that they are a singular, unified category of behavior. When these different lip-corner-up appearances are treated by the observer as one entity, then, it will appear, as it did to Klineberg and Birdwhistell, that the smile has no common meaning. It is only by understanding

the anatomy of facial action, by experience in the close description of facial behavior, that such errors in describing facial behavior can be avoided. The problem is especially acute when observations are made in real time without the opportunity to review the behavior repeatedly and in slow-motion, and when the observations are made by a single observer, so there is no possibility of checking on inter-observer reliability. The use of other imprecise terms, such as frown, grimace, scowl, also encourages observers to miss what may be important distinctions.

The conceptual problem raised by Klineberg and Birdwistell is their failure to consider the possibility that differences in observed facial expression may be due to culturally imposed attempts to manage universal expressions. They treated facial expression as if it is a totally involuntary system, not capable of being voluntarily controlled. Ekman and Friesen (1969) coined the phrase *display rules* to refer to such norms about who can show which emotion to whom, and when. People learn to interfere, they proposed, with facial expressions of emotion. The observation that Klineberg cites of the fierce look during a greeting, could, from this vantage point, be due to a display rule to mask the appearance of happiness. Similarly, the smiling appearance of the grieving Samurai women could be a display rule to cover any sadness or distress with the appearance of polite smiling.

It would be quite damaging to the conclusion that there are universal expressions of emotion if there were clear evidence that when people are in an negative affect situation, experiencing pain, sadness, disgust, fear, or anger, they show an expression in which the lip corners go up, *only if* the following other explanations can be ruled out: (1) the subject who shows this smiling countenance does not believe that negative feelings must be masked with a simulated, deliberate, smile; (2) the smile is not a comment added by the subject to signal that the negative experienced can be endured (a grin-and-bear-it smile, or what Ekman and Friesen called a 'miserable smile'); (3) the smile incorporates the features which Ekman and Friesen have found to occur when enjoyment is experienced (see description below), as distinct from polite or masking smiles. There is no such evidence.

LaBarre made his major argument against universality nine years after Klineberg. He failed to distinguish facial expressions of emotion from gestures, as seen in his statement 'there is no "natural" language of emotional gesture' (LaBarre, 1947, p. 55). The distinction between gesture and emotional expression is not an easy one, but it is necessary, since gestures are socially learned and culturally variable, while there is strong evidence that facial expressions of emotion are not. Ekman and Friesen (1969) subdivide gestures into what they termed *illustrators*, movements which punctuate or help to illustrate simultaneous speech, and *emblems*, a term first suggested by Efron (1941/1972), which refers to movements which have a direct verbal translation, a dictionary definition known to all members of a culture or subculture.

Any message can be conveyed by an emblem, including factual information, commands, attitudes, and (here is the complication) feelings. The last of these I have called *referential* expressions, expressions which refer to emotions, performed in a

way which signals that the emotion is not felt when the expression is made. The message conveyed by an emotional expression is, by definition, a feeling of the moment, providing information about likely antecedent events, consequent events, etc. In Ekman (1979) I give a more complete explanation of the differences between referential and emotional expressions.

It would take us too far afield to discuss thoroughly the differences between emblems, illustrators, and conversational regulators [which collectively Ekman (1979) called conversational signals] as compared with emotional expressions. It is sufficient to draw attention to the fact that every facial movement is *not* an emotional expression. While many conversational signals involve the hands, some do involve the face. Facial action is not dedicated solely to emotional expression. Brow raising, brow lowering, and a number of different types of actions which pull the lip corners up are among the most common conversational signals. LaBarre failed clearly to make these distinctions. Darwin also was not completely consistent in this regard. Darwin was primarily concerned with emotional expressions, which he considered innately determined, and thereby universal. While he mentioned a few emblems that he considered universal, he acknowledged that most were culture specific. While LaBarre focused primarily on emblems he included some emotional expressions and referential expressions.

EVIDENCE

There have been five empirical studies undertaken specifically to prove that facial expressions are either partly or totally culture specific. (Karl Heider also conducted such a study on the Dani of New Guinea, but we will consider it later as it was done to challenge work in New Guinea by Ekman and Friesen.) Dickey and Knower (1941) compared the judgements of facial expressions made by Mexican and American school children. Vinacke (1949) and Vinacke and Fong (1955) showed candid photographs to Caucasians, Chinese, and Japanese students at the University of Hawaii. Triandis and Lambert (1958) showed photographs of a professional actress to college students in the USA, Athens, and the village of Skafera in Greece. Cuceloglu (1970) used moon-like drawings to represent the face, which he showed to college students in the USA, Japan, and Turkey. Winkelmayer, Exline, Gottheil, and Paredes (1971) showed silent motion picture films of both normal and schizophrenic women to college students in the USA, Britain, and Mexico.

All five of these studies were undertaken to demonstrate that facial expressions are culture specific, and yet they found evidence of universals. Four of them also found evidence of cultural differences, but the nature of the differences found does not contradict the notion of universals in facial expressions of emotion. Each study had major flaws in the research design. Most gave little thought to the necessity to sample systematically the facial expressions they studied. Rather than selecting expressions according to either an *a priori* theory or a representative database, they took what was conveniently available.

EVIDENCE OF UNIVERSALS

Three research methods have been used in studies which obtained evidence of universals in facial expressions. (1) Poses of emotion have been elicited. (2) Spontaneous expressions have been compared in two or more cultures. (3) The most frequent type of research has been to compare the judgements of emotions made by observers in different cultures who view the same set of facial expressions.

ELICITING POSES

Ekman and Friesen (1971) asked members of one culture to show how their face would look if they were the person in each of a number of different emotional contexts (e.g. 'you feel sad because your child died', 'you are angry and about to fight,' etc.). They interpreted their findings as strongly supporting the possibility of universality, since observers in another culture did far better than chance in identifying which emotional contexts the posed expressions were intended to portray. This finding had unusual import because the persons displaying the expressions were members of a visually isolated New Guinea culture (the South Fore). The ability of Americans to understand these New Guinean expressions could not be attributed to prior contact between these groups nor to both having learned their expressions from mass media models.

Three problems limit these findings. First, there has been only one such study. It has not been repeated in another preliterate, visually isolated culture, nor for that matter in a literate, non-Western or Western culture. Second, not all the six emotions portrayed were accurately recognized. While anger, disgust, happiness, and sadness were distinguished from each other and from fear and surprise, the American observers could not distinguish the New Guineans' portrayals of fear and surprise. Third, the facial expressions were posed and Mead (1975) argued that establishing that posed expressions are universal need not imply that spontaneous facial expressions of emotion are universal. I (Ekman, 1977, pp. 68–70) replied to Mead that I could see no reason why people could readily interpret such posed facial expressions and readily pose them other than the likelihood that they had seen those facial expressions and experienced them in actual social life. The best answer to Mead would, of course, be from evidence on spontaneous expressions, which the next type of investigation did provide.

COMPARING SPONTANEOUS EXPRESSIONS IN DIFFERENT CULTURES

Ekman and Friesen compared spontaneous facial expressions shown by Japanese and American college students. They selected Japan as the comparison culture because of the popular notion of the inscrutability of the Oriental. They hoped to show that this was due to display rules about masking negative affect in the

presence of an authority. Subjects in Tokyo and in California came into a laboratory and watched both a travelogue and stress inducing films while measurements were taken of their skin resistance and heart rate. The videotapes taken with a hidden camera unknown to the subject were later measured by persons who did not know which film was seen when the facial expressions occurred. Better than 0.90 correlation was found in the particular facial movements shown by the Japanese and by the Americans (Ekman, 1972). Virtually the same repertoire of facial movements occurred at the same points in time.

Later in the same experiment, a scientist dressed in a white coat entered the room and sat with the subject while he or she watched a stress film. Now Ekman and Friesen expected that display rules for managing facial expression in the presence of an authority figure should be operative, more so in Japan than in the USA. Measurements of the facial behavior showed that the facial movements were no longer the same. The Japanese looked more polite, showed more lip corners up (social smiling) than did the Americans (Friesen, 1972). Examining these videotapes in slow-motion revealed the actual sequencing in which a smiling movement would be superimposed over the muscular action of disgust or fear. This was the first study to show how cultural differences in the management of facial expressions (display rules) can mask universal facial expressions.

Two problems, however, limit the findings from this study. Again it is but a single study; no one has yet attempted to replicate it. The second limitation is that the mutilation films elicited only a few emotions (disgust and fear) not allowing determination of whether the full range of spontaneous emotional expressions are universal. The next type of research met these two criticisms, studying many emotions, with many replications.

COMPARING JUDGEMENTS OF EMOTION MADE BY OBSERVERS FROM DIFFERENT CULTURES

Typically, the people in each culture are shown still photographs of facial expressions, and asked to select a single emotion word or category from a list of words or categories. Very high agreement was found in the specific emotions attributed to facial expressions across five literate cultures (Ekman, 1972; Ekman, Sorenson, and Friesen, 1969), in another such study, across nine literate cultures (Izard, 1971), and in another study of a non-Western literate culture (Boucher, 1973). The strength of this evidence is its many replications. Unlike the first two kinds of research, this type of study has been repeated in many cultures, by different investigators, using different photographs of facial expression.

These studies have provided consistent evidence for the common recognition of at least six emotions (happiness, anger, fear, sadness, surprise, and disgust). Izard reported agreement also for shame and interest, but it is questionable whether it was facial expression or head position which was the clue for recognizing these

emotions. There have been no other cross-cultural studies of the facial expressions of shame and interest. Ekman and Friesen (1986) have reported agreement across ten Western and non-Western literate cultures in the identification of a specific expression for contempt. Although there is some argument about this, (Izard and Haynes, 1988, and reply by Ekman and Friesen, 1988, in press; also Ricci Bitti, personal communication, 1986), Ekman and Heider (1988, in press) have again replicated the recognition of contempt in a non-Western culture.

Six questions can be raised about such judgement studies in which the same set of faces is shown to observers in different cultures. First, argument can be made that establishing agreement across cultures about the recognition of emotion across cultures does not prove that the expression of emotion is the same across these cultures. This objection seems highly implausible. The recognition of emotion is not a matter which is taught formally, but presuambly is learned by observing the expressions which actually do occur. (Some have suggested that the recognition of emotion is innate, but whether it is innate or learned, is not relevant to this particular point.) If the expression of anger involved a slack jaw and raised brows in culture A, and lowered brow and pressed lips in culture B, then those cultures should disagree in their judgements of emotion when viewing photographs of these two different expressions. But in fact that is not what occurs. Cultures agree in their attributions of anger, and other emotions.

A second objection is that the observers in all these studies were responding to posed, not spontaneous, expressions. The answer provided at the start of this section on universality to Mead's qualms about posed behavior apply here as well. It would seem quite far-fetched to propose that there are two unrelated sets of facial expressions, a posed set which for some reason is the same across cultures, and a spontaneous set which is culture specific. Furthermore, the posed expressions are similar in form to the expressions found in the cross-cultural studies of spontaneous expressions. Although such comparisons between spontaneous and posed behavior can only be made for disgust, fear, and happiness (since other emotions have not been elicited in cross-cultural studies of spontaneous expression), there is no reason to expect such similarity would not be found for other emotions. Within Western cultures such similarities between posed and spontaneous expressions have also been established for anger, surprise, and sadness.

Another answer to this question about whether universality is established if the expressions judged are posed, comes from another study that also found universality when the observers saw spontaneous facial behavior (Ekman, 1972). The expressions of the Japanese and American subjects in the study described above, in which subjects had watched body mutilation and neutral films, were shown to Japanese and American observers. These observers were asked to judge whether each person's expressions occurred in reaction to a stressful or a neutral film. The judgements made by the Japanese and American observers were highly correlated and did not differ as a function of whether they were interpreting the expressions of their own or the other culture.

A third objection is that all the people who were studied had shared visual contact. Perhaps they all learned to recognize emotional expressions, or even to make those expressions, by observing the same models in cinema, television, and photographs. This criticism is met by a judgement study in a visually isolated, preliterate New Guinea culture, the South Fore (Ekman and Friesen, 1971). (These were the same subjects whose poses of emotion were described at the beginning of this section on the evidence of universality.) The subjects had seen no movies, television or photographs. They spoke neither English nor Pidgin. They had never worked for a Caucasian or lived in a government settlement. Nearly 10% of the members of this culture were studied. For anger, happiness, sadness, disgust, and surprise (except in distinction from fear) the faces identified with each emotion were the same as in literate cultures. Karl Heider and Eleanor Rosch were skeptical of these findings, believing that facial expressions are culture specific. In 1970, on a field trip to West Irian, they repeated this study with the Dani, a more remote culture than the South Fore. They obtained a near perfect replication of Ekman and Friesen's results (reported in Ekman, 1972).

The fourth criticism of the judgement studies is that the judgement tasks which they employed might have concealed cultural differences in the perception of secondary, blended emotions. Many students of emotion have noted that facial expressions may contain more than one message (Ekman and Friesen, 1969; Izard, 1971; Plutchik, 1962; Tomkins, 1963). The two emotions in a blend may be of similar strength, or one emotion may be primary, much more salient than the other, secondary, emotion. In prior cross-cultural studies the investigators presumed that the expressions they showed displayed a single emotion rather than a blend, and therefore did not provide those who observed the expressions the opportunity to choose more than one emotion for each expression. Without such data, however, it is not possible to ascertain whether an expression conveys a single emotion or a blend, and if there is blend, whether cultures agree in their judgement of the secondary emotion. Prior evidence of cross-cultural agreement in the judgement of expressions might be limited just to the primary message and may not apply to the secondary, blended, emotions.

A recent study by Ekman *et al.* (1987) remedied this problem. In this study, members of ten literate Western and non-Western cultures were shown a set of Caucasian facial expressions. Instead of being limited to selecting one emotion term or category for each expression, the observers were allowed to indicate the presence of multiple emotions, and the relative intensity of each emotion. There was very high agreement across cultures about the secondary, blended, emotion signaled by an expression.

The fifth question is whether there is universality, not just about which emotion is signaled by an expression, but also about the intensity of the perceived emotion. Only two cross-cultural studies (Ekman, 1972; Saha, 1973) obtained intensity judgements, and no differences were found. But not many cultures were examined in either study. Ekman *et al.* (1987) addressed this question as well. They found

cross-cultural agreement about the relative strength of expressions of the same emotion. With few exceptions, the ten cultures they examined agreed about which of two different expressions of the same emotion was most intense.

Ekman *et al.* (1987) also uncovered evidence of cultural differences in the absolute intensity level attributed to an expression. The Asian cultures (Hong Kong, Japan, Sumatra) attributed less-intense emotions to expressions than did the non-Asian cultures. Since all the expressions shown had been of Caucasian faces, it was not possible to know whether this might be due to a reluctance by the Asians to attribute strong emotions to a person who they could tell was a foreigner. To examine this issue Matsumoto and Ekman (1988) showed expressions of both Japanese and Americans to subjects in both countries. Regardless of the culture or sex of the person they were judging, the Japanese judged the emotions to be less intense than did the Americans. Work now in progress is investigating whether the Japanese judge personal characteristics other than emotion to be less intense than do Americans.

Although no one study, nor just one of the three kinds of research, would be conclusive, collectively they provide an enormous body of consistent evidence for the universality of at least some facial expressions of emotions. One could maintain that not every culture in the world has been studied, and therefore universality is not established. Such a conservative interpretation of the literature (Fridlund, 1988, in press) is probably a bit far-fetched. Although not every culture has been studied, many have. The cultures studied have been non-Western as well as Western; non-literate as well as literate. Not just one investigator has been involved, but many investigators working independently. Not just those who were attempting to find evidence of universality have found such evidence, but so too have those who were attempting to challenge it.

While the evidence is strong for fear, anger, disgust, sadness, surprise, and happiness, there is still question about contempt, shame, and interest. Also, there are no data about how many expressions for each emotion are universal. Nor is it known how often these universal expressions of emotion are seen in ordinary social life. Furthermore, little has yet been documented about cultural differences in facial expression, except for the single study on display rules discussed earlier and the recent evidence about differences in the judgement of emotional intensity.

NEW FINDINGS ON SMILES

Although these are not cross-cultural studies, I report them here because they are quite new, they have not been reviewed before, and they show the value of precise descriptions of facial behavior, in this case distinguishing among different forms of smiling. As described earlier, in the section on culture-specific theorists, the failure to use such precise descriptions by those who advocated a culture-specific view of expression may have been responsible for their confusion about the universality of facial expressions.

All of these studies explored a distinction between voluntary and involuntary smiling behavior. What Ekman and Friesen (1982) have termed a *enjoyment smile* includes all smiles in which the person actually experiences, and presumably would usually report, a positive emotion. (They originally called these *felt smiles*, but because that phrase could imply that the crucial issue is whether the person actually is aware of the smile itself, I think it is better to call them *enjoyment smiles.*) 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. They proposed that these enjoyment smiles would differ in morphology and timing from more deliberate smiles such as the social, polite, or masking smile.

Their ideas about morphology were based on the writings of the French anatomist Duchenne (1862), and their own studies of voluntary facial actions. Duchenne's classic functional anatomy of facial expression was cited by Darwin (1872), but otherwise is not well known in the English-speaking world because it was never translated, and the original French volume has been out of print for many years. I quote from an English translation of Duchenne which is soon to be published.

> The emotion of frank joy is expressed on the face by the combined contraction of the zygomaticus major muscle and the orbicularis oculi. The first obeys the will but that the second is only put in play by the sweet emotions of the soul; the ... fake joy, the deceitful laugh, cannot provoke the contraction of this latter muscle.... The muscle around the eye does not obey the will; it is only brought into play by a true feeling, by an agreeable emotion. Its inertia, in smiling, unmasks a false friend. (1862; 1989)

Quite consistent with Duchenne's forecast, Ekman, Roper, and Hager (1980) found that most people are unable to contract voluntarily the orbicularis oculi muscle. This action thus would not be available, in most people, for recruitment into any of the voluntary smiles.

Based on these findings and Duchenne's observations, Ekman and Friesen proposed that the common morphological elements in the facial expressions of all such positive experiences are the action of two muscles: the zygomatic major muscle pulling the lip corners upwards towards the cheek bones; and, the outer portion of orbicularis oculi which raises the cheek and gathers the skin inwards from around the eye socket. In honor of Duchenne I propose that a smile incorporating both of these muscles be called a *Duchenne smile.*

Seven studies have obtained evidence for distinguishing this from other forms of smiling. Ekman, Friesen, and Ancoli (1980) found that Duchenne smiles occurred more often than three other types of smiling when people watched pleasant films; and only Duchenne smiles correlated with the subjective report of happiness. Ekman, Friesen, and O'Sullivan (1988) found that Duchenne smiles occurred more often when people were actually enjoying themselves, as compared

with when people feigned smiling to conceal negative emotions. Fox and Davidson (1988) found that in 10-month-old infants Duchenne smiles occurred more often in response to the mother's approach, while other types of smiles occurred more often in response to the approach of a stranger; and only Duchenne smiles were associated with the left frontal EEG activation, the pattern of cerebral activity repeatedly found in positive affect. Matsumoto (1986) found that depressed patients showed more Duchenne smiles in their discharge interviews than they did in their admission interviews, but there was no difference in the rate of other kind of smiling.

The possibility that these differences among types of smiling may be universal is suggested by the findings from the next three studies, all of which were conducted in Europe. Steiner (1986) found that Duchenne smiles but not other types of smiles increased over the course of psychotherapy in patients who were judged to have improved. Ruch (1987) found that Duchenne smiles were sensitive to the amount of humor felt by German adults when responding to jokes or cartoons. Schneider (1987) found that in young children Duchenne smiles distinguished whether they had succeeded or failed in a game.

Ekman and Friesen (1982) also proposed that enjoyment smiles would differ from other smiles in the amount of time it takes for the smile to appear, how long it remained on the face before fading, and in the time required for the smile to disappear. Two studies have shown the utility of these measures of timing, which are, however, much more costly to make than the measurement of which muscles are recruited. Bugental (1986) found that women showed more enjoyment smiles with responsive children than with unresponsive children. Weiss, Blum, and Gleberman (1987) found enjoyment smiles occurred more often during post-hypnotically induced positive affect than in deliberately posed positive affect.

Collectively, these studies show that smiles should no longer be considered a single category of behavior. They can be usefully distinguished by measuring different facets of the smile. Cross-cultural studies of the different forms of smiling need to be done. It also remains to be determined how many different smiles may provide different social signals, have different functions in social interaction, and relate to different aspects of subjective experience and concomitant physiology. [See Ekman (1985) for a description of 18 different types of smiling.]

THE ORIGIN OF FACIAL EXPRESSIONS OF EMOTION

Why are particular facial muscles activated in particular emotions? For example, why are the brows raised in surprise, and lowered in anger, rather than vice versa? The findings of universal facial expressions of emotion has been taken as evidence that these expressions are innate, prewired, specialized signals that have evolved through natural selection (Darwin, 1872; Eibl-Eibesfeldt, 1972; Redican, 1975,

1982; Tomkins, 1962). From this viewpoint, the facial actions seen in emotional expressions originally served some purely biological or instrumental function in our progenitors. In addition, these actions conveyed information to others about an individual's possible future behavior, or what might have happened to elicit the action. Because this (at first) communicative value was also adaptive, the facial actions were maintained in the repertoire even if the original function was lost, or the actions were modified as a result of natural selection, to enhance their efficacy as signals. Ethologists use the term *ritualization* to describe the process by which a behavior is modified through genetic evolution to enhance its efficacy as a signal.

There is an alternative explanation to ritualization, one which stresses the current adaptive value of the expression, emphasizing ontogenetic development rather than genetic evolution. Learning experiences common to all members of a species have been invoked to explain the origin of facial expressions of emotion (Allport, 1924; Peiper, 1963).

I will argue that both explanations—ritualization and species-constant learning—have merit. Each may explain the origin of different facial expressions of emotion. Contrasting these two explanations can usefully highlight the type of research needed to enable one to choose between them. To illustrate the difference between these explanations let us consider the origin of just two facial actions, the brow raise and the brow lower.

All those who have written about the origin of brow raising have noted that this action increases the visual input, by increasing the superior visual field. The benefit of this action depends upon how deeply set the eyes are in the bony socket, the prominence of the brow raise, and how well-endowed with hair the eyebrows are. A number of other functions of brow raising have been suggested which are not supported by current knowledge of the neuroanatomy of vision. (These are discussed in Ekman, 1979.)

Brow lowering acts as a sunshade, decreasing the light coming in from the superior visual field. Brow lowering also helps to protect the eyeball from blows and also may enhance focal illumination by diminishing background light (Redican, 1982). A number of other functions of brow lowering have been suggested which have no known basis. (These are discussed in Ekman, 1979.)

Since brow lowering and brow raising have opposite effects on vision, these effects can be used to explain their role in emotional expression. Presumably brow raise occurs in surprise expressions rather than brow lowering because raising increases visual input. Similarly, brow lowering, it could be argued, occurs in anger and sadness expressions because this action decreases glare, and protects the eyeball from blows. Thus, the selection of brow raise and brow lower from their respective signals could have been the product of learning rather than genetic evolution (ritualization). Two problems weaken the ritualization explanation.

First, ritualization presumes that selection of actions for their role as signals occurred through phylogenetic evolution. Yet the evidence that in other primates brow raises occur in surprising contexts and brow lowering in antagonistic

encounters is ambiguous (Chevalier–Skolnikoff, 1973; Redican, 1982). The lack of evidence of homologous eyebrow actions in non-human primates does not rule out an evolutionary account of the role of these actions in emotional expression, although the presence of such actions would be supportive.

Second, implicit in the ritualization explanation is the idea that their function as signals is innate and cannot be explained on the basis of some purely biological function in present-day *Homo sapiens*, either in adults or children. Yet those brow actions continue to serve an adaptive function for contemporary humans. Ontogeny may play more of a role than phylogeny in shaping these actions in emotional signals. The genes may determine only how the equipment works (brow raise increases the visual field). The signal value of such an action and its association with emotion (surprise) may depend primarily upon early experience, experience common to all members of the species who have functioning visual apparatus. Such reasoning would go as follows:

> Infants encounter unexpected events in which they would raise their brows to see what is happening above them. (One could even argue that the unexpected is more likely to be above than below an infant.) Over time, perhaps abetted by the signal value of the movement, brow raising and surprise would become associated. In the strictest version of this explanation, the infant would have to learn, presumably by trial and error, that brow raising increases his visual field. Alternatively, that might be given, and what he learns is to make this movement when trying to see what has unexpectedly happened. To grant even more to biology, the infant could be born equipped to raise his brows when visually scanning unexpected sudden visual events. What he needs to learn is to generalize this response to any unexpected event, regardless of whether it is visual. (Ekman, 1977, p. 66)

I do not mean to suggest that this type of species-constant learning is the correct explanation, only that it is just as plausible as an explanation based on ritualization. There is no clear evidential basis for making a choice. The origin of brow raises in surprise could be resolved by developmental data. If blind infants do not show brow raising to sudden unexpected sounds or touches, then at least we could assume that the brow raise is not wired in for surprise, nor for scanning if the eyes are not operative. Unfortunately the relevant data are equivocal (Charlesworth, 1970; Eibi-Eibesfeldt, 1972; Lersch, 1932, 1971; Goodenough, 1932; Peiper, 1963). No one has yet done a detailed descriptive study of the repertoire of facial behavior in the first year of life, for either blind or sighted infants.

Although the evidence is not as good as it could be if better research methods were employed, there is, nevertheless, evidence that the facial expressions of monkeys, apes, and humans are homologous for fear, anger, happiness, and perhaps sadness (reviewed by Redican, 1982). In summarizing a much more detailed discussion of these issues, I wrote that I think it is likely:

> that evolution played a major role in emotional expression. This must be the case for some facial actions in some facial expressions of emotion. But which ones, and on

> what basis is not known. ... The problem with accepting ritualization as the explanation of the origin of facial expressions of emotion is that it forecloses investigations of issues which should be explored, it leads away from rather than toward research which needs to be done. Competing explanations should be considered and ambiguities emphasized to motivate the research which is needed. (Ekman, 1979, pp. 201–2)

WHAT INFORMATION IS PROVIDED BY FACIAL EXPRESSIONS OF EMOTION?

There is no evidence about precisely what type of information is conveyed when, during an on-going social interaction, one person sees a facial expression of emotion on another person's face. There are not even data on how noticeable facial expressions actually are when they occur as briefly as they usually do, competing with other sources of information (voice, speech content, body movement, etc.) during interactions.

The fact that in an experiment people agree in selecting an emotion term for a face does not mean that people engaged in social interaction usually respond to faces in those terms; although it must happen sometimes, at least in many cultures. The experience of having someone say to you, 'you look afraid', or 'are you afraid?' is not unknown. People may also respond to seeing an expression by noting the antecedent event rather than utilizing an emotion term. For example, instead of 'you're sad' one person might say to another, 'you look like you lost all your money in the stock market crash.' In one of the experiments reviewed earlier (Ekman and Friesen, 1971), observers had no difficulty in linking a face to an antecedent event such as, 'show me the person whose child has died.' People might also respond to a face in terms of the unobservable activities which they infer accompany that expression. 'Your heart must be pounding,' would be an example of noting a known physiological accompaniment of anger expressions. 'You must be remembering something terrible,' would be a comment on a cognitive process associated with an emotion.

Emotion terms can be thought of as a kind of shorthand, an abbreviated way to refer to a package of events and processes which comprise the phenomenon. Each emotion term, I believe, refers to a different set of organized, integrated, processes. They include the antecedent events which set off these processes, the appraisal activity brought to bear upon those antecedent events, the physiological and motor responses, the memories, thoughts, images, and information processing, and the mobilization of efforts to cope with the source of emotion. All or any of these may be implied when someone says 'he looks angry.'

It is not sensible, in my view, to suggest that 'It is probably truer for a man to say "I would like to hit you" than for him to say "I am angry"' (Andrew, 1963, p. 5). Neither is more true. 'I am angry' is a more abstract statement; a shorthand which could refer to the wish to hit, or what provoked that wish, or the sensation of feeling

hot, or any other part of what makes up anger. It is much more convenient, if less precise, to use the single emotion term, than to list the sequence of processes that term encompasses. When someone uses the shorthand emotion term we cannot know which facet of emotion is being referred to unless we ask or observe.

The fact that we do not know which facet does not mean that we have no information when someone uses an emotion term. Compare a few of the differences in the information implied when someone says 'I am angry' versus 'I am disgusted.' In anger the antecedent event is more likely to be a provocation, an interference with an ongoing activity, or a threat. In disgust the antecedent event is more likely to be something distasteful, literally or figuratively. In terms of likely actions, these are movement forward, and attempts to strike in anger, as compared with a movement away or to the side, to block further input in disgust; a louder, harsher voice in anger, as compared with a more retching sound in disgust. In anger there is heart rate acceleration and warm skin temperature; there is heart rate deceleration in disgust.

I believe it is obfuscating to claim (Andrew, 1963; Fridlund, 1988; Smith, 1985) that facial expressions signal information only, or more truly, about intentions or social actions. It would be just as misleading to maintain that expressions signal information only about physiological changes or associated memories. These are not mutually exclusive, they are different aspects of the same phenomenon.

The reification, *a priori*, of but one type of information as the only real signal conveyed by a facial expression, also has the unfortunate consequence of attempting to create a division between ethologists looking at displays and psychologists studying emotional expression. Even more regrettable, it leads us away from the interesting empirical questions which should be addressed. We need to learn about which type of information is derived from a facial expression by whom, when, and in what specific types of social, cultural settings.

REFERENCES

Allport, F. H. (1924) *Social Psychology*. Boston: Houghton-Mifflin.

Andrew, R. J. (1963) Evolution of facial expression. *Science*, **141**, 1034–41.

Birdwhistell, R. L. (1970) *Kinetics and Context*. Philadelphia, PA: University of Pennsylvania Press.

Blurton Jones, N. G. (1972) Non-verbal communication in children. In R. A. Hinde (Ed.), *Nonverbal Communication*, pp. 271–96. Cambridge: Cambrdige University Press.

Boucher, J. D. (1973) Facial behavior and the perception of emotion: studies of Malays and Temuan Orang Asli. Paper presented at the Conference on Psychology Related Disciplines, Kuala Lumpur.

Brannigan, C. R., and Humphries, D. A. (1972) Human nonverbal behavior, a means of communication. In N. G. Blurton Jones (Ed.), *Ethological Studies of Child Behavior*. Cambridge: Cambridge University Press.

Bruner, J. S., and Tagiuri, R. (1954) The perception of people. In G. Lindzey (Ed.), *Handbook of Social Psychology*, Vol. 2, pp. 634–54. Reading, MA: Addison Wesley.

Bugental, D. B. (1986) Unmasking the 'polite smile': situational and personal determinants of managed affect in adult–child interaction. *Personality and Social Psychology Bulletin*, **12**, 7–16.

Charlesworth, W. R. (1970) *Surprise Reactions in Congenitally Blind and Sighted Children* (Progress Report). Washington, DC: National Institute of Mental Health.

Charlesworth, W. R., and Kreutzer, M. A. (1973) Facial expression of infants and children. In P. Ekman (Ed.), *Darwin and Facial Expression*, pp. 91–168. New York: Academic Press.

Chevalier-Skolnikoff, S. (1973) Facial expression of emotion in nonhuman primates. In P. Ekman (Ed.), *Darwin and Facial Expression*, pp. 11–83. New York: Academic Press.

Cuceloglu, D. M. (1970) Perception of facial expressions in three cultures. *Ergonomics*, **13** (1), 93–100.

Darwin, C. (1859) *On the Origin of Species by means of Natural Selection*. London: Murray.

Darwin, C. (1872) *The Expression of the Emotions in Man and Animals*. New York: Philosophical Library.

Davidson, R. J., Ekman, P., Saron, C., Senulis, J., and Friesen, W. V. (1988) Emotional expression and brain physiology I: Approach/withdrawal and cerebral asymmetry.

Dickey, R. V., and Knower, R. H. (1941) A note on some ethnological differences in recognition of simulated expressions of the emotions. *American Journal of Sociology*, **47**, 190–3.

Duchenne, B. (1862) *Mechanisme de la physionomie humaine ou analyse electrophysiologigue de l'expression des passions*. Paris: Bailliere.

Efron, D. (1972) *Gesture, Race and Culture*. The Hague: Mouton. (Originally published 1941, *Gesture and Environment*.)

Eibl-Eibesfeldt, I. (1972) Similarities and differences between cultures in expressive movements. In R. A. Hinde (Ed.), *Nonverbal Communication*, pp. 297–312. Cambridge: Cambridge University Press.

Ekman, P. (1972) Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska Symposium on Motivation, 1971*, pp. 207–283. Lincoln, NE: University of Nebraska Press.

Ekman, P. (1973) Cross-cultural studies of facial expressions. In P. Ekman (Ed.), *Darwin and Facial Expression*. pp. 169–229. New York: Academic Press.

Ekman, P. (1977) Biological and cultural contributions to body and facial movement. In J. Blacking (Ed.), *The Anthropology of the Body*. pp. 34–84. London: Academic Press.

Ekman, P. (1979) About brows: emotional and conversational signals. In M. von Cranach, K. Foppa, W. Lepenies, and D. Ploog (Eds), *Human Ethology*, pp. 169–248. Cambridge: Cambridge University Press.

Ekman, P. (1982) Methods for measuring facial action. In K. Scherer and P. Ekman (Eds), *Handbook of Methods in Nonverbal Behavior Research*, pp. 45–90. New York: Cambridge University Press.

Ekman, P. (1984) Expression and the nature of emotion. In K. Scherer and P. Ekman (Eds), *Approaches to Emotion*, pp. 319–44. Hillsdale, NJ: Erlbaum.

Ekman, P. (1985) *Telling Lies*. New York: Norton.

Ekman, P., and Friesen, W. V. (1969) The repertoire of nonverbal behavior: categories, origins, usage, and coding. *Semiotica*, **1**, 49–98.

Ekman, P., and Friesen, W. V. (1971) Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, **17**, 124–9.

Ekman, P., and Friesen, W. V. (1976) Measuring facial movement. *Journal of Environmental Psychology and Nonverbal Behavior*, **1**, 56–75.

Ekman, P., and Friesen, W. V. (1978) *The Facial Action Coding System.* Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., and Friesen, W. V. (1982) Felt, false, and miserable smiles. *Journal of Nonverbal Behavior*, **6**, 238–252.

Ekman, P., and Friesen, W. V. (1986) A new pan cultural expression of emotion. *Motivation and Emotion*, **10**, 159–168.

Ekman, P., and Friesen, W. V. (1988) Who knows what about contempt: a reply to Izard and Haynes. *Motivation and Emotion*, **12**, 17–22.

Ekman, P., Friesen, W. V., and Ancoli, S. (1980) Facial signs of emotional experience. *Journal of Personality and Social Psychology*, **39**, 1125–34.

Ekman, P., Friesen, W. V., and Ellsworth, P. (1972) *Emotion in the Human Face: Guidelines for Research and an Integration of Findings*, New York: Pergamon Press. 2nd ed., *Emotion in the Human Face* (1982) New York: Cambridge University Press.

Ekman, P., Friesen, W. V., and O'Sullivan, M. (1988). Smiles when lying. *Journal of Personality and Social Psychology*, **54**, 414–20.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., Krause, R., LeCompte, W. A., Pitcairn, T., Ricci-Bitti, P. E., Scherer, K. R., Tomita, M., and Tzavaras, A., (1987) Universals and cultural differences in the judgements of facial expressions of emotion. *Journal of Personality and Social Psychology*, **53**, 712–17.

Ekman, P., and Heider, K. (1988) The universality of a contempt expression: a replication. *Motivation and Emotion*, **12**, 303–8.

Ekman, P., Levenson, R. W., and Friesen, W. V. (1983) Emotions differ in autonomic nervous system activity. *Science*, **221**, 1208–10.

Ekman, P., and Oster, H. (1979) Facial expressions of emotion. *Annual Review of Psychology*, **30**, 527–54.

Ekman, P., Roper, G., and Hager, J. C. (1980) Deliberate facial movement. *Child Development*, **51**, 886–91.

Ekman, P., Sorenson, E. R., and Friesen, W. V. (1969) Pan-cultural elements in facial displays of emotions. *Science*, **164**, 86–88.

Fox, N. A., and Davidson, R. J. (1988, in press) *Patterns of Brain Electrical Activity During Facial Signs of Emotion in 10-Month-Old Infants. Developmental Psychology*, **24**, 230–6.

Fridlund, A. J. (1988, in press) What can asymmetry and laterality in facial EMG tell us about the face and brain? *International Journal of Neuroscience*, **39**, 53–69.

Fridlund, A. J., and Cacioppo, J. T. (1986) Guidelines for human electromyographic research. *Psychophysiology*, **23**, 567–89.

Fridlund, A. J., Ekman, P., and Oster, H. (1987) Facial expressions of emotion. In A. Siegman and S. Feldstein (Eds), *Nonverbal Behavior and Communication*, pp. 143–224. Hillsdale, NJ: Erlbaum.

Friesen, W. V. (1972) Cultural differences in facial expressions in a social situation: An experimental test of the concept of display rules. Unpublished doctoral dissertation, University of California, San Francisco.

Goldstein, A. G. (1983) Behavioral scientists' fascination with faces. *Journal of Nonverbal Behavior*, **7**, 223–55.

Goodenough, F. L. (1932) Expression of the emotions in a blind-deaf child. *Journal of Abnormal Social Psychology*, **27**, 328–33.

Grant, N. G. (1969) Human facial expression. *Man*, **4**, 525–36.

Heider, K. (1974) Affect display rules in the Dani. Paper presented at the Meeting of the American Anthropology Association, New Orleans.

Hunt, W. A. (1941) Recent developments in the field of emotion. *Psychological Bulletin*, **38**, 249–76.

Izard, C. E. (1971) *The Face of Emotion.* New York: Appleton-Centruy-Crofts.

Izard, C. E. (1977) *Human Emotions*. New York: Plenum Press.
Izard, C. E. (1979) The maximally discriminative facial movement coding system (MAX). Unpublished manuscript. Available from Instructional Resource Center, University of Delaware, Newark, Delaware.
Izard, C. E., and Haynes, O. M. (1988) On the form and universality of the contempt expression: a correction for Ekman and Friesen's claim of discovery. *Motivation and Emotion*, **12**, 1–16.
Klineberg, O. (1940) *Social Psychology*. New York: Henry Holt.
LaBarre, W. (1947) The cultural basis of emotions and gestures. *Journal of Personality*, **16**, 49–68.
Lersch, P. (1971) *Gesicht und seele*. Munich: Ernst Reinhardt Verlag. (First published 1932.)
Matsumoto, D. (1986) Cross-cultural communication of emotion. Doctoral dissertation, University of California, Berkeley.
Matsumoto, D., and Ekman, P. (1988, in press) American–Japanese cultural differences in rating the intensity of facial expressions of emotion. Manuscript submitted for publication.
McGrew, W. C. (1972) *An Ethological Study of Children's Behavior*. New York: Academic Press.
Mead, M. (1975) Review of *Darwin and Facial Expression*. *Journal of Communication*, **25**, 209–13.
Peiper, A. (1963) *Cerebral Function in Infancy and Childhood*. New York: Consultants Bureau.
Plutchik, R. (1962) *The Emotions: Facts, Theories and a New Model*. New York: Random House.
Redican, W. K. (1975) Facial expression in nonhuman primates. In L. A. Rosenblum (Ed.), *Primate Behavior*, Vol. 4, pp. 103–94. New York: Academic Press.
Redican, W. K. (1982) An evolutionary perspective on human facial displays. In P. Ekman (Ed.), *Emotion in the Human Face*, 2nd edn, pp. 212–80. Elmsford, NY: Pergamon Press.
Ruch, W. (1987) Personality aspects in the psychobiology of humour laughter. Paper presented at the Third Meeting of the ISSID, Toronto, June 1987.
Saha, G. B. (1973) Judgment of facial expression of emotion—a cross-cultural study. *Journal of Psychological Research*, **17**, 59–63.
Schlosberg, H. (1941) A scale for the judgment of facial expression. *Journal of Experimental Psychology*, **29**, 497–510.
Schlosberg, H. (1952) The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology*, **44**, 229–37.
Schlosberg, H. (1954) Three dimensions of emotion. *Psychological Review*, **61**, 81–8.
Schneider, K. (1987) Achievement-related emotions in preschoolers. In F. Hahseh and J. Kuhl (Eds), *Motivation, Intention and Volition*. Berlin: Springer.
Smith, W. J. (1985) Consistency and change in communication. In G. Zivin (Ed.), *The Development of Expressive Behavior*. pp. 51–75. Orlando: Academic Press.
Steiner, F. (1986) Differentiating smiles,. In E. Branniger-Huber and F. Steiner (Eds), *FACS in Psychotherapy Research*, pp. 139–48. Zurich: Department of Clinical Psychology, Universitat Zurich.
Tagiuri, R. (1968) Person perception. In G. Lindzey and E. Aronson (Eds), *Handbook of Social Psychology*, pp. 395–449. Reading, MA: Addisson-Wesley.
Tomkins, S. S. (1962) *Affect, Imagery, Consciousness*. Vol. 1. *The Positive Affects*. New York: Springer.
Tomkins, S. S. (1963) *Affect, Imagery, Consciousness*. Vol. 2. *The Negative Affects*. New York: Springer.
Tomkins, S. S., and McCarter, R. (1964) What and where are the primary affects? Some evidence for a theory. *Perception and Motor Skills*, **18**, 119–58.

Triandis, H. C., and Lambert, W. W. (1958) A restatement and test of Schlosberg's theory of emotion with two kinds of subjects from Greece. *Journal of Abnormal and Social Psychology*, **58**, 321–8.

Vinacke, W. E. (1949) The judgment of facial expressions by three national-racial groups in Hawaii. I. Caucasian faces. *Journal of Personality*, **17**, 407–29.

Vinacke, W. E., and Fong, R. W. (1955) The judgment of facial expressions by three national-racial groups in Hawaii. II. Oriental faces. *Journal of Social Psychology*, **41**, 184–95.

Weiss, F., Blum, G. S., and Gleberman, L. (1987) Anatomically based measurement of facial expressions in simulated versus hypnotically induced affect. *Motivation and Emotion*, **11**, 67–81.

Winklemeyer, R., Exline, R. V., Gottheil, E., and Paredes, A. (1971) Cross-cultural differences in judging emotions. Unpublished work.