COGNITION AND EMOTION, 1992, 6 (3/4), 169–200

An Argument for Basic Emotions

Paul Ekman
University of California, San Francisco, U.S.A.

Emotions are viewed as having evolved through their adaptive value in dealing with fundamental life-tasks. Each emotion has unique features: signal, physiology, and antecedent events. Each emotion also has characteristics in common with other emotions: rapid onset, short duration, unbidden occurrence, automatic appraisal, and coherence among responses. These shared and unique characteristics are the product of our evolution, and distinguish emotions from other affective phenomena.

INTRODUCTION

In this article I reach beyond what is empirically known, to consider what the evidence suggests is likely to be found. What I present is more of a research agenda than a theory about emotion, although theory is involved. I will indicate where I think the evidence is clear, where it is tentative, where it is merely anecdotal but seems persuasive, and where I am simply extrapolating or guessing.

The logic which underlies this effort is my attempt to answer questions which arose when I and others found evidence, more than 20 years ago, that certain facial expressions of emotion appeared to be universal (for a recent review of that work see Ekman, 1989). These findings forced me to reject my previous beliefs that: (1) a pleasant-unpleasant scale was sufficient to capture the differences among emotions; and (2) the relationship between a facial configuration and what it signified is socially learned and culturally variable. I found in Darwin (1872/1965) and Tomkins (1962) an

Requests for reprints should be sent to Paul Ekman, University of California – San Francisco, 401 Parnassus, San Francisco, CA 94143–0984, U.S.A.

I thank Richard Davidson, Phoebe Ellsworth, Wallace V. Friesen, Dacher Keltner, Richard Lazarus, Robert Levenson, Harriet Oster, and Erika Rosenberg for their helpful criticisms and suggestions on earlier versions of this paper. I also thank the Editors of this Special Issue, Nancy Stein and Keith Oatley, for their encouragement and helpful criticisms. Preparation was supported by a Research Scientist Award from the National Institute of Mental Health (MH06091).

© 1992 Lawrence Erlbaum Associates Limited

alternative framework which better fit my data, although I do not accept in total what either said.

There are two key issues, which I use the adjective *basic* to convey about the position I have adopted and will explain here. (1) There are a number of separate emotions which differ one from another in important ways. (2) Evolution played an important role in shaping both the unique and the common features which these emotions display as well as their current function.[1] Let me explain each of these ideas in more detail.

A number of separate, discrete, emotional states, such as fear, anger, and enjoyment, can be identified which differ not only in expression but probably in other important aspects, such as appraisal, antecedent events, probable behavioural response, physiology, etc. This basic emotions perspective is in contrast to those who treat emotions as fundamentally similar in most respects, differing only in terms of one or more dimensions, the most common ones being arousal, pleasantness, and activity; or those who carve emotions into just a positive and a negative state.[2]

Those who describe separate emotions differ in terms of how many different basic emotions they recognise (although there is considerable overlap, far more than Ortony and Turner, 1990, acknowledge), and what specific characteristics they posit such emotions share. Most of my presentation will describe nine characteristics of the emotions of anger, fear, sadness, enjoyment, disgust, and surprise. I will also raise the possibility that contempt, shame, guilt, embarrassment, and awe may also be found to share these nine characteristics.

To identify separate discrete emotions does not necessarily require that one also take an evolutionary view of emotions. A social constructionist could allow for separate emotions without embracing the second meaning of the adjective "basic". Even the discovery of universals in expression or in antecedent events does not require giving a major role to evolution. Instead, one can attribute universals to species-constant learning—social learning which will usually occur for all members of the species regardless of culture (cf. Allport, 1924). In this view, it is ontogeny not phylogeny which is responsible for any commonalities in emotion, universals in expression are due to what ethologists call conventionalisation not ritualisation (see Ekman, 1979, for a discussion of these distinctions as applied to emotion).

[1]A third usage of the term "basic" is to postulate that other non-basic emotions are combinations of the basic emotions, which may be called blends or mixed emotional states (Ekman & Friesen, 1975; Plutchik, 1962; Tomkins, 1963; Tomkins & McCarter, 1964). I will not deal with this usage of the phrase basic emotions. Instead, my focus will be upon the first two meanings of basic emotions—that there are separate discrete emotions, which have evolved to prepare us to deal with fundamental life-tasks. I am grateful to K. Oatley for suggesting that I make clear these different ways in which the term basic has been used.

[2]In earlier writings (Ekman, Friesen, & Ellsworth, 1972) we made this same distinction in terms of those who studied the recognition of emotion from the face in terms of emotion *categories* or emotion *dimensions*.

The second meaning of the adjective "basic" is to indicate instead the view that emotions evolved for their adaptive value in dealing with *fundamental life-tasks*. Innate factors play a role in accounting for the characteristics they share, not species-constant or species-variable learning. There are a number of ways to describe these fundamental life-tasks. Johnson-Laird and Oatley (this issue) say they are "universal human predicaments, such as achievements, losses, frustrations, etc. . . . [E]ach emotion thus prompts us in a direction which in the course of evolution has done better than other solutions in recurring circumstances that are relevant to goals". Lazarus talks of "common adaptational tasks as these are appraised and configured into core relational themes" (1991, p. 202) and gives examples of facing an immediate danger, experiencing an irrevocable loss, progressing towards the realisation of a goal, etc. Stein and Trabasso (this issue) say that in happiness a goal is attained or maintained, in sadness there is a failure to attain or maintain a goal, in anger an agent causes a loss of a goal, and in fear there is an expectation of failure to achieve a goal. Toobey and Cosmides tell us that emotions impose ". . . on the present world an interpretative landscape derived from the covariant structure of the past . . ." Emotions they say (1990, pp. 407–408) deal with recurrent ". . . adaptive situations[,] [f]ighting, falling in love, escaping predators, confronting sexual infidelity, and so on, each [of which] recurred innumerable times in evolutionary history . . ." Toobey and Cosmides emphasise what I consider the crucial element which distinguishes the emotions: Our appraisal of a current event is influenced by our ancestral past.

These different descriptions are quite compatible, each emphasising another aspect of the phenomenon. Common to all these views is the presumption that emotions are designed to deal with inter-organismic encounters, between people or between people and other animals. Nevertheless, it is important to note that emotions can and do occur when we are not in the presence of others, and are not imagining other people. We can have emotional reactions to thunder, music, loss of physical support, autoerotic activity, etc. Yet I believe the primary function of emotion is to mobilise the organism to deal quickly with important interpersonal encounters, prepared to do so in part, at least, by what types of activity have been adaptive in the past. The past refers in part to what has been

adaptive in the past history of our species, and the past refers also to what has been adaptive in our own life history.[3]

Before saying more about the characteristics which distinguish emotions from other affective states, I must first explain the concept of emotion families, containing both a distinguishing theme and a number of variations around that theme.

EMOTION FAMILIES

Each of the basic emotions is not a single affective state but a *family* of related states (Ekman & Friesen, 1975). In using the term family I do not mean to imply the structure of a human family, but more generally to refer to "a group of things related by common characteristics" (*Webster's ninth new collegiate dictionary*, 1987). Each member of an emotion family shares certain characteristics, for example, commonalities in expression, in physiological activity, in nature of the antecedent events which call them forth, and perhaps also in the appraisal processes. These shared characteristics within a family differ between emotion families, distinguishing one family from another.

My use of the term "family" can be illustrated by Ekman and Friesen's (1975, 1978) description of the family of anger expressions. They specified not one anger expression but more than 60 anger expressions. Each of the anger expressions share certain configurational (muscular patterns) features, by which they recognisably differ from the family of fear expressions, disgust expressions, etc. For example, in all members of the anger family the brows are lowered and drawn together, the upper eyelid is raised and the muscle in the lips is tightened. Other muscular actions may or may not be evident in anger expressions, such as a tightened lower eyelid, lips pressed together tightly or tightly open in a square shape, tightening of the lip corners, pushing the lower lip upwards, etc. Variations in the family of anger facial expressions are hypothesised to reflect whether or not the anger is controlled, whether the anger is simulated or spontaneous, and the specifics of the event which provoked anger. There is also

[3]Fridlund (1991) created a false dichotomy between those who consider facial expressions to have solely an interpersonal signalling function and those who consider such expressions to be emotional responses linked to other aspects of emotional experience. Obviously they are both, and in no way unrelated. Fridlund also claims that facial expressions do not occur unless another person is present and dismisses any evidence to the contrary as being due to one imagining another person to be present. Ekman and Friesen (1969) took a more complex position, proposing that the presence or absence of others can act to amplify or de-amplify expressions, depending upon the social context and their role relationships.

evidence that the strength of the muscular contractions are related to intensity of a reported emotion (Ekman, Friesen, & Ancoli, 1980).

Each emotion family can be considered to constitute a *theme* and *variations*. The theme is composed of the characteristics unique to that family. The variations on that theme are the product of various influences: individual differences in biological constitution; different learning experiences; and differences specific to and reflecting the nature of the particular occasion in which an emotion occurs. Ohman's (1986) description of a multiple-level evolutionary perspective suggests that the themes may be largely the product of our evolution and given genetically, while the variations reflect learning, both species constant and species variable learning experiences. This learning, he maintains (p. 127) is ". . . constrained and shaped by evolution".

There are some resemblances to the way I am using the term family, with theme and variations and Rosch's (1973) discussion of categories and prototypes. I am proposing that the themes are not simply the most common feature of a basic emotion category, but are the core elements, the product of our evolution, to be found in all instances of an emotion. Also, I do not propose that the boundaries between basic emotion families are fuzzy.[4]

There is some evidence about which are the themes and which are the variations in regards to facial expression, but it is far from conclusive. Presumably, there should be greater cross-cultural consensus about theme expressions than about the expressions which represent the variations within a family, but no one has yet done such research. One of the major empirical tasks ahead is to isolate the theme and variations for each emotion family, considering not just expression, but also physiology, subjective experience, appraisal, and other cognitive activities. (On identification of the themes for cognitive appraisal see Johnson-Laird and Oatley, this issue; Roseman, 1991; Stein and Trabasso, this issue.)

The confusion which has plagued the field of emotion research about what are the emotions, has been due, I believe to two problems. The first has been the failure to recognise that many of the emotion terms refer to variations within a family. Shaver, Schwartz, Kirson, and O'Connor (1987, p. 1072) analysing their subjects similarity rating of emotion words, came to a similar conclusion although they did not utilise the term emotion family.

[4]I am grateful to the editors for urging that I make some mention of how this part of my discussion relates to Rosch. Space does not allow a full discussion of how my use of family, basic, and theme differs from Rosch.

> It seems possible, given the results, that all of the terms in the emotion lexicon—at least the hundred or so that are most prototypical of the category *emotion*—refer in one way or another to a mere handful of basic-level emotions. Each term seems to specify either the intensity of the basic emotion in question . . . or the antecedent context in which the emotion arises . . .[5]

Johnson-Laird and Oatley's (1989) analysis of emotion words supported their contention that there are five basic emotions: happiness; sadness; anger; fear; and disgust. Their list is exactly the same as the group of emotions which share the nine characteristics I will describe. The names we use to refer to the basic emotions should attempt to denote the family theme. There should be many other emotion names within a family for lexically marked variations. But, there is no reason to expect that our usual use of language will perfectly represent this matter.

The confusion about what are the emotions has been due not just to a failure, by some, to organise emotions into families, with themes and variations, but also to a failure to distinguish emotions from other affective phenomena, such as moods, emotional traits and attitudes, and emotional disorders. At the conclusion of this paper I will briefly describe these other affective phenomena which differ from the emotions.

THE NINE CHARACTERISTICS WHICH DISTINGUISH BASIC EMOTIONS

Table 1 lists these characteristics which I will separately consider. Some distinguish one emotion from another (1, 3, and 4). The other characteristics I propose are useful in distinguishing emotions from other affective states, such as moods, emotional traits, emotional attitudes, etc. I have not included three characteristics which some might expect to be on such a list—ontogeny, thought processes, and subjective experience.

I acknowledge that the first appearance of each emotion is an important matter, and how emotion is socialised and changes over the life course is central to our understanding of emotion. But I do *not* maintain that if biology has played an important role in emotion then emotions must appear, fully differentiated, at birth or early in life before much opportunity for learning has occurred. Izard (1977) disagrees and has reported evidence which he believes shows the early appearance of each emotion. His position and evidence has been convincingly challenged by Camras (this issue) and also by Oster, Hegley, and Nagel (in press). When this matter is settled, regularities in the first appearance of each emotion may be useful in differentiating one emotion from another, and thus usefully added to Table 1.

[5]Shaver et al.'s list of basic emotions and the emotion families listed at the beginning of this paper only partially overlap, but that may be because Shaver considered only the lexicon, examined subjects who were not experiencing an emotion, and asked for abstract ratings of words rather than how people talk about emotion. There is no reason to expect that the lexicon, particularly what emerges from rating scales, will map perfectly with what is found by analysing spontaneous emotional behaviour, focusing on expression, physiology, and actual emotion talk.

TABLE 1
Characteristics which Distinguish Basic Emotions from One Another and from Other Affective Phenomena

	Basic with regard to:	
	Distinctive States	*Biological Contribution*
1. Distinctive universal signals	x	x
2. Presence in other primates		x
3. Distinctive physiology	x	x
4. Distinctive universals in antecedent events	x	x
5. Coherence among emotional response		x
6. Quick onset		x
7. Brief duration		x
8. Automatic appraisal		x
9. Unbidden occurrence		x

I expect that specific emotions regulate the way in which we think, and that this will be evident in memories, imagery, and expectations. I suspect that the relationship between emotions and thoughts are not solely a function of social learning because of biological constraints put on the thought system as well as the emotion system. I have not included this in my list of characteristics because it is not yet clear how thought processes are related to other characteristics of emotional behaviour.

The subjective experience of emotion, how each emotion feels, is for some at the centre of what an emotion is. This presumably includes physical sensations, and other feelings which are the consequence of feedback from the various response changes which occur uniquely for each emotion. Again this is excluded because too little is known about how subjectivity maps on to other aspects of an emotional experience.

Distinctive Universal Signals

The strongest evidence for distinguishing one emotion from another comes from research on facial expressions. There is robust, consistent evidence of a distinctive, universal facial expression for anger, fear, enjoyment, sad-

ness, and disgust. This evidence is based not just on high agreement across literate and preliterate cultures in the labelling of what these expressions signal, but also from studies of the actual expression of emotions, both deliberate and spontaneous, and the association of expressions with social interactive contexts (see Ekman, 1989, for a recent overview).

It should be noted, however, that for each emotion more than one universal expression has been identified, but their description here would take me further afield (see Ekman & Friesen, 1975, 1978). Although the study has not been done in other cultures Etcoff's (1990) novel study of the judgement of faces, which found few confusions exist at the boundaries between emotions, also provides strong evidence in support of the view that there are a number of separate emotions. (See Johnson-Laird and Oatley, this issue, for a description of Etcoff's study.)

The evidence for a unique facial expression for surprise and contempt is not as firm. Surprise expressions were recognised across literate cultures, and in the two studies of preliterate cultures (reported in Ekman, 1972) surprise was distinguished from anger, disgust, and happiness, but the surprise faces were distinguished from fear faces in only one of the two preliterate cultures studied. Etcoff and Magee (in press) found evidence that surprise is perceived differently than other emotions, not defining an exclusive category. It would be important to know if her findings on surprise and on other emotions would replicate in other languages.

Contempt expressions were not included in preliterate culture studies, and the current evidence on literate cultures is contradictory (Ekman & Friesen, 1986, 1988; Ekman & Heider, 1988; Izard & Haynes, 1988; Russell, in press; Ricci-Bitti, Brighetti, Garotti, & Boggi-Cavallo, 1988). There are a number of new studies again confirming that contempt expressions are recognised across cultures (Ekman, O'Sullivan, & Matsumoto, in press; Matsumoto & Kudoh, submitted).

Izard (1971) reported cross-cultural evidence for an interest expression, but it is not clear whether he isolated an expression which was different from simple visual attention. Also, in Izard's cross-cultural studies the observers may have chosen interest by exclusion. There are similar problems with the stimulus Izard used for shame in his cross-cultural studies, in which the person is looking away from the camera.

Facial muscle movement is only one form of expression. Tomkins (1962) postulated a distinct vocal expression for each of the emotions which have distinctive facial expressions. Although there is as yet no empirical evidence across Western and non-Western cultures to determine whether this is so, I expect that when that work is done Tomkins will be proven correct.

It is not possible to be certain that there are no other emotions which have a universal facial expression, but none have been suggested. Friesen and I inspected hundreds of hours of motion picture films of spontaneous behaviour in two preliterate cultures (taken by Carleton Gajdusek in the 1960s), and saw no other expressions than the ones I have discussed. But that is only an impression, and those who believe there are other universal expressions should obtain the evidence.

I believe that emotional expressions provide information to conspecifics, as well as to other animals, about antecedent events, concomitant responses, and probable next behaviour. For example, when you see a person with a disgust expression, you know that the person is responding to something offensive to taste or smell, literally or metaphorically, that the person is likely to make sounds such as "yuck" rather than "yum", and is likely to turn away from the source of stimulation. We still lack systematic cross-cultural data to support my claim about what an expression signals. It requires obtaining open-ended responses from subjects who are shown expressions out of context and asked to describe what they can infer. Stein, Trabasso, and their colleagues have done some of that work with children, but to date on only some emotions, and only in our own culture.

Emotional expressions are crucial to the development and regulation of interpersonal relationships. To mention just three examples, facial expressions should be involved in the formation of attachments (in infancy as well as in courtship), and in the regulation, acceleration, or deceleration of aggression. People I have studied who have congenital facial paralysis (Mobius syndrome) report great difficulty in developing and maintaining even causal relationships if there is no capability for facial expressiveness.[6] Ross (1981) also found that stroke patients who can not properly identify the prosody that accompanies speech or who cannot generate the prosody that accompanies emotion utterances have severe interpersonal difficulties.

Basic emotions can occur without any evident signal. This may be due to deliberate or habitual attempts to inhibit the appearance of a signal. Also, a threshold may need to be crossed to bring about an expressive signal, and that threshold may vary across individuals. If we could measure the brain areas which send information to the facial nucleus during spontaneous emotional experience, I expect we would find that there is some distinctive activity even in low threshold states or when an individual is attempting to inhibit emotion. This remains an empirical question.

Should we consider an affective state to be a basic emotion if there never is a distinctive signal? I will return to that question after describing the other eight characteristics of basic emotions.

The evidence of universality in expression is consistent with the view, espoused by Darwin (1872/1965), that these expressions, and the emotions they signal, are the product of evolution. Ortony and Turner (1990) and

[6]See a report by a Mobius patient (Goldblatt & Williams, 1986).

Ellsworth (1991) have offered a different interpretation of this evidence, proposing that it is the single muscle actions which have universal meaning, not their combination into full face emotional expressions. I (Ekman, in press) have shown how their proposal is not supported by much systematic research and contradicts known facts about the muscular basis of facial expressions.[7]

The finding of universal facial expressions is consistent with an evolutionary explanation of emotion, but does not rule out alternative explanations. Allport (1924) explained how learning experiences common to all humans could account for the origin of the disgust expression. All that is innate is the muscle movements that are required to eject matter from the oral cavity. All infants will make those movements when they regurgitate food which tastes or smells bad. Over time all members of the species will associate those facial muscle movements with anything which is metaphorically related, producing this disgust expression to social events which are distasteful. I (Ekman, 1979) offered a similar explanation for the origin of the raised brows in surprise. All biology contributes, from this viewpoint, is that raising the brows increases the superior visual field allowing more to be seen and more light to enter the retina. All members of the species might learn to use this muscular action in expressions like surprise which metaphorically involve taking in more or unexpected input. It is much harder to explain the smile in enjoyment, or the sad facial expression on the basis of species-constant learning.

This explanation would be compelling if it were shown that congenitally blind children never raise the brow in surprise. Unfortunately there is no definitive data relevant to this or to any other crucial test of the species-constant learning explanation of universal facial expressions. The evolutionary explanation is strengthened by data, albeit not very strong or systematic, on the presence of some emotional expressions in other primates.

Comparable Expressions in other Animals

Darwin considered such evidence crucial, for it was his interest in demonstrating the power of evolutionary theory which led him to write *The expression of emotion in man and animals* (1872/1965). In modern times,

[7]There is no evidence to support their claim that the four muscle actions they describe have universal signal value. Even if some elemental muscle movements were to be shown to have universal signal value, that would not prove that the meaning of the complex facial expressions is derived from the meanings of the muscular elements. It might just as well be the reverse. Ortony and Turner's view also implies that all facial expressions of emotion are composed of more than one element, which is not the case for disgust.

Plutchik (1962) was the first to make this characteristic the organising principle of his theory of emotion.

There is some evidence for similar facial expressions in other primates for fear and anger, possibly also for sadness and happiness (Chevalier-Skolnikoff, 1973; Redican, 1982). Unfortunately, the work they cite is old, and based on casual rather than systematic study of this question. No primatologist has specifically attempted to identify the universe of facial expressions in another species to compare them to what is known about human expressions. The techniques for measuring human expression in muscular terms (Ekman & Friesen, 1976, 1978; Izard, 1979), could be modified for use with other primates, allowing very precise comparisons of the muscular displays.

Although the more systematic primate studies have yet to be completed, researchers have observed that other primates generate facial expressions similar to those observed in humans. These observations are also consistent with an evolutionary explanation of the origin of expression, and more generally with the position that biology plays an important role in these emotions. There is no necessary reason why every emotion must appear in other animals, some emotions might have emerged only in humans. Lazarus (1991) suggests this is so for pride, shame, and gratitude. I do not know of convincing evidence that these states are not evident in other animals. Furthermore, I do not believe that there has been sufficient study of these states mentioned by Lazarus to determine which of the nine characteristics found in basic emotions they share. So the issue remains an open one.

If basic emotions evolved to deal with fundamental life-tasks, they should not only provide information through expressions to conspecifics about what is occurring, but there should also be physiological changes preparing the organism to respond differently in different emotional states.

Emotion-specific physiology

There is evidence (Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990) for distinctive patterns of autonomic nervous system (ANS) activity for anger, fear, and disgust, and it appears that there may also be a distinctive pattern for sadness (Levenson, Carstensen, Friesen, & Ekman, 1991). These findings have now been replicated in four separate experiments, in two different age groups. Although there are some inconsistencies between the ANS patterns they found and the findings of other investigators, we should not ignore the many consistencies with the results of Schwartz, Weinberger, and Singer (1981); Ax (1953); Roberts and Weerts (1982); and Graham (1962). Levenson (1988) has reviewed this and

earlier work explaining why methodological problems in the latter may be responsible for the some failures to find emotion-specific ANS activity.

The only recent challenge to our findings was Stemmler's (1989) report that ANS patterning was specific to how the emotion was elicited. However, this may be due to a number of methodological problems including measuring physiology a considerable period after the induction was over, and studying very low emotional intensities, and including a substantial number of subjects who reported not experiencing the emotion.[8] We have preliminary evidence in two different studies (Levenson et al., 1990; Ekman & Davidson, submitted) of the same emotion-specific pattern when emotion was elicited in very different ways. Clearly, the matter is far from settled. Noting that qualification, I will further consider what the implications are if further research strengthens and supports our findings to date of emotion-specific physiology.

Such evidence would be a challenge to those who view emotion as a social construction with no important biological contribution. A social constructionist might dismiss our findings by claiming that these different patterns of ANS activity were socially learned not the product of evolution. Their argument would be that people are taught to engage in different types of behaviour when experiencing different emotions. Over time this will establish different patterns of ANS activity, subserving these different action patterns. If people show the same emotion-specific ANS activity that may simply reflect common, culturally based, socialisation practices. Presumably those who advocate such a view should expect different behavioural patterns to be taught for each emotion, and therefore different patterns of ANS activity with each emotion, to be found in cultures which are known to differ in their attitudes about emotion.

Simply put, the social constructionist emphasises the past history of the individual, whereas the evolutionary theorist emphasises the past history of the species in explaining why there is emotion-specific ANS activity. If it is only ontogeny, than to the extent to which different people learn different ways of behaving when experiencing one or another emotion, there should be different patterns of ANS activity observed for the emotions we have studied. Levenson, Ekman, Heider, and Friesen (in press) recently repeated their experiments in a non-Western culture. They studied the Minangkabau of Western Sumatra, a fundamentalist Moslim, matrilineal society. They replicated Ekman et al.'s (1983) original findings of emotion-

[8]See Levenson, Ekman, and Friesen (1990) for a fuller discussion of the problems in Stemmler's study. Tassinary, Cacioppo, and Geen (1989) report another failure to replicate our findings, but they relegate this to a footnote and do not provide enough information to know what they actually did.

specific ANS activity in this very different culture. This provides important support consistent with an evolutionary view that these are basic emotions.

Does the failure to find emotion-specific ANS activity for enjoyment and surprise mean that these are not basic emotions? Kemper (1978) would make that argument, for he views differentiated ANS activity as the *sine qua non* for basic emotions. But consider why we expect emotion-specific ANS activity in the first place. Our presumption is that these ANS patterns evolved because they subserve patterns of motor behaviour which were adaptive for each of these emotions, preparing the organism for quite different actions. For example, fighting might well have been the adaptive action in anger, which is consistent with the finding that blood goes to the hands in anger. Fleeing from a predator might well have been the adaptive action in fear, which is consistent with the finding that blood goes to large skeletal muscles (see Levenson, Ekman, & Friesen, 1990, for a more elaborate discussion of this reasoning).

Freezing in fear might seem to create a problem for this line of reasoning, but not if freezing is interpreted as a fearful state in which the organism is nevertheless still prepared, autonomically, for fast flight if the freezing action does not provide concealment. Not every fearful experience involves a threat from which one can flee. A doctor's report that more tests are necessary to confirm whether the preliminary results are correct in indicating a terminal illness, arouse fear, but the event is not one the person can flee from. The ANS pattern of activity which subserves flight might still occur in this example, if the evolved motor programme for this emotion is flight. It is a question which awaits research.

Ohman's (1986) analysis of fear is relevant to these complexities. He distinguishes fear of animals, fear of people, and fear of inanimate objects, suggesting that the evolutionally given actions may be different for fear of a predator as compared to social fears. It is not clear whether he views predator fear as including fear of other aggressive humans, or is it strictly limited to fear of other animals? Nor is it certain from his writings whether he would consider the fear of the doctor's news about terminal illness to be a predator or social fear.

If no specific pattern of motor activity had survival value for an emotion, then there would be no reason to expect a specific pattern of ANS activity to have been established for that emotion. That is why I think we have not found an emotion-specific pattern, a pattern which differs from each of the other emotions, for either surprise or enjoyment.

Frijda (1986) should disagree for he has proposed an action readiness for every emotion. I know of no observational data (examining what people actually do rather than how they answer questionnaires), which shows that there is a universal action pattern for the emotions of sadness, amusement, relief, contentment, or the enjoyment which occurs when hearing music,

watching a sunset, or receiving strokes to the body or the ego. It is not that actions never occur in any of these states, but it is not self-evident that there is any uniform, universal tendency for one or another action in each of these different positive emotions. (Stein and Trabasso, in this issue, similarly question Frijda's view.) Further, it seems likely that when any of the agreeable emotions are occurring, one's survival is not at stake, there is no urgent need to act. A slightly different argument can be made for surprise. No motor action is required or relevant, but instead processing and evaluation of the new unexpected information.

It is not just in regard to positive emotions where there is a lack of observational data to demonstrate decisively an action tendency. There is no such data for *any* emotion which shows a universal, uniform action tendency whenever that emotion occurs. Johnson-Laird and Oatley's (this issue) suggestion that there is an action plan rather than action readiness, allows more flexibility, but again it is not clear what the action plan would be for some emotions. Stein and Levine (1989) have found certain action plans for certain emotions in children, but again they have not studied all emotions, and their data are limited to one culture.

Plans are important, but they are not actions. They are not a substitute for observational data on what actions people engage in, with any regularity, during particular emotions in particular social contexts. In all likelihood there will be more variation in observed actions than in action plans, but that remains to be determined. Furthermore, similarly there may be more variation in action plans than in the evolved readiness to perform motor acts which our findings of emotion-specific ANS activity implies.

I have no argument with Davidson's (this issue) belief that approaching vs. withdrawing is a fundamental issue in terms of the action plans which may be associated with each basic emotion. However, there is no definitive evidence to show that all positive emotions always involve just approach. Certainly, anger, fear, and disgust can involve approach or withdrawal. Is Davidson arguing that for each emotion, evolution prepares us to *either* approach or avoid, and it is only social learning which may add the other action pattern? If that was so it might be possible to measure electromyographically the beginning of that tendency even when the action taken is different. For now, I propose we do not regard either an action readiness or emotion-specific ANS activity as the *sine qua non* for defining basic emotions.

However, it is necessary to posit emotion-specific central nervous system (CNS) activity in my account of basic emotions. The distinctive features of each emotion, including the changes not just in expression but in memories, imagery, expectations, and other cognitive activities, could not occur without CNS organisation and direction. There must be *unique* physiological patterns for each emotion, and these CNS patterns should be specific to

these emotions not found in other mental activity. Here, I am reaching far beyond the data, but not far beyond what the new techniques for measuring brain activity may allow us to discover in this decade.

My contention is consistent with the findings of those who have used EEG measures of regional brain activity to study emotion (see Davidson, 1984, 1987, for reviews of this literature). Davidson et al.'s (1990) recent findings of different patterns of regional brain activity coincident with enjoyment and disgust facial expressions can be explained as reflecting *either* differences in approach vs. withdrawal or positive vs. negative emotions. More critical for my argument are new, not yet published findings (Ekman & Davidson, submitted), which uncovered more differentiated regional brain activity when subjects voluntarily made the facial configurations found with each of the six basic emotions. This evidence must be regarded as tentative, as it is not yet replicated, but the evidence was strong, and it is encouraging for this line of reasoning and research.

Universal Antecedent Events

If emotions are viewed as having evolved to deal with fundamental life-tasks in ways which have been adaptive phylogenetically, then it is logically consistent to expect that there will be some common elements in the contexts in which emotions are found to occur. This is not to presume that every social context which calls forth an emotion will be the same for all people within or across cultures. Clearly there must be major differences attributable to social learning experiences. Ohman (1986, pp. 128–129) describes well how both evolution and social learning contribute to the establishment of those events which call forth one or another emotion.

> [E]volutionary economy has left to environmental influences to inscribe the exact characteristics of dangerous predators . . . [L]earning is critically involved in selecting which stimuli activate the predatory defense system. But this learning is likely to be biologically primed or constrained in the sense that the responses are much more easily attached to some types of stimuli than to others. In other words, it is appropriate to speak about biologically prepared learning. Thus it is likely to require only minimal input in terms of training, and to result in very persistent responses that are not easily extinguished.

Ohman cites research by Mineka, Davidson, Cook, and Keir (1984) showing that limited exposure is sufficient for establishing snake fears in the monkey which are very difficult to extinguish. Lazarus (1991) cites this same study to argue his rather similar view. Although he emphasises what he calls "meaning analysis", Lazarus also describes common antecedent events. Johnson-Laird and Oatley's (this issue) view is also similar.

My view on this matter, which is in agreement with Ohman, Lazarus, Johnson-Laird and Oatley, and Stein and her colleagues, developed in the 1970s when I learned of the findings of Boucher and Brant, which they did not publish until some years later (1981). They found commonalities in emotion antecedents in the many non-Western cultures they examined. It was not in the specific details but on a more abstract level that universality in antecedent events was found. The loss of a significant other, they found (Boucher, 1983, p. 407), is ". . . an antecedent to sadness in many, perhaps all cultures. But who a significant other is or can be will differ from culture to culture".

On the basis of Boucher and Brant's findings, Ekman and Friesen (1975) formulated prototypic interpersonal events which would universally call forth each of this set of emotions. For example, the antecedent event for fear is physical or psychological harm. Lazarus (1991), has a similar but in some ways different account, describing what he calls the "core relational theme" unique to the appraisal of each emotion. Neither of us has evidence, but what we each have proposed is consistent with Boucher and Brant's findings, and with those of Scherer and his group (Scherer, Summerfield, & Wallbott, 1983) in their study of the antecedents of emotion in Western cultures.

Unfortunately, there is little ethological description of the commonalities in the naturally occurring antecedent events for emotions within and across cultures. There is questionnaire and also interview data in which subjects are asked to describe emotional events. However, we do not yet know the extent to which such data resembles what actually occurs during emotion, how much idealisation, and stereotyping may occur when subjects coldly describe what they think about their emotional experience.

Coherence in Response Systems

There is an extensive literature reporting contradictory findings on whether there is or is not coherence in expression and autonomic changes during emotion (see reviews by Buck, 1977; and by Fridlund, Ekman, & Oster, 1987, pp. 195–199). It is not possible as yet to determine whether the dissociations between autonomic and expressive behaviour that have been found are normative or instead reflect differences in personality, temperament, and/or differential attempts to inhibit activity. For now, I propose that when we examine individuals who have not chronically or at the moment tried to inhibit their feelings or expression, we will find that there is *some* coherence, some systematic relationship between these two response systems during emotional events (for those emotions which do have a distinctive ANS pattern). I am positing that the autonomic responses and expressive changes are not, by nature, disconnected,

although there will be large individual differences, some constitutional and some based on social learning. And, I am also positing connection rather than disconnection between facial expressions of emotion and distinctive patterns of CNS activity, and not limited just to the brain areas involved in production of the facial expression. An important qualifier, is that such connections between emotion-specific CNS activity and facial expressions of emotion will only obtain when we distinguish actual, spontaneous emotional expressions from more social or deliberate expressions (cf. Ekman, Davidson, & Friesen, 1990).

I have described five characteristics shared by each of the basic emotion families: (1) distinctive universal signals; (2) presence in other primates; (3) distinctive physiology; (4) universal, distinctive antecedent events; and (5) coherence among response systems. Let me now add four other characteristics which are more interpretative, but consistent, if not dictated, with the evidence I have summarised and with other findings.

Quick Onset

It is in the nature of emotion, I believe, that emotions can begin so quickly that they can happen before one is aware that they have started. Indeed, quick onset is fundamental I believe to the adaptive value of emotions, mobilising us to respond to important events with little time required for consideration or preparation. There is some evidence from both expression and physiology to support the proposal that emotions can onset quickly. Ekman and Friesen (1978) found that facial expressions can begin in a matter of milliseconds after an emotion-provoking stimulus, although not as quickly as we found the startle reactions begins, which I consider a reflex (Ekman, Friesen, & Simons, 1985). Collaborations with Levenson on ANS activity and with Davidson on CNS activity suggest that physiological changes may also begin in fractions of a second.

Clearly, emotions do not always begin so quickly. There are occasions, when an emotion unfolds very slowly, taking a number of seconds or minutes for characteristically emotional responses to occur. I will return to this later when discussing appraisal.

Brief Duration

It is not only adaptive for emotions to be capable of mobilising the organism very quickly (onset), but for the response changes so mobilised not to last very long unless the emotion is evoked again. If one emotion-arousing event typically produced a set of response changes which endured for hours regardless of what was occurring in the external world, emotions would be less responsive than I think they are to rapidly changing circumst-

ances. It may be that under exceptional circumstances a single emotion endures for more than seconds or minutes, but I think it more likely that close inspection would reveal that the same emotion is being repeatedly evoked. All, however, that I need to commit myself to is that emotions usually last only for seconds, not minutes, hours or days.

There is no agreement about how exactly long emotions last, and no agreement about which aspect of emotion must be considered to empirically make that determination. Motor behaviour is probably a better index of when emotions begin than when they are over. Some of the ANS changes last longer than others, and both may last longer than people subjectively believe they are experiencing the emotion, hence the observation after the near-miss car accident, "I am no longer afraid but I feel as if I am".

My proposal that emotions are typically a matter of seconds not minutes or hours, is supported by some preliminary evidence. Examining the duration of both expressive and physiological changes during spontaneous emotional events suggests a short time span. When subjects have reported experiencing an emotion for 15 or 20 minutes, and I have had access to a videotaped record of their preceding behaviour, I found that they showed multiple expressions of that emotion. My interpretation of such incidents is that people summate in their verbal report what was actually a series of repeated but discrete emotion episodes. Unfortunately, I did not have physiological data also in those cases, so I cannot be certain whether the physiological changes were as episodic as the expressions.

A final reason for proposing that emotions are brief in duration is to distinguish emotions from moods, which last for hours or days. Although moods are highly saturated with one or another emotion—irritability with anger, dysphoria with sadness, apprehensiveness with fear, euphoria with a type of enjoyment—I have explained elsewhere (Ekman, 1984, 1991) how moods differ from emotions not only in duration, but also in what brings them forth, and in their physiology.

Frijda, Mesquita, Sonnemans, and Van Goozen (in press) propose that emotions last between 5 seconds and several hours. These figures are similar to those proposed by Scherer, Wallbott, and Summerfield (1986), probably because both Scherer et al. and Frijda relied upon what subjects who were not feeling an emotion reported about how long they think emotions last. Frijda also distinguishes "acute" from not so acute emotions, the former having expressive behaviour and distinct physiology. However, Frijda says he does not know how long acute emotions last. Frijda and Scherer et al. do agree with Ekman and Friesen's (1975) proposal that some emotions are typically of shorter duration than others, and that moods last much longer than emotions. In work in progress, Stein and Trabasso have children enact emotions, and they find that the emotional responses last for seconds not minutes or hours.

Learning more about the duration of emotions requires, I believe, actually examining the occurrence of emotions in the stream of behaviour, not just asking people. Levenson and Gottman are measuring emotions during the course of marital interaction and they (personal communication) report observing many emotional events which last seconds not minutes.

Automatic Appraisal Mechanism

I (Ekman, 1977, pp. 58–59) proposed two appraisal mechanisms, one automatic and the other extended:

> There must be an appraiser mechanism which selectively attends to those stimuli (external or internal) which are the occasion for . . . [one or another emotion]. Since the interval between stimulus and emotional response is sometimes extraordinarily short, the appraisal mechanism must be capable of operating with great speed. Often the appraisal is not only quick but it happens without awareness, so I must postulate that the appraisal mechanism is able to operate automatically. It must be constructed so that it quickly attends to some stimuli, determining not only that they pertain to emotion, but to which emotion . . . Appraisal is not always automatic. Sometimes the evaluation of what is happening is slow, deliberate and conscious. With such a more extended appraisal there may be some automatic arousal, but perhaps not of a kind which is differentiated. The person could be said to be aroused or alerted, but no specific emotion is operative. Cognition plays the important role in determining what will transpire. During such extended appraisal the evaluation may match to the selective filters of the automatic appraiser . . . It need not be, however; the experience may be diffuse rather than specific to one emotion.

Similar views have since been described by Zajonc (1985); Ohman (1986); Leventhal and Scherer (1987); and Buck (1985). LeDoux's study (1991, p. 50) of the anatomy of emotion has led him also to take a view nearly identical to what I propose.

> Emotional processing systems . . . tend to use the minimal stimulus representation possible to activate emotional response control systems, which characteristically involve relatively hard-wired, species-typical behaviors and physiological reactions. Emotional reactions . . . need to be executed with speed, and the use of the highest level of stimulus processing is maladaptive when a lower level will do . . . However, not all emotional reactions can be mediated by primitive sensory events and subcortical neural circuits.

In a major shift in his own position to incorporate the evidence on basic emotions Lazarus (1991, Ch.5, p. 3) recently adopted my position on this issue: "I distinguish between two modes of appraisal: one automatic, unreflective, and unconscious or preconscious, the other deliberate and conscious." Lazarus succinctly described what he called a "psychobiological principle", which he said (pp. 191–192) "provides for universals in the emotion process. Once the appraisals have been made, the emotional response is a foregone conclusion, a consequence of biology". Here, Lazarus goes further than I do, as I believe that the responses reflect not just biology but social learning as well. Stein and Trabasso's (this issue) analysis of appraisal, although based on very different data, is very similar, as they point out, to Lazarus's position.

It is not known exactly how a biological contribution to appraisal operates, what it is that is given, which is then operated on automatically. It seems reasonable to presume that that which is biologically given must be related to the universal antecedents of emotion described above. How does this occur, by what mechanism?

Automatic appraisal does not simply and solely operate on what is given biologically, dealing only with stimulus events that exactly fit what is given. In all likelihood, not enough is given for automatic appraisal to ever operate without considerable amplification and detailing through social learning. (See especially Ohman, 1986, on this point.) An exception might be the appraisal which occurs to a sudden loss of support or when an object is perceived to be moving very quickly directly into one's visual field. But such examples are probably rare. Perhaps they act as metaphors for many other events to become associated through experience with emotion.

Automatic appraisal operates also on a variety of stimulus events that we have repeatedly encountered or with events which although rare were extraordinarily intense. Lazarus notes how differences in our experience allows for enormous variations in the specifics of what calls forth emotions which are attributable to personality, family, and culture. And yet it is not totally malleable. There are some commonalities in what calls forth an emotion for anyone (Toobey & Cosmides, 1990, pp. 418–419).

> The ancestrally recurrent structured situation that the organism categorizes itself as being in is the 'meaning' of the situation for that organism. It 'sees', i.e. is organized to respond to, previous fitness contingencies, not present ones . . . Emotions . . . lead organisms to act as if certain things were true about the present circumstances whether or not they are because they were true of past circumstances . . . In this lies their strength and their weakness . . . [The automatic appraisal] cannot detect when the invariances that held true ancestrally no longer obtain.

Often in civilised life, our emotions occur in response to words not actions, to events which are complex and indirect, and it is an extended

appraisal process which operates with consciousness and deliberation. Then the person is quite aware of what Lazarus calls the "meaning analysis" which occurs. Here is another entry place for social learning to generate large differences between cultural groups, and major individual differences within a culture.

A number of theorists (see reviews by Ellsworth, 1991; Scherer, 1991) have developed models of how appraisal processes may operate. Reading their descriptions and considering most of their data sources it appears that they are considering only extended appraisal, but I think that they believe their models to characterise automatic appraisal as well. Their models are not contradictory with a basic emotions position, but they apparently do see a contradiction. Lazarus, I believe, is the only appraisal theorist who also incorporates basic emotions in his framework. Lazarus differs from the other appraisal theorists in not offering a model of how the appraisal process works. Instead he more abstractly describes the relevant principle and the prototypic events (core relational themes) for each emotion.

Unbidden Occurrence

Because emotions can occur with rapid onset, through automatic appraisal, with little awareness, and with involuntary response changes in expression and physiology, we often experience emotions as happening to, not chosen by us. One can not simply elect when to have which emotion. Psychotherapists would have less business if that was so. When emotions are the product of extended appraisal and the onset is more gradual it is more possible to interfere with or influence what emotion one is beginning to experience. But when the emotion is a result of automatic appraisal the person must struggle with forces within to control what is happening. "[A]n automatic involuntary aspect is present in the experience of all emotion" (Stein and Trabasso, this issue).

It is easier to control the skeletal muscular set than the facial expression, easier to inhibit or control the facial expressions, than the sound of the voice, and probably easier to change the voice than some of the autonomic changes (see Ekman, 1985). The robustness and quickness of emotional response are likely areas of individual difference, and hence differences also in the extent to which emotion is experienced as unbidden.

People do choose to put themselves in situations in which an emotion is likely to occur, arranging circumstances known to be likely to bring on the emotion, but that does not contradict the claim that emotions are unbidden. It is the fact that we cannot choose the emotions which we have which allows people to account for and explain their behaviour by noting they were in the grip of an emotion when the behaviour occurred.

THE PROBLEM OF POSITIVE EMOTIONS

Friesen and I (Ekman & Friesen, 1975) described a number of different *positive emotions*. I have used the term enjoyment as a gloss to cover amusement, relief, sensory pleasure, pride in achievement, the thrill of excitement, satisfaction, and contentment. (I do not claim this is an exhaustive list of the positive emotions.) The problem is that each of these positive emotions does *not* have a distinctive signal (Ekman & Friesen, 1982), although each of the basic negative emotions does have such a distinctive signal. Instead, all of the positive emotions share what I have called the Duchenne smile (Ekman, 1989; Ekman et al., 1990), which is marked by not only the smiling lips (produced by the *zygomaticus major* muscle), but also by the pulling inwards of the skin surrounding the eyes (produced by the *orbicularis oculi, pars lateralis* muscle). Now, it may be that when the voice is studied carefully, each of these positive emotions will be found to have its own distinctive vocal signature. But suppose that is not so, why might it be that emotions which differ as much as relief and the thrill of excitement, might not have their own distinctive signal?

Perhaps it has not been relevant to survival to know which positive emotion was occurring, only that it was a positive emotion rather than anger, fear, disgust, or sadness. Such an idea is implied by Darwin in his principle of antithesis. Ellsworth (personal communication, May 1991) questioned whether it would not matter in sexual selection whether one was being seduced or laughed at, but the little work done on signs of flirtation and/or sexual interest, Eibl-Eibesfeldt (1972) suggests this looks nothing like laughter. I do acknowledge that people are not always certain whether another is amused with them, or whether they are the object of another's amusement, but that underlines the problem it does not provide an answer. Lazarus (personal communication, June 1991) disagrees with me, believing that it is important and necessary to know, for example, whether one's partner or lover is happy or satisfied. We (Frank, Ekman, & Friesen, in press) have recently found that people can distinguish the enjoyment, or Duchenne smile, from a more social, fabricated smile. Perhaps differences in the timing and in accompanying vocalisation allow the other types of enjoyment to be readily distinguished from one another.

One solution to the problem of there being but one facial signal for these different positive emotions would be if they are all considered to be members of the enjoyment emotion family. The thrill of excitement, relief, contentment, might all be different variations on a common theme, just as annoyance, fury, resentment, and outrage are all members of the anger family. But this is not a decision to be made theoretically in order to deal with an inconsistency in one's theory. If these positive states are to be considered members of one family, research should find a commonality in the physiology of these positive states, a common theme albeit with variations, and a common theme in the antecedent events.

Are there Other Basic Emotions which have these Nine Characteristics?

The evidence is far from complete for anger, fear, disgust, and sadness, and I have indicated more uncertainty about the positive emotions (except in their differences from the negative emotions), and about interest, contempt, surprise, guilt, and shame. I do not think there are other emotions which share all nine characteristics, but that is an empirical matter. Let me briefly describe three more affective states about which even less is known, which are candidates to be considered as basic emotions.

Embarrassment. Most researchers have tried to diminish its impact upon the emotional state they are trying to evoke rather than focus upon embarrassment itself. A number of theorists consider embarrassment to be part of the shame or guilt family. Although arguing that embarrassment is a form of shame Izard (1977) does not explain why people do not typically blush in shame.

I expect that when the research is completed, embarrassment will be found to have all of the characteristics I have described, but with an unusual signal—the blush. I do not know if the blushing in embarrassment is very evident in dark skinned persons, and if it is not, that would make for a signal which is much more apparent in some races than in others. In embarrassment, people often want to hide, and that is consistent with a less explicit signal than what occurs in the other basic emotions. Miller and Fahey (1991) suggests that blushing can only occur in the presence of another person, not when one is alone. If this is so, it would be a second way in which embarrassment differs from the other basic emotions because they can occur when alone, although they typically occur in response to the actual or remembered actions of others. Recent work by Keltner (personal communication, October 1991) suggests that the embarrassment signal involves a sequence of facial and head movements, rather than one set of co-ordinated muscle movements which occur simultaneously. Keltner also has evidence that observers can distinguish between embarrassment and amusement.

Awe. Unlike embarrassment, it is not easy to provoke awe in a laboratory. It is rare, but I think there is a reasonable chance that it will also be found to share all nine characteristics.

Excitement. Tomkins (1962) said excitement is intense, extreme interest, a position adopted subsequently by Izard (1971). I suspect that excitement is a separate emotion, no more related to interest than it is to enjoyment or fear. Again, there has been little research on excitement itself.

GENERAL CONSIDERATIONS

Must a Basic Emotion have all Nine Characteristics?

Those who ask this question usually are specifically questioning the necessity of two of the characteristics: a unique, universal signal, and presence in other animals. I see no reason to argue that the unique signal must be facial. Vocalisation would be just as good, or a patterned, distinctive set of body or head movements with or without the face. The more difficult question is what if there is no signal of any kind? I have no way of knowing how to answer such a question other than by trying to discover whether there are actually such signal-less affective states in nature which have all of the other eight characteristics. That research has not been done. The value of the basic emotion approach is to focus our attention on such gaps in our knowledge. Our task must be to describe nature, to find out what is, not to prescribe on some a priori basis.

It would certainly be important if emotions which have the other eight characteristics but no distinct signal were discovered. Such emotions would have very different social consequences, privately experienced with no notification to conspecifics. I think it unlikely that there are such emotions, and if they are found we should be interested in how different they may function in our social life.

I also think it is unlikely that we will find an emotion that is not evident in any other animal yet has all of the other characteristics I have described. Again, this is a question to settle by research not by argument. I do not reject the possibility of emotions emerging in humans which are not shown by other animals, I just think it is improbable.

Does any One Characteristic Distinguish the Basic Emotions?

I do not think any of the nine characteristics should be regarded as the *sine qua non* for emotions, the hallmark which distinguishes emotions from other affective phenomena. What is unique is that when an emotion occurs we are dealing with current fundamental life-tasks in ways which were adaptive in our evolutionary past. This is not to deny that our own individual past experience will also influence how we deal with these fundamental life-tasks, but that is not what is unique to emotions. It is our past as a species in dealing with fundamental life-tasks and how that organises and at least initially influences how we appraise and respond to a current event which marks the emotions.

This is not much help for empiricists who want to know when we can tell—as observers—if an emotion is occurring. "An observer can infer that an emotion is likely to be occurring when:

- the response system changes are complex, when it is not just facial, or skeletal, or vocal, or [physiological], . . . but a combination;
- the changes are organised, in the sense of being inter-related and distinctive . . .;
- the changes happen quickly;
- some of the response system changes are ones common to all people; and
- some of the responses are not unique to *homo sapiens*.

This is *not* the only time emotion occurs, but when an observer's estimate is *most* likely to be safe" (Ekman, 1977, p. 62).

How to Deal with all the Other Emotions, such as Smugness, Hope, Grief, Jealousy, etc.

Although the emotions I propose to be basic include those most often considered by other theorists, certainly some affective states remain which I have not so far considered. I have nine answers to the question of what to do with these other emotion-related phenomena.

First, the concept of emotion families, which I introduced at the beginning of this paper, allows the inclusion within a family of many variations around a common theme. Thus, many different emotion terms will be found within each family.

Second, it is worth noting that the list of basic emotions and possible basic emotions is not a short one. It includes (in alphabetical order) anger, awe, contempt, disgust, embarrassment, excitement, fear, guilt, interest, sadness, shame, and surprise. And also enjoyment, which is comprised of at least amusement, contentment, relief, enjoyment from sensory sources, and enjoyment based on accomplishment. The exact number of emotions is not germane to the basic emotions approach, but it is one of the values of that approach to focus attention on trying to discover which affective phenomena share the nine characteristics I described and therefore should be designated basic emotions.

Third, a number of emotion terms can be considered as moods, e.g. apprehension, dysphoria, euphoria, irritation. Although each of these moods is highly saturated with one or another emotion, I have argued elsewhere (Ekman, 1984, in press) that they differ from emotions in what calls them forth, their time course, the appraisals involved, and the physiological substrate.

Fourth, a number of emotion terms can be considered as *emotional attitudes*, for example, love or hatred. They are more sustained, and typically involve more than one emotion.

Fifth, a number of terms can be considered as designating *emotional traits* (e.g. hostile, melancholic, timorous, Pollyannaish), and sixth, still other terms designate *emotional disorders* (e.g. major depression, anxiety disorder, mania, pathological violence). Both the traits and disorders involve emotions, typically more than one, but they differ from each other and from the emotions themselves, in terms of their time course, and in other ways as well (see Ekman, 1984, in press).

Seventh, a number of what others consider to be emotions I think are more complex, involving settings and stories in which emotions occur.[9] I have called these *emotional plots*. Grief, jealousy, and infatuation are such emotional plots which specify (Ekman, 1984, p. 329)

> . . . the particular context within which specific emotions will be felt by specific persons, casting the actors and what has or is about to transpire. [Grief, for example,] . . . specifies two actors, the deceased and the survivor, something about their past relationship, the survivor was attached to the deceased, the pivotal event, one of the actors died. The survivor is likely to feel distress, sadness, and perhaps fear and anger.

Grief is much more specific than sadness. We know that in grief a death has occurred, in sadness we only know that the person has suffered an important loss, but not what kind of loss. Jealousy is another example of an emotional plot. It tells us the cast of three, their roles, something about the past history, and the emotions each cast member is likely to feel. Anger may be felt by the spurned one, but sadness and fear may also be felt. We also know something about the feelings of the rival and the object of mutual attention. An emotional plot contains much more specific information, than do any of the basic emotions. Oatley and Johnson-Laird (1987) had a similar concept for what they called "complex emotions".

Eighth, is the possibility of *blends*, terms which describe the co-occurrence of two quite different emotions, as for example, scorn being a

[9]Tomkins (1962) should be credited for emphasising that emotions have generality rather than containing specific information, although he made this distinction to differentiate emotions from pain, not from what I am calling emotional plots.

blend of enjoyment and disgust. Although I think there is lexical evidence for blend terms (e.g. Plutchik, 1962), the evidence for the existence of blends in terms of physiology and expression is meagre. It is equally possible that blend terms are used to designate a rapid sequence of two basic emotions. Johnson-Laird and Oatley (this issue) talk of *mixed* emotions, and perhaps this would be a better term, allowing for both blends and rapidly sequential emotions. This too is an area much in need of research.

Ninth, is the possibility that there are more emotional words than there are basic emotions, terms which refer not only to the emotion but features of the eliciting situation, of differential responses to that situation, etc. Oatley and Johnson-Laird (1987) and Stein and Trabasso (this issue) elaborate how this occurs, and how such variations in emotion terms can be dealt with from a basic emotions viewpoint.

THE VALUE OF THE BASIC EMOTIONS POSITION

The basic emotions position which I have described does not dismiss the variety of affective phenomena, it attempts to organise those phenomena, highlighting possible differences between basic emotions and other affective phenomena, which can only be determined by further research. It should be clear by now that I do not allow for "non-basic" emotions. All the emotions which share the nine characteristics I have described are basic. Further research will show, I believe, that they each have unique features (signal, physiology, and antecedent events). Each emotion also has features in common with other emotions—rapid onset, short duration, unbidden occurrence, automatic appraisal, and coherence among responses—which allow us to begin to deal with fundamental life-tasks quickly without much elaborated planning, in ways that have been adaptive in our past.

If all emotions are basic, what then is the value of using that term. It underlines the differences between this and other viewpoints and approaches to emotion which do not consider emotions to be separate from one another, and/or do not take an evolutionary viewpoint. It captures what is unique about emotion, and what emotions have in common which distinguish them from other phenomena. The basic emotions framework makes sense of the nine characteristics I have described which distinguish emotions from other affective phenomena.[10] This framework serves us

[10]Adopting a basic emotions viewpoint does not, however, require a commitment to one or another position about how emotional behaviour is organised and regulated. In earlier writings (Ekman, 1972, 1977) I elaborated on Tomkins' (1962) concept of an "affect program", which has been criticised by Camras (this issue), Davidson (this issue), and Lazarus (1991). I am currently evaluating the advantages and disadvantages of that concept as compared to a neural network.

well in raising for empirical study a number of questions about other affective states which further research might show are also basic emotions.

The adjective "basic" should not be the issue, however, but instead what questions this stance raises for research about emotion. It was this position which led myself and Friesen, and quite independently Izard, to seek evidence on the universality of facial expression. It was this position which also motivated phylogenetic comparisons (Chevalier-Skolnikoff, 1973; Redican, 1982). It also guided much of the recent research on emotion-specific physiology which I described earlier, and research on the early development of expression (see Fridlund, Ekman, & Oster's, 1987 review). Thirty years ago before Tomkins (1962) and Plutchik (1962) published their quite different theories of basic emotions, these findings did not exist, and emotion was not the popular topic it is today. When we consider what has been learned about emotional *responses* I think it is reasonable to acknowledge that the basic emotions approach provided the basis for the questions which were asked. Clearly, this has not been the case for the generation of recent research offering different models of appraisal, although perhaps the basic emotions approach was influential indirectly, for some of the appraisal model theorists reacted against this position.

The nine characteristics I have described are meant as challenges for more research. They point us to what we still need to learn about the emotions. They highlight the gaps in our knowledge. The utility of this approach will be evident 10 years from now by what research it generates to confirm or disconfirm the possibilities I have suggested, and new possibilities I have not conceived of.

Manuscript received 8 October 1990
Revised manuscript received 25 November 1991

REFERENCES

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

Ax, A.F. (1953). The physiological differentiation between fear and anger in humans. *Psychosomatic Medicine, 15*, 433–442.

Boucher, J.D. (1983). Antecedents to emotions across cultures. In S.H. Irvine & J.W. Berry (Eds), *Human assessment and cultural factors*. New York: Plenum, pp. 407–420.

Boucher, J.D. & Brant, M.E. (1981). Judgment of emotion: American and Maylay antecedents. *Journal of Cross-Cultural Psychology, 12*, 272–283.

Buck, R. (1985). Prime theory: A integrated theory of motivation and emotion. *Psychological Review, 92*, 389–413.

Buck, R.W. (1977). Nonverbal communication of affect in preschool children: Relationships with personality and skin conductance. *Journal of Personality and Social Psychology, 35*, 225–236.

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

Darwin, C. (1872). *The expression of the emotions in man and animals*. [Reprinted 1965.] University of Chicago Press.

Davidson, R.J. (1984). Affect, cognition and hemispheric specialization. In C.E. Izard, J. Kagan, & R. Zajonc (Eds), *Emotion, cognition and behavior*. Cambridge University Press, pp. 320–365.

Davidson, R.J. (1987). Cerebral asymmetry and the nature of emotion: Implications for the study of individual differences and psychopathology. In R. Takahashi, P. Flor-Henry, J. Gruzelier, & S. Niwa (Eds), *Cerebral dynamics, laterality and psychopathology*. New York: Elsevier.

Davidson, R.J., Ekman, P., Saron, C., Senulis, J., & Friesen, W.V. (1990). Emotional expression and brain physiology. I: Approach/withdrawal and cerebral asymmetry. *Journal of Personality and Social Psychology, 58*, 330–341.

Eibl-Eibesfeldt, I. (1972). Similarities and differences between cultures in expressive movements. In R.A. Hinde (Ed.), *Non-verbal communication*. Cambridge University Press, pp. 297–314.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska symposium on motivation, 1971*, Vol. 19. Lincoln, NE.: University of Nebraska Press, pp. 207–283.

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

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

Ekman, P. (1984). Expression and the nature of emotion. In K. Scherer & P. Ekman (Eds), *Approaches to emotion*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc., pp. 319–344.

Ekman, P. (1985). *Telling lies: Clues to deceit in the marketplace, marriage, and politics*. New York: Norton. [Paperback edition, New York: Berkeley Books, 1986.]

Ekman, P. (1989). The argument and evidence about universals in facial expressions of emotion. In H. Wagner & A. Manstead (Eds), *Handbook of social psychophysiology*. Chichester: Wiley, pp. 143–164.

Ekman, P. (1991). *Distinguishing emotions from other affective states*. Unpublished manuscript.

Ekman, P. (In press). Facial expression of emotion: New findings, new questions. *Psychological Science*.

Ekman, P. & Davidson, R.J. (Submitted). *Voluntary smiling changes regional brain activity*.

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

Ekman, P. & Friesen, W.V. (1975). *Unmasking the face: A guide to recognizing emotions from facial clues*. New Jersey: Prentice Hall. [Reprinted edition, Palo Alto, CA: Consulting Psychologists Press, 1984.]

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

Ekman, P. & Friesen, W.V. (1978). *Facial action coding system: A technique for the measurement of facial movement*. Palo Alto, CA: Consulting Psychologists Press.

Ekman, P. & Friesen, W.V. (1982). Felt, false and miserable smiles. *Journal of Nonverbal Behavior, 6*(4), 238–252.

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

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

Ekman, P. & Heider, K.G. (1988). The universality of a contempt expression: A replication. *Motivation and Emotion, 12*(4), 303–308.

Ekman, P., Friesen, W.V., & Ellsworth, P. (1972). *Emotion in the human face: Guidelines for research and an integration of findings*. New York: Pergamon.

Ekman, P., Friesen, W.V., & Ancoli, S. (1980). Facial signs of emotional experience. *Journal of Personality and Social Psychology, 39*(6), 1125–1134.

Ekman, P., Levenson, R.W., & Friesen, W.V. (1983). Autonomic nervous system activity distinguishes between emotions. *Science, 221*, 1208–1210.

Ekman, P., Friesen, W.V., & Simons, R.C. (1985). Is the startle reaction an emotion? *Journal of Personality and Social Psychology, 49*(5), 1416–1426.

Ekman, P., Davidson, R.J., & Friesen, W.V. (1990). The Duchenne smile: Emotional expression and brain physiology. II. *Journal of Personality and Social Psychology, 58*, 342–353.

Ekman, P., O'Sullivan, M., & Matsumoto, D. (In press). Confusions about contest in the judgment of facial expression: A reply to "Contempt and the Relativity Thesis". *Motivation and Emotion*.

Ellsworth, P. (1991). Some implications of cognitive appraisal theories of emotion. In K.T. Strongman (Ed.), *International review of studies on emotion*. Chichester and New York: Wiley, pp. 143–161.

Etcoff, N.L. & Magee, J.J. (In press). Categorical perception of facial expressions. *Cognition*.

Frank, M.G., Ekman, P., & Friesen, W.V. (In press). Behavioral markers of the smile of enjoyment. *Journal of Personality and Social Psychology*.

Fridlund, A.J. (1991). Evolution and facial action in reflex, social motive, and paralanguage. *Biological Psychology, 32*, 3–100.

Fridlund, A., Ekman, P., & Oster, H. (1987). Facial expressions of emotion. In A. Siegman & S. Feldstein (Eds), *Nonverbal behavior and communication*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc, pp. 143–224.

Frijda, N.H. (1986). *The emotions*. Cambridge University Press.

Frijda, N.H., Mesquita, B., Sonnemans, J., & Van Goozen, S. (In press). The duration of affective phenomena or emotions, sentiments and passions. *International review of studies on emotion*, Vol. 1. Chichester: Wiley.

Goldblatt, D. & Williams, D. (1986). "I *an* sniling!" Mobius' syndrome inside and out. *Journal of Child Neurology, 1*, 71–78.

Graham, D.T. (1962). Some research on psychophysiologic specificity and its relation to psychosomatic disease. In R. Roessler & N.S. Greenfield (Eds), *Physiological correlates of psychological disorder*. Madison: University of Wisconsin Press, pp. 221–238.

Izard, C.E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.

Izard, C.E. (1977). *Human emotions*. New York: Plenum.

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. & Haynes, O.M. (1988). On the form and universality of the contempt expression: A challenge to Ekman and Friesen's claim of discovery. *Motivation and Emotion, 12*, 1–16.

Johnson-Laird, P.N. & Oatley, K. (1989). The language of emotions: An analysis of a semantic field. *Cognition and Emotion, 3*, 81–123.

Kemper, T.D. (1978). *A social interactional theory of emotions*. New York: Wiley.

Lazarus, R.S. (1991). *Emotion and adaptation*. Oxford University Press.

LeDoux, J.E. (1991). Emotion and the brain. *The Journal of NIH Research, 3*, 49–51.

Levenson, R.W. (1988). Emotion and the autonomic nervous system: A prospectus for research on autonomic specificity. In N.H. Wagner (Ed.), *Social psychophysiology: Theory and clinical applications*. London: Wiley, pp. 17–42.

Levenson, R.W., Ekman, P., & Friesen, W.V. (1990). Voluntary facial expression generates emotion-specific nervous system activity. *Psychophysiology, 27*, 363–384.

Levenson, R.W., Carstensen, L.L., Friesen, W.V., & Ekman, P. (1991). Emotion, physiology, and expression in old age. *Psychology and Aging, 6*, 28–35.

Levenson, R.W., Ekman, P., Heider, K., & Friesen, W.V. (In press). Emotion and autonomic nervous system activity in an Indonesian culture. *Journal of Personality and Social Psychology*.

Leventhal, H. & Scherer, K.R. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion, 1*, 3–28.

Matsumoto, D.R. & Kudoh, T. (Submitted). Cultural differences in judgments of emotion and other personal attributes: What's in a smile?

Miller, R.S. & Fahey, D.E. (1991, August). *Blushing as an appeasement gesture: Felt, displayed and observed embarrassment*. Paper presented at the meeting of the American Psychological Association, San Francisco, CA.

Mineka, S., Davidson, M., Cook, M., & Keir, R. (1984). Observational conditioning of snake fear in Rhesus monkeys. *Journal of Abnormal Psychology, 93*, 355–372.

Oatley, K. & Johnson-Laird, P.N. (1987). Towards a cognitive theory of the emotions. *Cognition and Emotion, 1*, 29–50.

Ohman, A. (1986). Face the beast and fear the face: Animal and social fears as prototypes for evolutionary analyses of emotion. *Psychophysiology, 23*, 123–145.

Ortony, A. & Turner, T.J. (1990). What's basic about basic emotions? *Psychological Review, 97*, 313–331.

Oster, H., Hegley, D., & Nagel, L. (In press). Adult judgment and fine-grained analysis of infant facial expressions: Testing the validity of *a priori* coding formulas. *Developmental Psychology*.

Plutchik, R. (1962). *The emotions: Facts, theories and a new model*. New York: Random House.

Redican, W.K. (1982). An evolutionary perspective on human facial displays. In P. Ekman (Ed.), *Emotion in the human face* (2nd edn). Elmsford, New York: Pergamon, pp. 212–280.

Ricci-Bitti, P.E., Brighetti, G., Garotti, P.L., & Boggi-Cavallo, P. (1988). *Is contempt expressed by pan-cultural facial movements*? Paper presented at the XXIV International Congress of Psychology, Sydney, Australia.

Roberts, R.J. & Weerts, T.C. (1982). Cardiovascular responding during anger and fear imagery. *Psychological Reports, 50*, 219–230.

Rosch, E.H. (1973). Natural categories. *Cognitive Psychology, 4*, 328–350.

Roseman, I.J. (1991). Appraisal determineants of discrete emotion. *Cognition and Emotion, 5*(3), 161–200.

Ross, E.D. (1981). The aprosodias: functional-anatomical organization of the affective components of language in the right hemisphere. *Archives of Neurology, 38*, 561–569.

Russell, J. (In press). Negative results on a reported facial expression of contempt. *Motivation and Emotion*.

Scherer, K.R. (1991). Criteria for emotion-antecedent appraisal: a review. In V. Hamilton, G.H. Bower, & N.H. Fridja (Eds), *Cognitive perspectives on motivation and emotion*. Kluwer: Dordrecht: pp. 89–126.

Scherer, K.R., Summerfield, W.B., & Wallbott, H.G. (1983). Cross-national research on antecedents and components of emotion: A progress report. *Social Science Information, 22*, 355–385.

Scherer, K.R., Wallbott, H.G., & Summerfield, W.B. (Eds) (1986). *Experiencing emotion: A cross-cultural study*. Cambridge University Press.

Schwartz, G.E., Weinberger, D.A., & Singer, J.A. (1981). Cardiovascular differentiation of happiness, sadness, anger and fear following imagery and exercise. *Psychosomatic Medicine, 43*, 343–364.

Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology, 52*, 1061–1086.

Stein, N.L. & Levine, L.J. (1989). The causal organisation of emotional knowledge: A developmental study. *Cognition and Emotion, 3*(4), 343–378.

Stemmler, G. (1989). The autonomic differentiation of emotions revisited: Convergent and discriminant validation. *Psychophysiology, 26*, 617–632.

Tassinary, L.G., Cacioppo, J.T., & Geen, T.R. (1989). A psychometric study of surface electrode placements for facial electromyographic recording. I. *Psychophysiology, 26*, 1–16.

Toobey, J. & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology, 11*, 375–424.

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. & McCarter, R. (1964). What and where are the primary affects? Some evidence for a theory. *Perceptual and Motor Skills, 18*, 119–158.

Zajonc, R.B. (1985). Emotion and facial efference: A theory reclaimed. *Science, 228*, 15–21.