Reprinted from: APPROACHES TO EMOTION. K. Scherer & P. Ekman (Eds.). Hillsdale, NJ: Lawrence Erlbaum, 1984.

15 Expression and the Nature of Emotion

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INTRODUCTION

There is little agreement about a definition of emotion. Not all of those who study emotion even think it necessary to make their own definition explicit. None have explained how they distinguish the boundaries of emotion, how emotion differs from reflex, motive, mood, or attitude. The last half of this chapter proposes ten characteristics which can help in beginning to define what distinguishes emotion from other psychological states. These characteristics are based in part on my earlier work, (with Wallace V. Friesen) on universals in facial expression. I will summarize that work before describing our current research—on voluntary and involuntary expression, emotion-specific autonomic nervous system activity, and startle reactions—which is the other source for my ideas about the characteristics that distinguish emotion.

CROSS CULTURAL STUDIES OF EXPRESSION

For more than 100 years scientists argued about whether facial expressions are universal or specific to each culture. On one side Darwin (1872/1965), and, more recently, Lorenz (1965) and Eibl-Eibesfeldt (1972), argued that facial expressions are innate, evolved behavior. On the other side, Birdwhistell (1970), Klineberg (1940), LaBarre (1947), Leach (1972), and Mead (1975), argued that facial expressions are instead like a language, socially learned, culturally controlled, and variable in meaning from one setting to another.

When Friesen and I began our study of facial expression we fortunately were able to borrow from Carleton Gajdusek (1963), over 100,000 feet of film he had

taken of two preliterate New Guinea cultures in the late 50s and early 60s, befor these peoples had contact with the outside world. These New Guineans did no show any expressions we had not seen before; there were no unique facia expressions. Although the people looked very exotic in their dress and othei aspects of their behavior, their facial expressions were totally familiar and, as best we could tell when we could see enough of the social context to check our judgments, our interpretations of their expressions were correct. Their facial expressions were not a foreign language. After studying these films we set out to explore systematically the possibility of universality in facial expression.

Our best known experiments involved showing photographs of facial expressions to observers in different cultures and asking them to check from a list the emotion they saw. Observers in five cultures gave the same interpretation of each face. (This and our other cross cultural studies are reported in detail and compared to previous cross cultural studies of expression by other investigators in Ekman, 1973.) Quite independently of us, Carroll Izard (1971) did exactly the same experiment, with different photographs of facial expressions and a somewhat different list of emotion terms, and obtained very similar results.

Although pleased that we were able to obtain strong evidence of universality in expression which fit our impressions from viewing the New Guinea films we were perplexed about how wise people, anthropologists such as Weston La Barre and Margaret Mead who had studied many cultures, had come to the opposite judgment about facial expression. We came up with the notion of *display rules* (Ekman & Friesen, 1969a) to reconcile our findings with their observation of cultural differences. Display rules are overlearned habits about who can show what emotion to whom and when they can show it. Examples of display rules in many Western cultures are: males should not cry; females (except in a maternal role) should not show anger; losers should not cry in public and winners should not look too happy about winning. We presume that these display rules are learned early in childhood as well as later, that they vary with social class and ethnic background within cultures, as well as across cultures.

We designed an experiment to show that display rules are responsible for the frequent observation of cultural differences in facial expression. Within a single experiment we hoped to show universality both in facial expression and cultural differences due to display rules. We contrasted Japan with the United States because of the observations of how Orientals are "inscrutable" and because of the anthropological data, which translated into our terms, suggested that Japanese have very different display rules, particularly about not displaying negative affect in the presence of an authority.

A subject sat alone in a room, watching positive (scenery) and negative (surgical) films while a hidden video camera recorded facial expressions. We had one set of subjects in Berkeley, California, and another set of subjects in Tokyo. When we measured each and every movement of the face we found nearly identical facial muscle movement at nearly identical points in the film, regardless

of culture. The correlations between the expressions shown by Americans and Japanese were above .90. Culture made no difference. In the second part of the experiment, we brought a scientist into the room with the subject, an American in Berkeley, a Japanese scientist in Tokyo. Our hypothesis was that display rules would operate in Japan, causing the subject to mask negative affect with a smile. In the United States the presence of an authority might lead college students, (during the rebellious 1960s), to amplify negative affect, certainly not to conceal it. Measurement of the facial movements showed no overlap in the facial behavior of the Japanese and Americans.

In this single experiment we had shown how facial expressions are both universal and culturally different. In private, when no display rules to mask expression were operative, we saw the biologically based, evolved, universal facial expressions of emotion. In a social situation, we had shown how different rules about the management of expression led to culturally different facial expressions.

There was still a loophole, one which Ray Birdwhistell was quick to exploit, in our evidence of universals in facial expression. All the people we had studied had shared visual input. Instead of evolution being responsible for pan-human facial expressions it might be the television tube and the silver screen. Birdwhistell argued that people had learned from watching John Wayne and Charlie Chaplin, which expressions signify which emotion.

We went to New Guinea to close this loophole. We studied a visually isolated people, who had not seen the television screen, movies, photographs, magazines, and few, if any, outsiders. We did two types of studies. We could not do a typical emotion judgment study because the people could not check emotion labels off from a list. Instead we told the subject a story, such as, "A man has learned that his child has just died," and asked the subject to choose from three expressions the photograph that showed that man. These visually isolated subjects picked for the child-died story the photograph that had been judged as sad in literate cultures; the angry one for the "about to fight" story, and so on. Incidently, we got the idea for the task from a report by Dashiell (1927) about how to measure the judgment of emotional expression in children who could not yet read. Our second study turned the design around. We read a story to the subject and asked him to show it to us on his face. When we measured the New Guinean posed expressions we found they moved the same muscles for each emotion as do people in literate cultures.

VOLUNTARY AND INVOLUNTARY EXPRESSION

When people follow display rules to manage an expression do they totally succeed, or is some leakage detectable? How completely can expressions be masked? Can people who deliberately put on feelings they don't actually experience

do so in a way that is convincing to others? Can one tell from the expression itself that it is false, or is that only learned from the context in which it occurs, if at all. More generally these are questions about how well voluntary efforts can inhibit involuntary expression and the extent to which voluntary action can duplicate action brought about involuntarily.

Work in clinical neurology (Meihlke, 1973; Myers, 1976; Tschiassny, 1953) has shown that different neural pathways are involved in voluntary and involuntary facial expression. Certain types of brain lesions result in a patient being unable to smile on request, but able to smile if happiness is spontaneously aroused. Lesions in another part of the brain produce the reverse pattern. The patient can smile on request but not spontaneously. The fact that different neural pathways are involved in voluntary and involuntary expression does not prove or even make it more likely that voluntary and involuntary expressions would differ in appearance, but it at least makes the question a reasonable one to ask.

Part of the problem encountered in asking such a question resides in the over simplification of the voluntary—involuntary dichotomy. There are many different voluntary expressions, and many types of involuntary expressions, each probably varying in the underlying neural substrates that are involved. We have conducted three studies, each examining a different type of voluntary expression. First let us consider the most deliberate of voluntary expressions, facial movements performed on request.

We contrasted these movements our subjects performed when we asked them to move specific muscles with unplanned, spontaneous emotional expression. We (Ekman, Hager, & Friesen, 1981) have extensive data comparing requested smiles with smiles in response to a joke. We found a significant difference between the two in the extent of asymmetry. Deliberate smiles more often than spontaneous ones were asymmetric; and, among those which were asymmetrical, the deliberate more often than the spontaneous were stronger on the left side of the face (with subjects who are right handed). Because most current thinking about hemispheric specialization claims that the right hemisphere, which controls the left side of the face, is implicated in emotion, one might wonder why the deliberate was stronger on the *left* not the right side of the face. Our a posteriori position is that the right hemisphere does not direct emotional expression, but instead manages and modulates it. In any kind of cortically modulated facial behavior, whether it is a requested action or a speech-accompanying piece of facial behavior, there will be more asymmetry than in either reflexive or more spontaneous emotional behavior.

Let me turn to a study of another kind of voluntary movement, this time a *false* expression. A false expression is put on the face deliberately to mislead the person viewing it into thinking an emotion is felt when it is not. One of our studies of false expression (Ekman, Friesen, & Simons, submitted) compared spontaneous startle reactions, reactions to a blank pistol shot, with the subjects' expressions when we told them that we were going to count from ten to zero and

when we reached zero there would be no gunshot but they were to act in such a way that anyone looking at them would think the gun had been fired. Fine grained measurement with our Facial Action Coding System (FACS) (Ekman & Frieson, 1976, 1978) revealed many markers of the false startle. The latency is too long. It seems that no one can put a startle on their face within a 100 msec. which is the hallmark of a genuine startle. The deliberate startles also are asymmetrical, tending to be stronger on the left side of the face.

A third study examined still another type of voluntary expression, what we call a *referential* expression. By this we mean an expression which refers to an emotion that is not felt at the moment. The person who sees a referential expression knows that the person showing it is mentioning an emotion which is not felt. The person who sees a false expression, however, often is misled. The referential expression that we have most closely examined is what we (Ekman & Friesen, 1982) call a *miserable smile*. This smile is put on to acknowledge being miserable. Anyone who sees it does not think the person making it is happy. Suppose the dentist tells a patient that a root canal is needed, which is going to hurt a lot and cost a lot of money. A good patient will greet such news with a miserable smile. It is a "grin and bear it" smile. It lets the other person know one is not going to show the distress or fear that one feels. It acknowledges one's misery.

There are many ways in which such deliberate, miserable smiles are marked. They are often either too short or too long, held on the face much longer than genuine smiles. Also, they tend not to have the involvement of the muscle around the eyes. Darwin was the first to propose that in genuine smiling not only do the lip corners go up but the orbicularis oculi muscle, which circles the eye, is contracted as well. Miserable smiles are often abrupt in onset and offset, appearing to jump on and off the face. A fourth way in which miserable smiles differ from genuine ones is in the addition of other muscular actions—lip pressing or chin muscle action, for example—which are not present in the genuine, uncontrolled happy expression. From a semiotic viewpoint, the miserable smile must be a transformation of the genuine smile signal which still resembles it. The message of something positive must be conveyed, yet the smile must look sufficiently different not to confuse the observer into thinking the person is actually happy.

Our three studies suggest that there are multiple facial clues to distinguishing between voluntary and involuntary expressions. Actions that are usually present when the emotion is felt are absent. Actions usually absent when emotion is felt are present. There is more asymmetry. Timing differs in a number of ways; the expression may be too short or too long in duration, onset or offset may be abrupt. Which type of marking occurs we believe depends on which type of voluntary expression occurs.

Many questions remain about the differences between voluntary and involuntary expressions. One of them is detectability. We can detect differences between

voluntary and involuntary facial expression, but to do so we spent enormous amounts of time, looking essentially with a microscope, in repeated, slowed motion. Are the signals apparently different without such analyses? Can people tell? We believe the referential expressions (such as the miserable smile) are performed in such a way as to be readily distinguished from the felt expression. But we do not yet know how well it is possible to detect the false expression when it is seen in real time embedded in the flow of behavior.

Are there individual differences in the ability to disguise emotional expression, to put on false expressions. Again we believe there is but it is not well understood. If there are such individual differences, is that ability a skill that can be developed by anyone? And if there is such a skill, is it general across emotions or are people adept in disguising one emotion but not in disguising another?

Is the ability to falsify an emotion, to put on an expression not felt, correlated with the ability to inhibit emotion, to conceal what is felt? The neurologists tell us that these involve different neural substrates. If you are good at one are you good at the other?

FACIAL EXPRESSION AND THE AUTONOMIC NERVOUS SYSTEM

Let me turn now to another question, a very old one in the history of psychology: whether or not Autonomic Nervous System (ANS) activity differs or is the same for each emotion. William James (1890), Ax (1953) and others suggested that each emotion has a different pattern of ANS activity. Cannon (1927), Schachter and Singer (1962), and others suggested that the ANS activity varies with just the extent but not the nature of emotional arousal. In the last decade with the growth of cognitive psychology the prevalent model of emotion (e.g., Mandler, 1975), stemming from the Schachter and Singer's study, holds that it is only differentiated cognitions, particular expectations, which produce the experience that each emotion differs in feeling. ANS activity is necessary, but probably contributes little or nothing to the impression that each emotion differs in feeling. People interpret any awareness of ANS changes strictly in terms of their cognitions.

We (Ekman, Levenson, & Friesen, 1983) used voluntary facial actions to explore different patterns of ANS activity for each emotion. Previous attempts to demonstrate emotion-differentiated ANS activity foundered for three reasons. First, most experiments only studied a couple of emotions; usually with only one or two ANS measures. We studied six emotions and used four ANS measures.

A second flaw in past studies has been the failure to recognize that embarrassment may have confounded their attempts to elicit different emotions. Being in an experiment with electrical leads attached to various places on one's body is not a neutral situation. We suspect most subjects were embarrassed, and if

embarrassment has it's own pattern of ANS activity that feeling would overlay the experimental *attempts to produce different* emotions. While the experimenter might think he was eliciting fear at one point and anger at another, the social psychology of the situation might be that embarrassment was contaminating both. We eliminated this problem by our choice of subjects. They were people who are not self-conscious about having their faces, ANS, or emotional life carefully scrutinized in public. They were people who work at our laboratory, who are well accustomed to having their facial expressions filmed, and also trained actors.

A third flaw in past studies of whether ANS activity varies with different emotion has been the failure to verify that pure emotions were sampled. If blends of two emotions are obtained rather than pure emotions, this could produce undifferentiated ANS activity even if each of the single emotions contained in the blend actually produces a different pattern of ANS activity. Most investigators have blithely assumed that all subjects would produce but a single emotion, and would do so when they were supposed to. If, for example, subjects were asked to imagine fear at one point and anger at another, investigators presumed that is just what happened, failing to recognize the need to verify that they had obtained samples of single emotions. Our experience suggests that people typically experience blends of emotion. If subjects are asked to imagine fear they are likely to generate fear blended with surprise, or fear blended with distress. The problem is no different if emotion is elicited by showing a stress-inducing film. Our studies of self-report and expression when subjects watch films of accidents, surgery or mutilation, found that more than one emotion was typically elicited. Fear, disgust, distress, surprise often occurred within the same subject, often in rapid sequence, merging one on top of another. Because of the likelihood of obtaining blends it is necessary for the investigator to verify by some means that the subjects have indeed generated a single emotion when the experimenter wanted them to do so. We dealt with this problem by using new emotion eliciting techniques, chosen because they are likely to elicit pure emotion samples. And, we further verified that blending did not occur.

We *told our* subjects to voluntarily move particular patterns of facial movement, hypothesizing that such deliberate performances of facial actions would turn on the autonomic nervous system. We did not ask people to produce emotions; we did not say "look afraid" or "look angry" but instead we told them particular muscles to move on their face. For fear, for example, the instruction was: raise your brows, while holding them raised pull your brows together, now raise your upper eyelid and tighten the lower eyelid, now stretch your lips horizontally. Each of the subjects received six different instructions; each instruction involved a combination of muscle movements, the combinations chosen both on the basis of theory and evidence as to which expressions signal which emotions universally. The instructions were for the muscle movements

involved in fear, anger, surprise, disgust, sadness and happiness. Each set of instructed facial movements was specific to one and only one emotion. We did not trust our subjects to do what we said but we scored the facial movements they made and we analyzed the data using only the performances where people indeed did make the muscle movements as instructed.

We found differential activity on both skin temperature and heart rate, distinguished among emotions. Figure 15.1 shows that the ANS activity differed not just between positive and negative emotions, but also noted were different patterns of ANS changes for anger versus disgust, and either anger or disgust as compared to fear or surprise. When we analyzed all the data regardless of whether the subjects had actually been able to perform each set of facial muscle actions in each instruction, the results were much weaker. The specified set of muscle movements must be performed to produce the clearly differentiated patterns of ANS activity. There was no difference in the results between the people at our laboratory and the actors.

The changes in ANS activity produced by the directed facial actions task were not trivial. Heart rate increases of up to 25 beats per minute for anger and 22 beats per minute for fear were observed. There are no larger differences in ANS activity reported in the experimental literature.

We replicated our findings of emotion-differentiated ANS activity using a Stanislavski technique, in which the subjects were asked to remember and relive

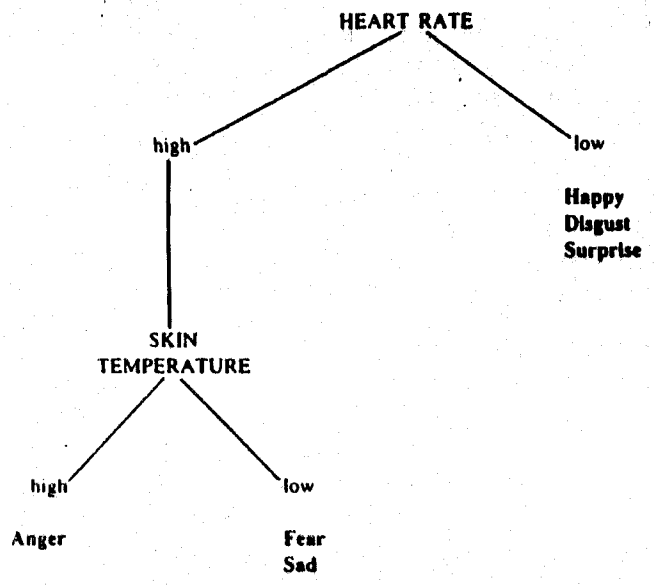

FIG. 15.1. Decision tree for discriminating emotions in Direct Facial Action Task.

emotions. We verified through self-ratings that the subject experienced but one emotion, not a blend. The findings differ in some details but the main effects were the same. Positive emotions could be distinguished from negative emotions, and differences in the pattern of ANS changes distinguished among negative emotions.

This study raises two important issues for any theory of emotion. The first issue is what is the role of emotion-differentiated ANS activity as compared to cognition in the experience of emotion? The second question is how could voluntary facial movement from the motor cortex turn on hypothalamicly directed autonomic nervous system changes?

The first issue. There is now evidence of three differentiated emotion systems. Strong evidence for differentiation in cognition and in facial expression, and more tentative evidence, which I believe our present studies will strengthen, of emotion specific activity in the autonomic nervous system. (We suspect the voice is also differentiated for each emotion, but the evidence for that is not yet available. See Scherer, Chapter 14.) With three emotion-differentiated systems the question is how do they interrelate? We believe that they must be interconnected. Our experiment suggests that changing one (face) changes another (ANS). I presume that usually these three systems operate consistently, and that interrelated variations in each are what produce the color and unique quality of each and every emotional experience.

When are they discrepant? Are they ever discrepant outside the psychologist's laboratory? I suspect that we will have to work hard to make them discrepant. If they are discrepant is cognition always the master in determining subjective experience? I suspect not. Whether cognition will override the autonomic nervous system patterning in determining a person's impressions as to which emotion is occurring will depend on the strength of the cognitive process, how fixed and strong the expectations might be, and the strength and nature of ANS activity. There may be individual differences as well.

We are not throwing out, nor denying the importance of cognitive processes in the experience of emotion. We are only suggesting that cognition is a part of an integrated, differentiated package. The autonomic nervous system activity may be more differentiated and play more of a role in emotional experience than some of the cognitive theorists have presumed.

Let me turn to the second issue raised by our study: How is it that a voluntary muscle action produces autonomic nervous system activity of any kind let alone differentiated autonomic activity? We can not yet rule out the possibility that cognitive mediation was necessary to produce the ANS activity. Our subjects might have attached a label to the facial instructions they received, and it might have been the label not the directed facial actions that produced each pattern of ANS activity. We do not think that was the case and our next studies will evaluate the role of this and other cognitive mediators. We believe that there is a direct, central connection between the pathways leading from the motor cortex

that direct facial muscle activity and hypothalamic areas involved in the direction of ANS activity, but learning about that will also take further research.

The fact that voluntary facial action produced emotion-specific patterns of ANS activity has many implications. Clinicians might wonder whether voluntary facial action instructions could be used therapeutically. If somebody is anxious, will giving them the instructions for a nonanxious face change their ANS activity, and make them feel less anxious? If they are depressed can directed facial actions make them happy, or if manic, can they be toned down, just by giving them a set of directed facial muscle movements? We doubt that directed facial actions have much therapeutic value, but we do plan to investigate the related question of whether deliberate facial actions can influence ANS changes which were aroused spontaneously by an emotional event.

Our results may help explain why people seek social interaction to pick up their mood when they are feeling rather emotionless. Putting on a polite expression, going to a social gathering in which one has to smile and be polite, may actually change how one feels. Our evidence suggests that putting on such an expression will actually start to produce the physiological changes that are part and parcel of a happy or an excited experience.

Our study may also help to explain why advertisers so often show us people smiling with their products. It may well be a nice conditioning experiment. Because people usually imitate smiles they see, even in advertisements, presenting a product with a smile may cause the viewer to experience positively toned ANS changes in association with the advertiser's product.

DISTINGUISHING EMOTION FROM REFLEX

Our recent study of startle reactions has raised anew the question about whether startle is an emotion or a reflex (Ekman, Friesen, & Simons, submitted). Averill (1980) and Lazarus (1982) said startle cannot be an emotion because cognition does not play a causal role in eliciting it. Bull (1951), Lindsley (1951), Plutchik (1962), Tomkins (1962) and Woodworth and Schlosberg (1954) all classified startle as an emotion not a reflex. Landis and Hunt (1939) in their pioneering study of startle reactions took an intermediate position, considering startle to be "preemotional" as it is simpler in organization and expression than true emotions.

We examined subjects facial and bodily responses in four conditions: when they did not know when a blank pistol would be fired; when they knew exactly when the pistol would be fired; when they attempted to inhibit their startle response; and, when they attempted to simulate a genuine startle response. Some of our findings on the simulated condition were reported earlier in discussing the differences between voluntary and involuntary expressions. Now let us compare our findings on startle with what is known about emotions such as fear, anger, or surprise.

In some respect startle resembles emotions. There is a uniform facial appearance in startle, apart from from intensity variations or attempts to control the expression, as there is in emotions such as happiness, surprise or fear. While startle has a very brief latency and duration, beginning within 100 msec. and gone within 500 msec., surprise also is brief, although startle is much briefer than surprise.

In a number of ways, however, startle differs from emotions, including surprise. Startle is very easy to elicit. It is highly reliable; for every subject it was the initial response to the gunshot. By contrast, there is no single elicitor for any emotion which, at least in the adult, will always call forth the same initial emotional response. The startle response can not be totally inhibited, whereas the little evidence available suggests that emotions can be. When subjects were told exactly when they would be startled and instructed that they were to inhibit any sign of being startled, none succeeded. Although the muscular actions that form the startle pattern were diminished, they did not disappear. Our studies of deception have shown that some subjects can succeed totally in eliminating any sign of felt emotion, even though that emotion is quite severe. And, we found that no one could simulate the startle correctly; everyone failed to produce the very brief latency which is the hallmark of a startle. There is no comparable clear-cut marker of simulated expressions for the emotions. The only candidate would be the finding (described earlier), that deliberate facial actions are more asymmetrical than genuine ones; but asymmetries are not always present and even when they are evident they are typically subtle in appearance.

In sum, we believe startle differs in so many ways from what characterizes emotions that it should not be considered an emotion. Yet, this evaluation should remain tentative, because the information about just what characterizes any emotion is in many respects conjectural, not, as with startle, based on careful descriptive study. This very fact—that so much more is known about startle than about any emotion—may be further proof that startle is not an emotion. It is so easy to study, regular in occurrence, and reliably elicited in a laboratory.

CHARACTERISTICS OF EMOTION

Our studies of emotional expression may help in distinguishing the boundaries of emotion, how an emotion differs from a reflex, mood, emotional trait, or emotional disorder.[1] The distinctions I wish to draw among these affective phe-

[1]Still another boundary state which needs to be distinguished from emotion is what I term *emotional plots*. Such a plot specifies the particular context within which specific emotions will be felt by specific persons, casting the actors and what has or is about to transpire. Mourning specifies two actors, the deceased and the survivor, something about their past relationship, the survivor was attached to the deceased, and the pivotal event, one of the actors died. The survivor is likely to feel distress, sadness, and perhaps fear and anger. Jealousy and infatuation are examples of other emotional plots in which there is more than one live actor. Elsewhere (Ekman & Matsumoto, in prepara-

nomena are partly, but imperfectly, expressed in language. Distress is an emotion, feeling-blue a mood, melancholic an emotional trait, and depression the related emotional disorder. A similar set of distinctions is implied by the words: fear (emotion), apprehensive (mood), timorous (trait), and anxiety state (disorder); or by joy (emotion), euphoric (mood), happy-go-lucky (trait), and mania (emotional disorder, with the emotion of excitement as well); or by anger (emotion), irritable (mood), and hostile (trait). There is no English word for an emotional disorder in which anger is principally implicated, although people who are chronically violent may represent such an entity.

Language suggests but cannot provide the bases for discovering how emotions differ from these other affective phenomena. Any one language reflects only those distinctions recognized by a particular culture. Language tells us what features of an emotion are symbolically represented in awareness, subject to discussion, consensual check, likely to be governed by display and feeling rules (Ekman, 1971; Hochschild, 1983). An emotion ignored (Levy, Chapter 19) or denoted by only one or two words in one language may be highly differentiated in another language, with terms which denote variations in intensity, antecedents, extent of control, etc.

I propose to distinguish the boundaries of emotion by focusing not on language but upon the patterned changes in expression and physiology which are distinctive for emotion. I will suggest how emotion differs from either a reflex or a mood in terms of how these patterned changes are organized and brought into action by particular kinds of information processing. I will emphasize less how emotion differs from either emotional traits or emotional disorders, treating those boundaries more fully elsewhere (Ekman & Matsumoto, in preparation). While the ten characteristics which I describe emphasize expression, it is *not* because I believe expression is the most important feature in characterizing any affective phenomena. Physiological and cognitive activity are important also, as is the influence of the social context and the subjective experience. But, expression is what I know most about, and what is most readily accessible for study.

1. There is a Distinctive Pan-Cultural Signal for Each Emotion

Earlier in this chapter I reviewed our evidence of such a distinctive facial expression for fear, surprise, anger, disgust, distress, and happiness. The evidence of universality is weaker for surprise and still weaker for interest, contempt and shame. If there is no distinctive universal facial expression associated with a given state, which functions as a signal, I propose that we not call that state an emotion. This does not mean that an expression must always be visible or audible, for emotional expressions can be inhibited (see Characteristic 7).

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tion) the distinction between emotional plots and other affective states are described more completely. Also see Clanton and Smith, 1977; and Gordon, 1981 for related but different treatments of emotional plots; Plutchik, 1980 for a different set of distinctions among emotions, moods,traits and disorders).

Furthermore, even without inhibition, an expression may be too weak to be noticeable when emotion is elicited by imagery or memory (Characteristic 9 discusses various routes for calling forth an emotion). Also, the mere presence of an emotional expression does not itself establish the presence of an emotion, for emotional expressions can be simulated (Characteristic 8). I believe that no *single* characteristic is sufficient to establish emotion, but a set of characteristics is required, organized, as I will describe, into a coherent pattern. Nevertheless the requirement that there be a pan-cultural signal has some utility in distinguishing the boundaries of emotion.

Although reflexes have a distinctive pan-human pattern of motor behavior, they do not function as signals. A reflex such as the startle is too brief—less than half a sec—to have much value as a signal. Many other reflexes occur in parts of the body which are not sufficiently visible to have signal value. Moods do not have a particular facial expression, at least none that is universal and none that has signal value. A person who is in an irritable mood, for example, does not show an irritable signal, but instead irritability is marked by when and how anger occurs. When irritable a person is more than usually likely to: (a) become angry, the threshold for eliciting anger is lower; (b) stay angry, the duration is extended, the person cannot as readily turn anger off; (c) recycle anger, almost as if anger is calling forth more anger; and, (d) appear angrier, manifesting intense displays. There might be enduring, distinctive, but very subtle changes in muscle tonus for each mood, but there is no evidence as yet, and they would not, in any case, be sufficiently clear to function as signals.

Much of what I suggest in regard to the role of emotion signals in moods, is also relevant to emotional traits and emotional disorders. There is no distinctive signal for an emotional trait, nor for an emotional disorder; instead, both are marked by how often and when particular emotional signals occur. A hostile person chronically shows anger, not just when in an irritable mood. A hostile person becomes angry about matters that do not usually elicit anger in others, and when a hostile person is angry, the anger expression and the social consequences of the anger are likely to be more severe than is so when a non-hostile person is angry. Hostile characters also may be less able to dampen anger expressions, and they may have a longer recovery time. Hostile characters are known to others by their anger, it is what is salient about them, central to the organization of their personality, just as sadness is for the melancholic character.

While the idea that there is no distinctive signals unique to moods or emotional traits is based only on examples, I do have evidence (Ekman & Friesen, 1974; Matsumoto, Ekman & Friesen, in prep) to support the idea that there are no distinctive universal expressive signals in any of the emotional disorders. Our studies of depression and mania found no unique, pathognomic facial or bodily expressions unique to them, but only the emotional expressions. What was distinctive was not the signal but the high saturation of the signal. As I describe later (Characteristic 4), in the emotional disorders particular emotions are *flooded*.

2. Distinctive Universal Facial Expressions of Emotion Can Be Traced Phylogenetically

I accept Darwin's view that facial expressions of emotion have evolved, and are universal in humans because they are part of our biological inheritance. There is some evidence of similar distinctive expressions in other primates for fear and anger, possibly also sadness and happiness, although there is argument about both of these (Chevalier-Skolnikoff, 1973; Redican, 1982). Disgust has not been carefully studied in nonhuman primates. It is not certain whether surprise can be seen separately from fear in nonhuman primates, but there are doubts about that also from some of the human studies in preliterate cultures. This characteristic of emotional expressions—that the signal can be traced phylogenetically—does not add to our ability to distinguish the boundaries of emotion, but it is relevant to note because it explains the basis for universality which is a distinctive characteristic. Any emotional expression that cannot be traced phylogenetically is not likely to be pan human. While I expect there are such culture-specific emotional expressions, my attempts to identify them have failed.

3. Emotional Expressions Involve Multiple Signals, Involving the Voice as Well as the Face

Scherer (1981) says that there has not been sufficient research to yet determine whether the voice conveys only the difference between positive and negative states, or provides the differentiated information about specific emotions available from facial expression. Since facial expressions require visual attention, the young infant would be at quite a disadvantage if vocalizations, which have the advantage over facial expressions of being able to reach a disattending caretaker, did not at least signal positive/negative states (see Engle, 1963). Presumably, that would be sufficient to capture attention, and then the face could provide the more precise information about which emotion is occurring. Yet, I expect that further work will confirm Tomkins (1962) proposal that vocal expressions are just as emotion-specific as facial expressions.

I propose that if the vocalization does not occur with the facial expression of emotion the emotional experience is weak, or some attempt (deliberate or habitual), has been made to manage the expression. Vocalization is not necessarily part of the package of events found in a reflex. We observed none in the startle. Moods, emotional traits, and emotional disorders, will, I presume, show a high saturation of vocal as well as facial signals of particular emotions.

4. There Are Limits on the Duration of an Emotion

Although emotions do vary in duration, and those variations, as I describe below, have signal value, I suggest that there may be absolute limits in the total duration of an emotion. Our studies of facial expression suggest that the great majority of expressions of felt emotions last between ½ second and 4 seconds,

and those that are shorter or longer are mock or other kinds of false expressions (Ekman & Friesen, 1982).[2] Even such false expressions are rarely less than ½ of a second or more than ten seconds. We have never seen a facial expression held for minutes, let alone hours. Spasms would occur if contractions of the facial muscles were maintained for many minutes.

While many of the changes in the autonomic nervous system that occur during emotion may last longer than facial expression, as may be so also of the neurohormonal activity, I nevertheless propose that certain limits on duration is a distinguishing characteristic of an emotion. Even the autonomic nervous system changes probably do not endure for many hours. And yet, in the language of the layman, that is what is meant by a mood. It is bizarre to speak of being in an irritable mood for a fraction of a second. Moods refer to longer time spans than emotions, and reflexes to shorter time spans.

A person is identified as having an emotional trait if a particular emotion or set of emotions chronically reappears. It is not a matter of a few hours or a day or two. An emotion must characterize that person over an entire life epoch, or perhaps over many life epochs. Nearly everyone may on occasion have an irritable mood, but for the hostile person, anger is more than an occasional matter. Obviously it is more than simply the duration or frequency of emotion episodes which distinguishes an emotional trait from a mood or an emotion—the style of behavior, and the organization of personality must be considered—but duration is of significance. It is not certain how the anger manifest by a hostile person differs from the anger manifest when a nonhostile person is in an irritable mood, or how the sadness manifest by a melancholic person differs from the sadness shown when a nonmelancholic person is in a blue mood, etc. Would it be accurate to say that a hostile person has many irritable moods, or does the expressive and physiological activity characterizing moods and emotional traits differ fundamentally?

In an emotional disorder, such as depression, mania, or anxiety states, duration is important in a different way. It is not that the relevant emotions chronically reappear over a life epoch, but instead that particular emotions are *flooded*. What I mean by a flooded emotion is that: (a) nearly anything that happens will set off the emotion, it is called forth by events that rarely would elicit it; (b) the

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[2]Not all emotions may have the same time envelope. All who have considered surprise have noted that it is the briefest of emotions, rarely lasting more than a second or two, although, as with any emotion, the unfolding of events may cause one to be surprised many times in a short period of time. I hypothesize that happiness, disgust and distress each have a larger time envelope within which they can vary. Each of these emotions can be as brief as surprise, but each may also last much longer. Distress may be a special case, since when it endures for long periods it is converted into sadness, which after a period of time may then revert back into distress. I believe that anger or fear have a time envelope which extends further than happiness, disgust, or distress. Although fear or anger can be as brief as any other emotion, they may also last much longer.

emotion appears to recycle frequently reappearing with no evident elicitor; (c) once called forth the emotion is intense; (d) the person cannot modulate, or deamplify the emotional expression or experience; and, (e) the reiteration of the emotion continues over time periods long enough to seriously interfere with fundamental life tasks such as eating, sleeping, working, and the usual emotional demands of polite social interaction. In depression, which is the disorder I have studied, the flooded emotions appear to be distress and fear.

5. *The Timing of an Emotional Expression Reflects the Specifics of a Particular Emotional Experience*

While the characteristic just described asserts limits on the total duration of an emotion, within those limits variations in timing do occur which are related to the particulars of an emotional experience. We (Ekman, Friesen, & Ancoli, 1980) found evidence that the duration of an emotional expression was correlated with the person's report of the strength of the emotional experience. And, that was so in regard to both positive and negative emotions.

Other aspects of the timing of an emotional expression also may be related to the strength of the emotional experience, or to the nature of the eliciting event, or to attempts to manage the expression. We distinguish *latency* (from the moment of stimulation to the point when an expression begins), *onset* (the period from latency until the performance reaches its maximal level), *apex* (the period during which the expression is maintained at maximal strength), and *offset* (from the end of apex until the expression disappears). Latency, onset, apex, and offset may each reflect multiple influences. Presumably the stronger the stimulus the shorter the latency and onset, and the longer the apex and offset. It also seems apparent that the events calling forth an emotion may have a given time course which influences the timing of the expression. For example, a slowly developing pattern of insults might produce a longer onset than an abrupt, clear, explicit insult. Finally, attempts to manage an expression may cause the onset period to become longer than it otherwise would be as a person struggles to contain the expression, or it may curtail the apex if the person succeeds in wiping out the expression, or cause the offset to appear abrupt.

On the basis of our research on the startle, we expect that the latency and onset and duration of the actions in a reflex are fixed, and unlike emotion do not vary with the nature of the experience. Moods may be characterized by alterations in onset and offset times. It seems reasonable to suppose that when irritable, for example, the onset of anger will be shorter and the offset longer than it usually is for that person. Our language suggests that emotional traits are also manifest in these different aspects of the timing of an emotion. A hot-head has a short latency and/or onset for anger; a sulker has a long anger apex and/or offset. It is not certain whether hot-heads and sulkers refers to two different traits, or if these terms instead refer to consistencies in style, without implying that the

emotion is central in personality organization. It would be interesting to learn whether there are parallel distinctions about timing for other emotions, and to examine how languages differ in whether individual differences in the timing of emotional experiences are represented.

6. Expressions Are Graded in Intensity, Reflecting Variations in the Strength of Felt Experience

Our evidence (Ekman, Friesen, & Ancoli, 1980) suggests that facial expressions of emotion as well as reflexes (Ekman, Friesen, & Simons, submitted) vary in the strength of muscular action and that is an index of the strength of the experience. We had hoped that emotions and reflexes would differ in this regard, but they apparently do not. I have already explained how more intense emotional experience and expression would be expected to characterize particular emotional traits and emotional disorders.

It is important to note exceptions to this congruence between the intensity of felt emotion and the intensity of expression, instances when emotions can be felt strongly but there is little or no apparent expression. One obvious instance is when someone attempts, either deliberately or through well established habit, to deamplify or totally inhibit the expression of emotion. The emotion may still be felt quite strongly, although the subjective experience should differ from when no attempt is made to diminish expression. Another exception is suggested by experiments in which people imagined an event or remembered and relived one. While people often report intense feelings in these circumstances, their expressions are usually too weak to be signals, detectable only by electromyography. This suggests that congruence between the intensity of felt emotion and the intensity of emotional expression may not be general, but limited only to those occasions when an emotion is brought forth by appraisal of an event. Work is needed to determine whether there might still be some relationship between the intensity of feeling and intensity of expression when remembering or imagining an emotional event occurs naturally rather than to meet an experimental request.

7. Emotional Expression Can Be Totally Inhibited

Our studies of people who followed instructions to conceal their reactions to stress inducing films (Ekman & Friesen, 1974; Ekman, Friesen, O'Sullivan, & Scherer, 1981; Ekman, Friesen, & Scherer, 1976) found that about ten percent of them were able to eliminate any facial leakage, avoiding detection even by our most microscopic measurement. While I believe that expression can be inhibited, I agree with Tomkins (Chapter 7) that the efferent impulses for a patterned facial expression will always be produced when an emotion is called forth. Those efferent impulses may not result in a visible expression if: (a) the arousal is very slight; (b) attempts to inhibit were very successful; (c) the emotion was called forth by imagining or remembering an event. In each of these instances the

nonvisible expression may still be detectable electromyographically. No one yet knows whether inhibition can take place *centrally*, preventing the efferent impulses from reaching the peripheral expressive equipment.

We suspect that some emotions are harder to inhibit than others. It seems obvious that it is harder to inhibit any emotion when it is very intense. Perhaps it is also difficult to inhibit emotions when they are felt only slightly because people are less alert to the onset of such feelings or the need for inhibition. We know there are marked individual differences in the ability to inhibit emotional expression, but we were unsuccessful in identifying the personality characteristics of skillful inhibitors of expression. Nor did we, nor has anyone, determined whether such individual differences are general across the range of emotions and across situational contexts. Quite apart from individual differences, the nature of the social context should influence the ease of inhibiting emotional expression. For example, in some situations people expect they may have to inhibit expression of their true feelings. We have hypothesized (Ekman, 1981; Ekman & Friesen, 1969b) that it is harder to inhibit some modes of expression than others: harder to inhibit signs of emotion in the voice than in facial expression, harder to inhibit facial expressions than signs of emotion in body movement.

If we can generalize from our study of the startle reaction, in which people could not inhibit the appearance of the startle, this may be another characteristic which distinguishes reflexes from emotion. If there is no neurological disorder, and the reflex has not been repeatedly called forth in a short time period, I expect that people typically cannot inhibit all evidence of it. There has been no study of whether people can inhibit signs of a mood. Earlier I suggested that mood has no distinctive signal, but is saturated with the appearance of particular emotions. I hypothesize that when a strong mood occurs the ability to inhibit any sign of the relevant emotion is at least partially impaired. For reasons explained earlier, it seems reasonable to propose that one way an emotional trait or emotional disorder can be manifest is in decreased evidence of inhibiting or deamplifying the expression of the relevant emotion(s).

8. Emotional Expressions Can Be Convincingly Simulated

Earlier, in discussing the startle, I suggested that the inability to simulate the expression probably means that the expression is a reflex, not an emotion. Not everyone can voluntarily move all of the facial muscles which are found in the universal expressions of every emotion (Ekman, Roper, & Hager, 1980). And, many people become so embarrassed when trying to simulate an emotional expression that they fail because the embarrassment overrides their attempts to deliberately move their facial muscles. The difficulties we found with the attempts to simulate the startle were not these, however. People could make the movements, and they were not embarrassed, but they could not produce the movements fast enough and assembled in the correct order.

Although emotions can be convincingly simulated that does not mean that they occur without flaws. We have found a number of markers of whether an emotional expression is felt or not, including the particular muscles deployed, duration, coordination of the muscular movements, and the symmetry of the expression (Ekman & Friesen, 1982). It is interesting to note that these signs of whether an expression is felt or false can be detected by others, although in the social interactions we have studied they often are not (Ekman, in press).

It seems reasonable to propose that moods make it more difficult to simulate convincingly the expression of an unfelt emotion. The more *dissimilar* the unfelt emotion is from the emotion involved in the mood, the harder it will be to simulate. We (Ekman & Friesen, 1975, 1978) found certain pairs of emotions to be quite similar in the facial muscles deployed in their expressions: fear and surprise; anger and disgust; and, to a lesser extent, fear, and distress. If distinctive vocal signals are found for each of these emotions I expect analysis of the vocal signals would yield parallel similarity pairings. It would be a very neat package indeed, if these similarities noted in expression could be observed also in the extent of overlap among emotions in the patterning of autonomic and central nervous system activity.

Even if the similarities are limited just to the facial expressions, when irritable it should be much easier to simulate disgust than fear, when apprehensive it should be easier to simulate surprise than anger, etc. In a related vein, we found that depressed patients could not convincingly simulate happiness or anger (Ekman & Friesen, 1974). It is less certain whether an emotional trait impairs the ability to simulate convincingly emotions most dissimilar from the emotion involved in the trait.

9. There Are Pan-Human Commonalities in the Elicitors for Each Emotion

Part of the informational package provided by an emotion signal is to tell others something about what has just happened to the person who shows the expression. (Also included is some idea of what sensations that person may be feeling and what that person is likely to do next.) Although what calls forth an emotion is not the same for a child and adult, nor for a given person in different social roles, nevertheless there is some commonality in the eliciting circumstances for each emotion. Theorists disagree about how much commonality.

Those who take an evolutionary view of emotion have proposed that those commonalities in what elicits each emotion cut across our species, although there is disagreement in how they characterize this. Tomkins (Chapter 7) proposed that it is the density of neural firing generated, not any specifics in the stimulus situations, which distinguishes the elicitors for each emotion. We (Ekman & Friesen, 1969a) initially proposed few universals in the elicitors of each emotion, but revised our position after Boucher (1981) obtained evidence of commonalities in emotion antecedents across many cultures, literate and nonliterate,

both Western and non-Western. We then proposed (Ekman, 1977; Ekman & Friesen, 1975) universal, abstract, *prototypic* situations as the elicitors for each emotion, such as loss of an important object for sadness, an unexpected event for surprise, etc. Scherer's (Chapter 14) recent evidence of commonalities in the antecedents of emotions across Western Europe fits well with our predictions.[3]

Despite this disagreement about the nature of the universal emotion elicitors, I agree with Tomkins that there is considerable generality in the stimuli which can, through experience, come to call forth an emotion. For example, almost any object can become the object of such psychological investment that a person will become distressed about the loss of it; a person can be taught to view almost any social act as repulsively disgusting, threateningly fearful, provocatively angering, etc. Experience fills in the details, sharpening and elaborating the universal prototypic elicitors for each emotion. I also agree with Tomkins that many, although not all, elicitors can bring forth emotional reactions near immediately. I have referred to this as *automatic* appraisal (Ekman, 1977) to distinguish it from the *extended* appraisal which has interested many cognitive psychologists.

In automatic appraisal an event is instantly matched with one of the prototypic situations, thereby immediately setting off emotion-specific changes in expression and physiology. This matching function may be determined genetically (e.g., sudden loss of physical support eliciting fear) or through repeated experience (e.g., entering a crowded room producing fear). Extended appraisal occurs when the antecedent event is not well established, it does not obviously match any of the prototypic situations, or is in some way baffling, requiring a more extended process of problem solving for its evaluation. External events such as social actions or physical events, and memories, or images of such events, fantasy, or perception of change in organismic state may elicit emotion via automatic or extended appraisal. By my reasoning the argument between Lazarus (Chapters 9 and 11) and Zajonc (Chapters 10 and 12) is due, in part, to each focusing upon a different type of appraisal, *both* of which occur in emotional experience.

The elicitors for a reflex are much more specific than for an emotion, and should be much less influenced either by immediate social context or longer term learning. In discussing the startle reaction I mentioned that the ability to call forth the startle so reliably, to specify a stimulus which would always succeed, makes the startle attractive to the experimenter, but also suggests it is a reflex not an emotion.

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[3]Too little work has examined the array of emotion elicitors. While it is important to ask people their beliefs about this, (Scherer, Chapter 14) that is no substitute for actually examining the circumstances in which emotions are elicited. Now that there are precise methods available for measuring the physical properties of emotional expressions in face and voice, developmental and cross cultural studies should be able to carry out the necessary but time consuming descriptive studies of the contexts in which emotions are seen to occur.

Little is known about what calls forth a mood, particularly as compared to emotions. I suspect moods can be produced in two different but related ways: (1) a change in the biochemical state of the organism resulting from tiredness, exertion, diet, disease, and a variety of other nonemotional/personal events; (2) the repeated elicitation of a particular emotion over a short time period. For example, irritability may be a consequence of tiredness (termed "cranky" in children); or, a person may become irritable if that person has repeatedly been provoked to anger within a short period of time. My presumption is that the second route turns into the first, that if anger is experienced often enough in a short enough time period a threshold is crossed, and a toxic state is generated, producing the biochemical changes which mediate the mood state. With anger this threshold may be crossed more quickly if the expression had to be dampened repeatedly, and if the person felt unable to cope with the source of the anger. It is not as clear that those considerations are as relevant with other moods. The likelihood of generating a positive mood may not be increased if joy repeatedly had to be dampened, nor would the ability to cope with the source of the joy be likely to increase the likelihood of producing a positive mood. Even among negative moods dampening an emotional expression may not be an antecedent. Whether fearful experiences generate an apprehensive mood would not seem to depend on whether the fearful expression had to be dampened.

I suspect that emotional traits also have a dual origin, both biologically and interpersonally based. Work now, such as that by Kagan (personal communication) is relevant to understanding how that may occur. It is beyond the scope of this discussion to review the arguments about what causes the emotional disorders, except to note again that the division is between those advocating biological and interpersonal factors. No matter which, the level and complexity of what is involved is far different than with an emotion.

10. There is a Pan-Human, Distinctive Pattern of Changes in the Autonomic and Central Nervous System for Each Emotion

Our study of ANS activity described earlier is but a first step. Many of our findings on the ANS activity distinctive for anger were quite independently uncovered by Lakoff and Kovecses' (1983) analysis of the language of anger referent words. Presuming that our finding of emotion-specific ANS activity replicates, I propose that if there is no distinctive pattern of ANS activity we not call that state an emotion. This does not mean that discovering a distinctive pattern of ANS activity is sufficient to establish emotion. ANS activity occurs with a variety of phenomena not considered emotional, as for example with pain or sexual arousal.

There must also be a variety of central nervous system changes which characterize each emotion (see Davidson, Chapter 2). I suspect that there are distinctive patterns of physiological activity which mark both moods and reflexes but that

they not only differ from each other but also from that which is found for emotion. I will not here attempt to specify how the physiological activity which accompanies particular emotions might differ for individuals with particular emotional traits or emotional disorders.

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The ten characteristics I have described are not of equal importance in distinguishing the boundaries of emotion. Duration is, for now, the most useful in distinguishing among all the affective phenomena. Research may soon show that these distinctions can be as readily made by the type and extent of ANS and CNS activity.

Three general assumptions about emotion have been implied in my discussion. (1) Emotion has evolved to deal with fundamental life tasks. (2) To be adaptive quite different patterns of activity would have evolved for each emotion, so that *what* occurs (in expression or physiology), and *when* it occurs (the events which call forth emotion) is emotion-specific, different for anger, fear, distress, happiness, etc. (3) There is coherence; for each emotion there are interconnected patterns in expression and physiology linked to the appraisal of prototypic situational events.

The ten characteristics are not all that distinguishes emotion, although it does include much of what has been found by emotion researchers in the last decade. I have not discussed the subjective experience of emotion, nor developmental factors. I left out how collateral cognitive activity (such as expectations and memories), and social contextual factors differentially come into play, distinguishing not only among the emotions, but also between emotions and the other affective states. Hopefully, what I have described will aid in sharpening the argument about the nature of emotion, exposing areas of agreement and disagreement, and most importantly, provoking questions for theoretical consideration which are amenable to empirical study.

ACKNOWLEDGMENT

Part of this chapter was reported in 1980 at the Conference on the Nature and Function of Emotion in Bad Homburg, Germany. Portions were also presented to the German Congress of Psychology in 1982 and are printed in the proceedings of that meeting. The preparation of this chapter was supported by a Research Scientist Award from the National Institute of Mental Health. The research reported was supported by a grant (MH 11976) from the National Institute of Mental Health and the John D. and Catherine T. MacArthur Foundation.

All of the research reported and the interpretations are the produce of collaborative research over the past 20 years with Wallace V. Friesen.

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