Chapter 1

A GENERAL PSYCHOEVOLUTIONARY THEORY OF EMOTION

ROBERT PLUTCHIK

ABSTRACT

The general psychoevolutionary theory of emotion that is presented here has a number of important characteristics. First, it provides a broad evolutionary foundation for conceptualizing the domain of emotion as seen in animals and humans. Second, it provides a structural model which describes the interrelations among emotions. Third, it has demonstrated both theoretical and empirical relations among a number of derivative domains including personality traits, diagnoses, and ego defenses. Fourth, it has provided a theoretical rationale for the construction of tests and scales for the measurement of key dimensions within these various domains. Fifth, it has stimulated a good deal of empirical research using these tools and concepts. Finally, the theory provides useful insights into the relationships among emotions, adaptations, and evolution.

Both an explicit and an implicit body of knowledge about emotions exist. The explicit knowledge concerns such things as how well we judge emotions from facial expressions, whether our emotions are revealed by physiological changes, what emotions infants express, and whether aggressive behavior can be produced by brain stimulation. This knowledge, based on formal studies, is often inconsistent and relatively narrow in the sense that only a few key issues have been examined in the laboratory.

3

The implicit knowledge of emotion is probably universal, and most people believe that they already know a great deal about emotions. For example, we believe that emotions are powerful inner forces that affect our behavior and thoughts, even when we would prefer that they did not. We know that some emotions feel good and some bad, and that some people are more emotional than others. Although no school teaches the meaning of emotional expressions of the face, most of us believe we can read emotions on the faces of other people. And almost anyone who has ever had a dog or a cat will insist that these animals show emotions as vividly as do humans.

Despite the existence of these domains of explicit and implicit knowledge of emotions, there are many questions and issues about emotions that are not intuitively known and seldom studied. Examples of these are the following: What functions do emotions serve? How universal are they? Do animals have them? How many are there? Are they inherited, learned, or both?

Such questions have seldom been considered in a systematic way, although it is evident that any adequate theory should have something to say about them. Unfortunately, many of the theories about emotion have dealt with only one or another of these questions, and some are little more than a definition of the term. If a theory is to be general, it should attempt to deal with these and other issues.

EMOTION AS A HYPOTHETICAL CONSTRUCT

A major element in both the implicit and explicit views of emotion is that an emotion is a subjective feeling of a certain kind—the kind for which labels such as angry, disgusted, and afraid are appropriate. However, there is considerable evidence to suggest that this is too narrow a way to define emotion and that the facts available to us imply the need for a broader conceptualization. In contrast, it may be proposed that an emotion is not a subjective experience, per se, but rather a construct or inference based on various classes of evidence. This evidence may include verbal reports about inner feelings, as well as expressive behaviors and peer–group reactions, among others.

The fact that verbal reports alone are inadequate measures of emotion can be illustrated by many examples. Let us consider only three. Davitz (1970) asked a group of students to write brief descriptions of their emotional experiences. Based on these descriptions, he compiled a list of 556 words and phrases describing emotions. To illustrate the complexity of the layman's descriptive language of emotion, consider some of the phrases used in relation to depression:

> *I feel empty, tired, sleepy, insignificant, alone, out of touch, not hungry, can't smile, want to withdraw.*

These terms present a picture of a complex state having many elements. There are physical symptoms, attitudes toward oneself, impulses to action, and physiological changes. It is evident that any one class of descriptions is therefore only a partial image of the total state called an *emotion*.

A second example of the limitations of subjective reports as measures of emotion is documented in an extensive review of cross-cultural studies of depression (Marsella, 1976). In his review, Marsella cited reports indicating that in some languages there are no terms for depression as such, and that different investigators have reported widely varying prevalence rates for depression depending on their theoretical expectations as well as the specific measures used. It appears that some cultures do not label inner mood states. The more Westernized a culture, the more likely are psychological components to be included in a description of depression. (The fact that a society does not have a word for it does not mean that a particular emotion does not exist.)

The third example of the problematic nature of verbal reports can be found in the Schachter and Singer (1962) study of the role of deception and arousal in reports of emotional states. In this investigation, groups of college students were exposed to conditions designed to arouse feelings of "euphoria" or "anger." To assess the extent to which these emotions were produced, the subjects rated their feelings of "happiness" and "anger" on a scale. The results showed that the subjects reported themselves as more "happy" than "angry" in the "euphoria" condition, as was predicted. However, in the "anger" condition, subjects still reported themselves as more "happy" than "angry." This puzzle was resolved after the experiment was over. It was then learned that the subjects in the anger condition actually felt angry, but many were afraid to say this publicly since the experimenter had promised them two extra points on their final exam for participating: They were afraid that telling the truth might jeopardize their grade. This again emphasizes the point that verbal responses describing emotional states cannot always be taken at face value, particularly when the situation allows various secondary gains (e.g., money, grades, good will, etc.).

Many other examples can be given of the fact that verbal reports of emotions cannot always be taken as a direct index of some presumed inner emotional state. Such examples come from the literature on nonverbal communication (Speer, 1972) and from the psychoanalytic literature (Brenner, 1975; Rado, 1969). In conclusion, it may be stated that the term "emotion" does not necessarily describe subjective feeling states revealed by verbal reports. The evidence against the view of emotion as verbal report may be partly summarized in the following list:

1. Verbal reports of emotions may be deliberate attempts to deceive another person (as in deception experiments).

2. Verbal reports of emotions may be distortions or partial truths for conscious or unconscious reasons.
3. Repression may create false negatives; that is, an observer may erroneously assume that no emotion exists because none has been reported.
4. Reports of emotions depend on an individual's particular conditioning history, as well as his or her facility with words.
5. Reports of inner emotional states usually are retrospective and depend on memory. Remembered events are notoriously subject to distortions such as leveling, sharpening, wishful thinking, and repression.
6. Requests for a report of one's immediate emotional state create the problem that the process of observing can change the thing observed.
7. Emotions are generally believed to occur in infants and in young children. Such young children have not yet acquired the cognitive or motor ability to use language to express their emotions. Therefore, the belief in emotions in infants and young children is based on other classes of evidence.
8. Emotions are generally believed to occur in mentally defective and in mentally deranged humans. In many such cases, the patient is unable to provide any direct verbal reports of his emotional states.
9. The inherent ambiguity of language creates the problem of the "true" meaning of emotion terms. The importance of context in determining meaning implies that the same verbal report of an emotion will have a different referent in another setting.
10. Emotions are rarely if ever experienced in a pure state. More typically, any given situation creates mixed emotions, which are difficult to describe in any simple or unequivocal way.

For these and other reasons to be described in the next section, we must conclude that a verbal report of an inner emotional state is only a rough index of whatever that state is. We conclude that an emotion is not to be considered as synonymous with a presumed inner feeling state. The word *emotion* refers to a complex theoretical term whose characteristics can only be inferred on the basis of a congruence of various classes of evidence. One of these classes of evidence consists of verbal reports of supposed inner states, but such evidence has no greater logical priority than do the other classes of evidence. This approach is exactly analogous to that taken in other parts of psychology or in the physical sciences. Such terms as memory, perceptions, traits, atoms, genes, and DNA molecules are hypothetical constructs whose properties are inferred on the basis of various kinds of evidence.

EMOTIONS IN ANIMALS

Most comparative psychologists and ethologists accept the idea that the concept of emotion applies to lower animals as well as to humans. For example, Hebb (1972) has written: "The dog is definitely capable of jealousy and

occasionally, in some dogs, there are signs of sulking. In the chimpanzee, however, we have the full picture of human anger in its three main forms: anger, sulking, and the temper tantrum.'' The validity of such emotion labels resides, in part, in their practical ability to predict an animal's behavior. If an animal is called "shy," caretakers know what to expect of it in the future. If an animal is called "angry" or "hostile," the caretakers will be cautious in its presence.

One important way to identify emotional reactions in a given animal is by observing the behavior of other animals toward the identified one. Delgado (1966) gives an example of this method in relation to the effects of electrical stimulation of the brain in monkeys. An electrode was placed in the rhinal fissure at the tip of the temporal lobe in a rhesus monkey. Electrical stimulation of this point produced opening of the mouth, rotation of the head, and scratching of the face, a pattern that, to a human observer, looked like aggression. However, this evoked behavior had no effect on the social behavior of the other members of the monkey colony. In contrast, electrical stimulation of the central gray area of the brain produced behavior that led the other animals to withdraw, grimace, and show submissive behaviors (Delgado, 1964). We can thus reasonably infer that stimulation of the central gray area produced aggressive behavior, whereas stimulation of the rhinal fissure did not, even though there were some superficial similarities in the two patterns of behavior. We may conclude that the behavior of other animals of the same species provides a partial basis for judging the existence and type of emotion present in a given, identified animal.

EMOTIONS AND EVOLUTION

It seems evident that emotions should be considered from a broad evolutionary point of view, since their existence can be inferred in lower animals as well as in humans. Darwin's concept of natural selection implies that almost every feature of each existing species has survival value, and this is as true of an animal's behavior, including its emotional behavior, as it is of its morphology. From an evolutionary point of view, we should therefore try to identify the ways in which emotions function adaptively in the lives of each organism.

In a general way it may be pointed out that all organisms, in order to survive and maintain their populations, must find food, avoid injury, and reproduce their kind. This is as true of lower animals as it is of higher ones. The nature of the environment creates certain functional requirements for all organisms if they are to survive. Any organism must take in nourishment and eliminate waste products. It must distinguish between prey and predator and between a potential mate and a potential enemy. It must explore its environ-

ment and orient its sense organs appropriately as it takes in information about the beneficial and harmful aspects of its immediate world. And in organisms that are relatively helpless at birth and for a while thereafter, there must be ways of indicating the need for care and nurturance. The specific behaviors by which these functions are carried out will vary widely throughout the animal kingdom, but the basic prototype functions will remain invariant.

Scott (1958) has listed some basic classes of adaptive behavior recognizable in most species. They include ingestive behavior, shelter-seeking behavior, agonistic (flight or fight) behavior, sexual behavior, care-giving behavior, care-soliciting behavior, eliminative behavior, allelomimetic (imitative) behavior, and investigative behavior. Wilson (1975), the sociobiologist, also suggests the existence of certain general classes of adaptive behavior. For example, in comparing termites and monkeys, Wilson notes the many similarities of function:

> Both [societies] are formed into cooperative groups that occupy territories. The group members communicate hunger, alarm, hostility, caste status or rank and reproductive status among themselves. . . . Individuals are intensely aware of the distinction between groupmates and nonmembers. . . . There is a well-marked division of labor.

In 1962, in my book *The emotions: Facts, theories and a new model,* I also proposed that there are only a few classes of basic adaptive reactions that are identifiable at all phylogenetic levels. From a functional point of view these include such things as *protection* responses (flight, avoidance, hiding, playing dead, etc.), *destruction* responses (clawing, biting, hitting, etc.), and *reproduction* responses (courting, copulating, egg-laying, etc.).

These ideas have been developed to form the bases of a general theory of emotions. The postulates of the theory have been stated explicitly and are listed below (Plutchik, 1980).

Postulates of the Theory

POSTULATE 1. *The concept of emotion is applicable to all evolutionary levels and applies to animals as well as to humans.*

POSTULATE 2. *Emotions have an evolutionary history and have evolved various forms of expression in different species.*

POSTULATE 3. *Emotions serve an adaptive role in helping organisms deal with key survival issues posed by the environment.*

POSTULATE 4. *Despite different forms of expression of emotions in different species, there are certain common elements, or prototype patterns, that can be identified.*

POSTULATE 5. *There is a small number of basic, primary, or prototype emotions.*

POSTULATE 6. *All other emotions are mixed or derivative states; that is, they occur as combinations, mixtures, or compounds of the primary emotions.*

POSTULATE 7. *Primary emotions are hypothetical constructs or idealized states whose properties and characteristics can only be inferred from various kinds of evidence.*

POSTULATE 8. *Primary emotions can be conceptualized in terms of pairs of polar opposites.*

POSTULATE 9. *All emotions vary in their degree of similarity to one another.*

POSTULATE 10. *Each emotion can exist in varying degrees of intensity or levels of arousal.*

The derivatives and implications of these postulates are far-reaching and have been discussed in detail in other publications (Plutchik, 1962, 1970, 1979, 1980; Plutchik, Kellerman, & Conte, 1979). In this chapter, a selection of important ideas will be presented. The theory will be evaluated in terms of its generality, its diversity of application, and its usefulness in integrating old observations and in suggesting new ones. Although one may take issue with any one postulate of the theory, it is important to evaluate the theory as a total conception in terms of its ability to relate psychological, clinical, and biological observations within a common framework.

EMOTIONS AND COGNITIONS

The functional approach to emotions of the present psychoevolutionary theory of emotion (Plutchik, 1980) implies that the recognition by an organism of the beneficial or harmful aspects of its environment means that it must evaluate its environment in some way. This evaluation process represents the cognitive aspect of emotions, and it influences the type of response pattern that is actually observed. So-called "cognitive" approaches to emotion are mainly concerned with the identification of variables that influence the evaluation process in humans, but it should be emphasized that an evaluation is not an emotion. Evaluations are a part of the total process that involves an organism interacting with its environment in biologically adaptive ways.

Cognitions have sometimes been described in a somewhat narrow sense as referring to the interpretations humans and animals make of the events that occur around them. In the present context, cognition will be considered as more or less synonymous with thinking and will include such functions as perceiving, conceptualizing, and remembering. The basic question to be considered concerns the relation between such cognitive or intellectual functions and emotions. This question will be considered from a point of view that

recognizes (*a*) that cognitive activities and their material basis, the brain, have a long evolutionary history; (*b*) that cognitive capacities have evolved along with the evolution of the brain; and (*c*) that cognitions are intimately related to emotions.

Before considering these questions, it will be helpful to make explicit the particular postulates concerning cognitions used in the development of the theory (Plutchik, 1977).

Postulates about Cognition–Emotion Relations

POSTULATE 1. *The existence of any emotion presupposes the prior occurrence of a cognition or evaluation. However, although all emotions presuppose evaluations, not all evaluations produce emotions.*

POSTULATE 2. *Cognitions may be based on information obtained from external or internal stimuli.*

POSTULATE 3. *Cognitions are concerned with whether a stimulus is beneficial or harmful, although there are different types of benefits, just as there are different types of harms.*

POSTULATE 4. *Most events are evaluated as both good and bad, beneficial as well as harmful. This is the basis for the wide existence of conflict.*

POSTULATE 5. *In most lower animals, certain cognitions occur without prior learning or experience (e.g., imprinting or courtship rituals).*

POSTULATE 6. *In higher animals, most cognitions depend on learning and can be modified by experience.*

POSTULATE 7. *Cognitions are not always conscious or reportable; they are hypothetical constructs or "maps" whose properties can be inferred on the basis of various kinds of evidence.*

POSTULATE 8. *Cognitions can be in error. It is possible for an individual to evaluate a certain stimulus as beneficial when it is really harmful or, conversely, to evaluate a stimulus as dangerous when it is not (as in most phobias).*

POSTULATE 9. *On the average, most cognitions must be reasonably accurate if an individual is to survive.*

POSTULATE 10. *There are a limited number of cognitions necessary for survival in the face of major life problems.*

Some of the ideas represented by these postulates can be illustrated by means of a diagram showing the sequence of events that occurs in relation to the development of an emotion.

Table 1.1 is meant to show that the occurrence of certain stimulus events,

TABLE 1.1

THE SEQUENCE OF EVENTS RELATED TO THE DEVELOPMENT OF AN EMOTION

STIMULUS EVENT	→	COGNITION	→	FEELING	→	BEHAVIOR	→	EFFECT
Threat by enemy	→	Danger	→	Fear	→	Run	→	Protection
Loss of parent	→	Isolation	→	Sadness	→	Cry for help	→	Assistance

such as a threat by an enemy or the loss of a parent, is followed by a cognition (interpretation) such as "danger" or "isolation." Such cognitions may (or may not) be reflexive and unconscious and will be followed by the introspective feelings such as fear or sadness that we usually think of as emotions. The feeling state is only one step in a chain of reactions and will be followed, with a certain probability, by some kind of appropriate behavior. Such behaviors, if successful, lead to protection of the individual or assistance provided by parent substitutes or other members of the individual's social group. The word emotion refers to this complex chain of reactions, which has adaptive value for the individual in dealing with various kinds of life crises or survival problems.

In describing the complex chain of reactions called an emotion, there are a number of vicissitudes that may befall the emotional sequence. For one thing, the initial cognition may be in error so that the threat is misperceived or misinterpreted. Ego defenses such as denial or projection could certainly play a role here (Postulate 8). If the cognition is accurate, it is still possible for the feeling aspect of the emotional chain to be blocked, modified, or distorted. Ego defenses such as displacement or repression could also operate at this point to transform the feeling state in some way. However, even if the feeling is clearly present, appropriate action may or may not occur. This is simply because environmental or internal restraints may prevent the action. If someone is physically tied up, running away in the face of danger is impossible. Similarly, if one has strong feelings about the importance of bravery, one may not run even if one's life is at stake. Finally, depending on whether appropriate and effective behavior occurred, the goal or purpose of the chain of emotional reactions may or may not be served. It is a lack of attention to these vicissitudes that has largely led to the confusions over whether emotions have purposes and, if so, what they are.

COGNITIONS ARE IN THE SERVICE OF EMOTIONS

Although there have been a number of recent "cognitive" approaches to emotion (Lazarus, 1968; Mandler, 1975; Schachter & Singer, 1962), none has considered cognitions within a broad evolutionary framework. The basic point of view to be presented here is that cognitive capacities have evolved along with the evolution of the brain, and that cognitions have largely evolved in the service of emotions. I have discussed these ideas more fully in a previous publication (Plutchik, 1977) so that only a brief summary will be given here.

The fossil record indicates that the major enlargement of the brain of human-like primate forms took place over a period of less than 1 million years. The stage of *Homo sapiens* is evident in the fossil record beginning

about 250,000 years ago; the records indicate a brain volume of approximately 1200 ml. In contrast, the brain of the gorilla is about 500 ml. The brain volume of present-day human adults is about 1400 ml.

Many explanations have been proposed for the large increase in the brain size of humans over a relatively short period of time since only unusual selection pressures could have produced such a rapid change. The following are a few of the explanations that have been proposed.

1. Social grouping evolved as a means of cooperative defense; the stability of relations in social groups required the development of a language for communication, which in turn required a large brain size.
2. The relative scarcity of food on the plains led early man to become a carnivore and hence a predator with a large hunting range. Efficient hunting required a complex signaling system and a relatively large brain (Jerison, 1973).
3. The cold weather associated with glaciation led to the need for artificial climate, as expressed in the use of fire and clothing. Crowding increased the need for social communication with a probable influence on brain size (Campbell, 1966).
4. The appearance of outbreeding (exogamy) in early humans resulted in a large increase in genetic variability, which in turn increased the chances of successful adaptation to changing ecological conditions. Increase in brain size was one such adaptation.

In a broad sense, we may say that the main function of a large brain and a highly developed cognitive system is to ensure survival. We may, however, describe the cognitive process in a more precise way. From the point of view of evolution, *cognition developed in order to predict the future.*

Cognitive activities are a form of map making. Cognition provides a model of the environment and codes information in a time-binding neural code. The development of abstract concepts denoting classes of events meant escape from the present. This increased ability to classify the environment made it possible for humans to develop foresight of future needs. The more precisely the environment could be assessed or mapped, the greater the capacity to make predictions about the likely course of external events and thus to initiate novel patterns of adaptive behavior.

In the most basic sense, any organism must predict on the basis of limited information whether there is food, a mate, or danger in its environment. Depending on the prediction made, the organism makes a decision to run, to attack, to play, or to mate. From this point of view the complex processes of sensory input, evaluation, symbolization, comparison with memory stores, and the like—those processes we call cognitive—are in the service of emotions and biological needs. This idea is not new. Dember (1974) has pointed out that the brain and the body have evolved as an adaptive mechanism and that cognitive processes are instruments, or means to an end—in effect, that the

brain is the servant of the stomach and the sex organs. In an article comparing humans with computing machines, Neisser (1963) also discussed the idea of cognitions as being in the service of needs and emotions. He pointed out that human thinking is intimately associated with emotions. In the course of early individual development, information from the environment is evaluated in terms of its need-satisfying and need-frustrating properties. Neisser stated: "One of the most common . . . modes of learning, that of reward and punishment, operates through an open involvement of strong and historically complicated emotions (p. 197)."

There is another important point that should be made in connection with the question of the function of cognition. This concerns the uses to which the cognitive mechanism may be put once it has developed. The original purpose of the evolution of cognition is to enable the organism to map its environment and to predict the future in regard to significant emotional or motivational events. However, once such a complex mechanism has evolved, it can be used for other things. Once developed, the cognitive mechanism can deal with nonemotional events and symbols as well as emotional ones. It can also deal with the symbols of past events as well as future ones, and the symbols, once in the store of memory, can be used for fantasy productions, art, literature, and play.

It is possible to go beyond a general statement of the relation between cognition and emotion and to speculate about various part-functions in the total cognitive process. In contrast to the subjective aspects of emotion, which are usually (but not always) conscious, the processes of thinking are essentially unconscious. Therefore, the structure of cognitive processes can only be inferred from the products of thinking in relation to the inputs to thinking. Another source of insight about cognitive processes is the aberrations that occur when the mechanisms are disrupted by either brain injury, disease, toxicity, or other events.

The following schema represents an attempt to describe the hypothetical part-processes that are involved in all cognitive events. This schema is based on the ideas that have been discussed about cognition as an evolving set of functions based on brain mechanisms, which are designed to make maps, predict the future, and organize appropriate actions. In general, in order for an organism to adapt successfully to a potentially dangerous environment, it must be able to store information about this environment in memory; it must be able to retrieve stored information when necessary; and it must be able to use the retrieved signals as a basis for actions. The details are summarized in Figure 1.1.

The final common pathway of this complex, inferred cognitive process is action, but it is action that is adaptively related to the evaluation of the stimulus event. If the prediction process leads to the implicit conclusion that a predator is attacking, then the appropriate feeling is fear, the appropriate behavior is flight, and the purpose is protection of the individual. If the prediction process leads to the conclusion that another member of one's own
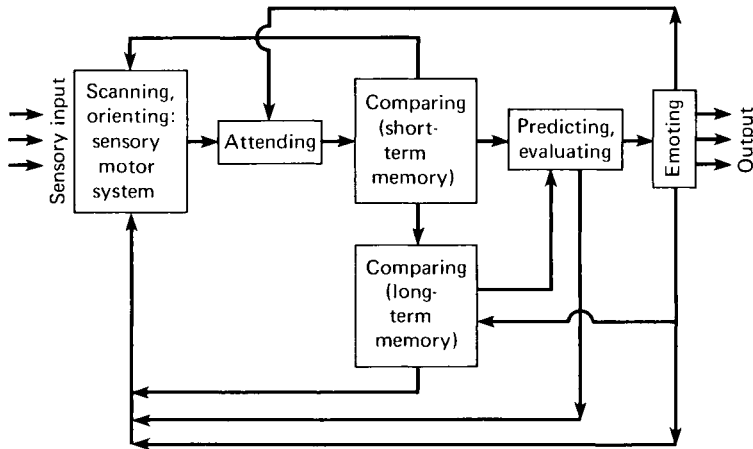
FIGURE 1.1 Schematic flow diagram of cognitive-emotional functioning. From Plutchik, R. Cognitions in the service of emotions: An evolutionary perspective. In D. K. Candland, J. P. Fell, E. Keen, A. I. Leshner, R. Plutchik, & R. M. Tarpy. *Emotion*. Monterey, Calif.: Brooks/Cole, 1977. Reprinted by permission.

species is threatening, then the appropriate feeling is anger, the appropriate behavior is attack, and the purpose is injury or destruction of the threatener. These complex responses, having multiple components of feeling, behavior, and purpose, are emotions. They are the end results of a complex cognitive process. The appropriateness of the emotional response determines whether the individual lives or dies. The whole cognitive process evolved over millions of years in order to make the evaluations of stimulus events more correct and the predictions more precise so that the emotional behavior that finally resulted would be adaptively related to the stimulus events. It is in this sense that cognitions are in the service of emotions.

THE MULTIPLE LANGUAGES OF EMOTION

Since an emotion is a complex sequence of reactions, one may describe different aspects of the sequence in different terms, or in different languages. Thus, there is a language for describing the stimulus events that produce emotions, a separate language for describing the inferred cognitions that interpret these events, still another language for describing the feeling states, and a language of behavioral reactions. The function of each emotion can be described in yet another way. Table 1.2 gives examples of languages used for each of the eight primary emotions.

The stimuli are all important life-related events that are connected with survival to some degree. The inferred cognitions are probable interpretations made of these events. The feeling states can be weak or strong, as can the associated behaviors. The column marked "Effect" refers to the functions of each emotion-complex.

TABLE 1.2
The Complex, Probabilistic Sequence of Events
Involved in the Development of an Emotion

Stimulus event	Inferred cognition	Feeling	Behavior	Effect
Threat	"Danger"	Fear, terror	Running, or flying away	Protection
Obstacle	"Enemy"	Anger, rage	Biting, hitting	Destruction
Potential mate	"Possess"	Joy, ecstasy	Courting, mating	Reproduction
Loss of valued person	"Isolation"	Sadness, grief	Crying for help	Reintegration
Group member	"Friend"	Acceptance, trust	Grooming, sharing	Affiliation
Gruesome object	"Poison"	Disgust, loathing	Vomiting, pushing away	Rejection
New territory	"What's out there?"	Anticipation	Examining, mapping	Exploration
Sudden novel object	"What is it?"	Surprise	Stopping, alerting	Orientation

Another point about Table 1.2 that should be emphasized is the fact that the primary emotion dimensions can be conceptualized in terms of pairs of opposites. Anger and fear are opposites in the sense that one implies attack and the other flight. Joy and sadness are opposites in the sense that one implies possession or gain while the other implies loss. Acceptance and disgust are opposites in the sense that one implies a taking in, and the other implies an ejection, or riddance. Surprise and anticipation are opposites in the sense that one implies the unpredictable and the other implies the predictable.

In addition to the polarities inherent in the structure of emotion, there is another implicit dimension, and that is the relative similarity of the emotions. Thus, anger and disgust are more similar than are anger and surprise.

The combination of these two elements, that is, polarity and similarity, leads to a circle as an analog structure or model since a circle combines the concepts of degree of similarity (nearness) and degree of opposition. I have proposed such a circular model (Plutchik, 1958, 1962) and have also suggested a particular ordering of the primary emotions around the circle.

H. R. Conte and I (Plutchik & Conte, 1978) have largely confirmed the proposed sequence; our method and results will be briefly described. A list of 150 emotion terms was selected as an initial pool of items from various sources (Davitz, 1969; Plutchik, 1962; Roget's international thesaurus, 1962; Russell & Mehrabian, 1977). Two independent methods were used to establish the similarity structure of the emotion terms.

The first method was a modified paired-comparison technique. Instead of comparing each term with every other term, which would have required thousands of comparisons, three emotion terms were selected as reference

words. All other emotions were compared with these three reference words for degree of similarity on a 7-point scale ranging from "identical" to "completely opposite."

The mean ratings from a group of judges were converted into angular placements on the basis of the convention that an emotion judged to be completely opposite a reference word was placed 180 degrees from it on a circle. An emotion judged to be unrelated to a reference word (i.e., neither similar nor dissimilar) was placed 90 degrees from it on the circle. All other ratings were located at intermediate positions. Since three reference words were used, the actual angular locations were based on the position that was associated with the smallest variability of placement. The results of this method, for a sample of 40 terms, reveal that the emotion terms tend to be distributed around the entire circle. This method for locating the angular placements would not necessarily guarantee such a result, and this finding is not, therefore, an artifact of the method.

Additional support for the reality of this circular structure of similarity relations is the fact that many of the terms that are linguistically opposite (in terms of a simple dictionary definition) fall at opposite parts of the circle. For example, the terms "interested" and "disinterested" are almost 180 degrees apart. This is also true for "affectionate" and "unaffectionate" and for "obedient" and "disobedient."

In addition, emotions that are relatively similar in meaning tend to cluster at neighboring points of the circle. For example, the terms lonely, apathetic, meek, guilty, sad, sorrowful, empty, remorseful, hopeless, and depressed are located in consecutive positions covering a range of 37 degrees on the circle. Finally, it should be noted that the sequence of clusters of emotion terms around the circle is almost identical to the sequence I postulated in 1962 (Plutchik, 1962).

In order to check on the validity of the placements of the emotion terms on the circle, an independent method, based on the semantic differential, was used. A set of 20 semantic differential terms was selected to sample Osgood's three semantic dimensions of evaluation, potency, and activity. A group of judges was asked to rate each of the 40 emotions on each of the 20 semantic differential scales.

The mean ratings on the scales produced a profile of connotative meanings for each of the 40 emotions. Product–moment correlations were then obtained between each pair of profiles to produce a 40×40 matrix of correlations. This matrix was then factor-analyzed by means of a principal components analysis and rotated by Varimax rotation. It was found that the first two factors accounted for 88% of the variance. The factor loadings on the first two orthogonal factors were then used to plot the locations of each of the 40 emotions on a two-dimensional space. The ordering of the emotions is shown in Figure 1.2.

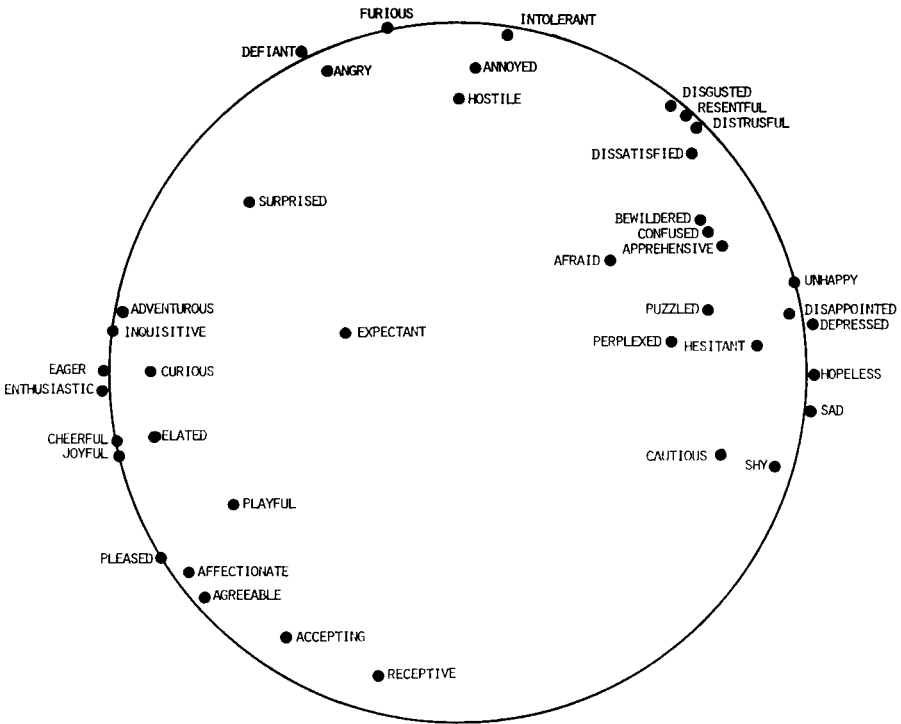It was found that almost all the emotions fell well out on the periphery of a

FIGURE 1.2. Factor analysis of semantic differential profiles for 40 emotion words.

circle. Angular locations for each term were then determined directly from the figure. The angles for the emotions placed by the first direct similarity estimation method were then correlated with the angles for the same emotions placed by means of the semantic differential profile similarity method. The product–moment correlation was found to be .90. This congruence of two independent methods strongly supports the circular similarity structure of emotions.

EMOTIONS AND PERSONALITY

One of the important implications of the theory is the concept of derivatives of emotions. In my 1962 book, I showed that the language of emotions also includes the language of personality traits, if personality is defined as interpersonal relations (and not as abilities, IQ, physical characteristics, or social status). Words like friendly, hostile, gloomy, and impulsive can be used to describe either a brief, emotional state or a long-term personality trait. When judges were asked to imagine what the result would be of the mixing or blending of primary emotions, the names given to the blends can be considered as

either emotional states or personality traits. Many writers have stressed the distinction between state measures of anxiety and trait measures. In other words, anxiety can be thought of as describing a temporary mood or an enduring trait. However, the results obtained when considering mixed emotions imply that the state–trait distinction applies not only to anxiety, but to every other emotion as well. Therefore, we can study anger as either a state or a trait, sadness as a state or a trait, etc.

Table 1.3 provides an illustration of the terms used by raters to describe the results of mixing primary emotions. It is important to notice that, although the terms in the first column are usually considered to be personality traits, they can also be descriptions of emotional states if they occur transiently. In other words, even a brave person can be occasionally cautious, just as an optimistic person can have a rare feeling of pessimism.

It is also possible to demonstrate that the circular model proposed for emotions can be used to describe the relations among personality traits. A circular model for personality traits has been proposed by Freedman, Leary, Ossorio, and Coffey (1951), by Stern (1958), by Schaefer (1959), by Becker and Krug (1964), by Lorr and McNair (1965), by Rinn (1965), by Schaefer and Plutchik (1966), and by Bayley (1968), among others. Most of these authors refer to Guttman's concept of a circumplex (1954).

The most extensive documentation of a circular model for personality was presented by Conte (1975). In her investigation, she began by identifying a universe of personality trait terms. This was based on the work of Allport and Odbert (1936), Anderson (1968), Norman (1967), and others. Many words from these various lists were excluded from the final population of terms on the grounds of ambiguity, slanginess, metaphor, etc., or on the grounds that the term did not appear on a majority of the lists. Such terms as kooky, neat, hairy, aghast, larksome, bad, and musical were excluded. The final pool of items contained 223 terms.

Judges were then asked to make direct similarity ratings of each of these

TABLE 1.3
EMOTION COMPONENTS OF A SAMPLE
OF PERSONALITY TRAITS

Personality trait	Emotion components	
	First	Second
Affectionate	Accepting	Joyful
Aggressive	Angry	Expectant
Anxious	Expectant	Afraid
Cautious	Timid	Expectant
Cruel	Rageful	Disgusted
Envious	Angry	Sad
Pessimistic	Sad	Expectant
Resentful	Angry	Dissatisfied

traits against three reference terms, which is, in essence, a modified method of paired comparisons. High positive ratings indicate great similarity of terms, whereas high negative ratings indicate near bipolarity. The average similarity ratings based on all judges were then transformed into an angular placement on a circle, by a method described fully by Conte (1975).

However, since the possibility of bias exists in relation to any given method, Conte replicated the angular placements of a sample of 40 of the terms using an entirely different and independent method: the semantic differential. Each of the 40 trait words was rated for connotative meaning on each of 30 semantic differential scales, such as active, inhibited, powerful, masculine, warm, ugly, and low. The average ratings of a group of judges produced a semantic profile for each trait. These profiles were then correlated in a 40 × 40 matrix. The correlations produce measures of similarity of shape of the different trait profiles in accordance with the descriptions given by Stone and Coles (1970).

The matrix of correlations was then factor-analyzed by the principal components method, and the first two factors were found to account for 91% of the variance; this clearly implied that a two-dimensional surface would be adequate to represent the relations among the traits. The empirical locations of each of the 40 traits were then plotted on the basis of their factor loadings on the first two factors in order to identify a circumplex. This is the method used by Becker and Krug (1964), and by Lorr and McNair (1965), among others, to locate the positions of the elements of a circumplex. Almost all placements were found to fall on the circumference of a circle. These locations were then transformed into angular placements.

In order to check the validity of the placements of the traits on a circle, the angular locations of the 40 traits based on direct similarity estimates were correlated against the angular locations of the same 40 traits using the method of semantic differential profile similarity. The correlation of the placements using the two independent methods was .99, thus strongly supporting the construct validity of the circumplex ordering for personality traits. This circular order is shown in Figure 1.3.

Since the theory of emotion presented in this chapter interprets personality traits as derivatives of emotions, it should be expected that the sequence of traits and emotions around the circle should have some relation to one another. An examination of Figure 1.3 bears this out.

The first cluster of traits (lower right quadrant) relates to the *reproduction* and *incorporation* dimensions of the model. This is followed (going clockwise) by a cluster of terms (e.g., docile, timid) reflecting the *protection* dimension. Following sequentially is the *reintegration* dimension, and it is appropriately described by terms such as depressed and pessimistic. The next dimension, which is *rejection,* is represented by such terms as suspicious, resentful, and critical. This is followed by the *destruction* dimension, and it is expressed by such terms as hot-tempered, quarrelsome, and aggressive. The *exploration* dimension, which follows next, is represented by terms such as adventurous and curious. The *orientation* dimension was not sampled in this
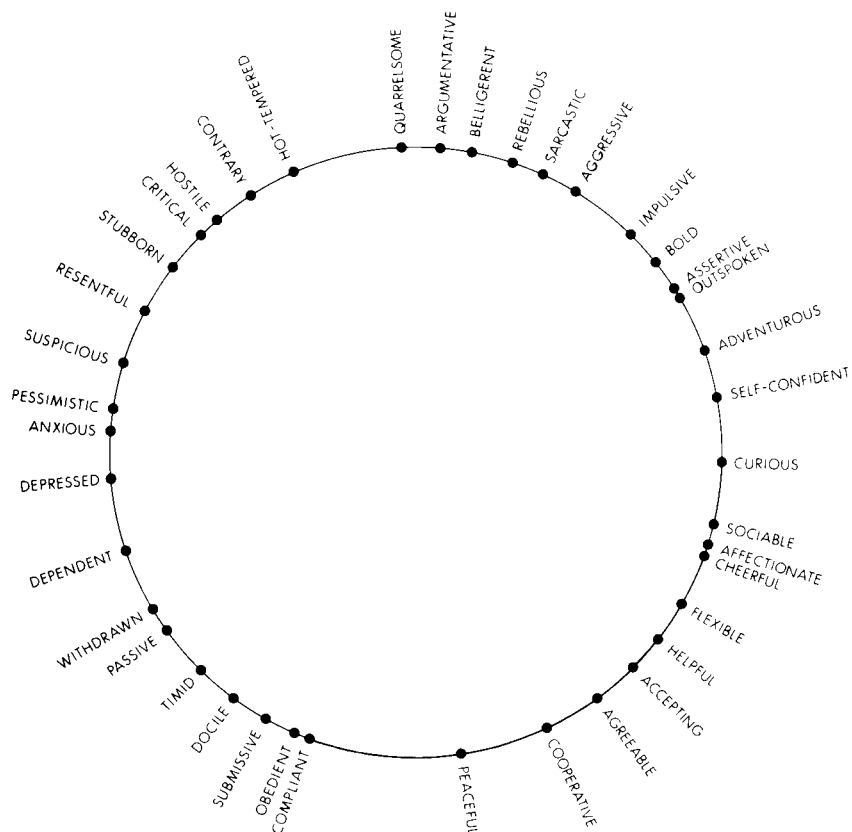
Figure 1.3. Similarity and polarity structure of a sample of 40 personality traits. From Conte, H. R., *A circumplex model for personality traits,* Ph.D. Dissertation, New York University, 1975. Reprinted by permission.

study, but it would be expected that such terms as impulsive and confused would reflect this dimension. There is thus an almost perfect correspondence between the primary emotion dimensions and the clusters of corresponding trait terms. This further supports the concept that personality traits are derivatives of basic emotions.

DIAGNOSTIC CONCEPTS
AS DERIVATIVES OF EMOTIONS

Many of the labels used to describe personality are also labels that are often used to diagnose psychopathology. For example, the traits of distrust and excessive tendencies to be critical are often associated with paranoia. Traits of detachment, inhibition, and passivity are often associated with schizoid per-

sonality, etc. It thus seems reasonable to hypothesize a diagnostic circumplex that has certain parallels to the personality circumplex.

Several studies have supported this hypothesis. In one, Schaefer and Plutchik (1966) asked experienced clinicians to make a series of judgments of the extent to which a person who was described by a given diagnostic label (such as paranoid or compulsive) would show each of a number of traits and emotions.

The ratings for all traits were then intercorrelated; this was also done separately for all emotions. These two matrices were then factor-analyzed. Since most of the variance was accounted for by the first two factors, it was evident that a two-dimensional surface would provide a good approximation to the data. The factor loadings of the trait and emotion variables on the first two factors were then plotted. This produced a circular configuration of both traits and emotions similar to the ones shown in Figures 1.2 and 1.3.

However, instead of correlating ratings between pairs of traits, or pairs of emotions, it was possible to correlate ratings between pairs of diagnostic labels. The resulting matrix of correlations was factor-analyzed using the principal components method, and the different diagnostic labels were plotted on the basis of their factor loadings. Here also, two factors accounted for most of the variance. Details of the method are given in Plutchik (1967).

Figure 1.4 shows the approximate circumplex produced by this method of analysis. On an empirical basis, the manic state is opposite the inhibited state, extraverted is opposite intraverted, psychopathic is opposite dependent, and well-adjusted is opposite a grouping consisting of obsessive, compulsive, schizoid, and neurotic labels.

Another method for studying the question of whether diagnostic concepts form a circumplex order was reported by Plutchik and Platman (1977). In this study, 20 psychiatrists were given a list of nonpsychotic personality disorders taken from DSM–II and asked to select personality trait terms that were identified in their minds with each diagnostic label. The personality disorders were compulsive, cyclothymic, hysterical, paranoid, passive–aggressive, schizoid, and sociopathic. To these was added one more term not included in the DSM–II list: well-adjusted.

The psychiatrists were asked to imagine someone who was diagnosed, for example, as paranoid. They were then to select one trait from each pair of trait words on a personality test called the Emotions Profile Index (Kellerman & Plutchik, 1968; Plutchik & Kellerman, 1974). This test consists of 12 personality trait terms selected on the basis of the factor analytic work of Schaefer (1961) and Schaefer and Plutchik (1966). The traits are paired in all possible combinations, yielding 66 pairs. The psychiatrists chose one word from each pair that most closely described the imagined patient. The choices were scored in terms of the eight basic affect dimensions that are considered to be the theoretical components of all traits. This produced a mean judgment for each diagnosis and for each basic affect. In essence, it provided an emotion profile for each diagnosis.
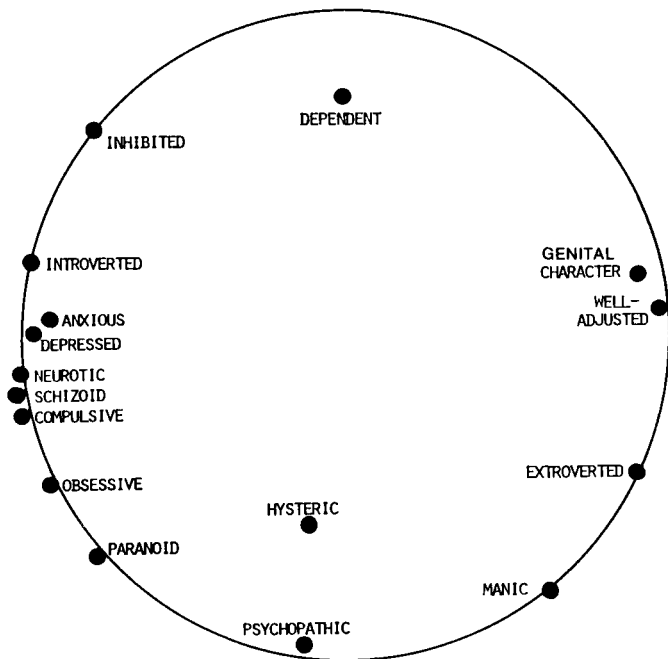
FIGURE 1.4. A diagnostic circumplex based on relative similarity of emotions implied by each diagnosis. From Plutchik, R. The affective differential: Emotion profiles implied by diagnostic concepts. *Psychological Reports,* 1967, *20,* 19–25. Reprinted by permission.
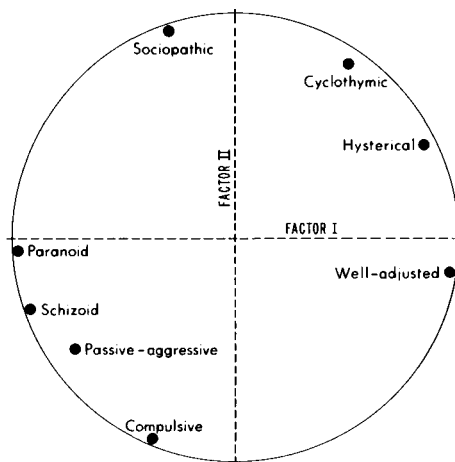

FIGURE 1.5. Factor analysis based on psychiatrists' definition of diagnostic terms. From Plutchik, R., & Platman, S. R. Personality connotations of psychiatric diagnoses: Implications for a similarity model. *The Journal of Nervous and Mental Disease,* 1977, *165,* 418–422. Reprinted by permission.

These profiles were then intercorrelated for all possible pairs of diagnoses. The matrix of intercorrelations was then factor-analyzed using the principal components method, and it was found that the first two factors accounted for 91% of the variance. The factor loadings for each diagnosis were plotted using the first two axes, which produced the circumplex shown in Figure 1.5.

Figure 1.5 shows that the paranoid, the schizoid, and the passive–aggressive diagnoses are relatively similar and that they are descriptively opposite the well-adjusted diagnosis. The sociopath is midway between the well-adjusted profile and the schizoid, neurotic profile. With some exceptions, the results are fairly similar to those shown in Figure 1.4. It thus appears that a circular model is appropriate for at least a subset of diagnostic labels. This is true simply because these diagnoses represent extremes or exaggerations of certain personality traits, which in turn represent mixtures of basic emotions. It is in this sense that diagnoses are derivatives of emotions.

EGO DEFENSES AS REGULATORS OF EMOTIONS

From a psychoanalytic point of view, ego defenses are mental processes that attempt to resolve conflicts among drives, emotions, and external reality. Despite the original application of the concept to the description of certain aspects of human adult behavior, the concept of ego defenses has gradually achieved a wider generality. Psychoanalysts have written about defenses in relation to both children and infants (Chess, 1964, 1966), and ethologists have demonstrated the operation of certain defense mechanisms, e.g., displacement and regression, in lower animals (Goodall, 1967; Lorenz, 1966). These observations imply the need to place the concept of defense mechanisms in a broad evolutionary framework. This task has been attempted, in a series of studies, by Plutchik et al. (1979); therefore, only a brief summary of this research will be presented here.

A review of the literature revealed that there was little agreement among clinicians on just how many defenses there are or even on how they should be defined. However, some conclusions did emerge from this review. First, it became evident that different defenses overlap and vary in their degree of similarity to one another. Second, some defenses were described as polar opposites. Third, some defenses were considered to be more primitive than others.

These descriptions of ego defenses are quite like the descriptions used to characterize emotions. I have shown that emotions vary in their degree of similarity to one another, that they show polarities, and that they vary in degree of intensity (Plutchik, 1962, 1970). These characteristics imply that ego defenses, like emotions, can be topographically represented by a circular model.

In addition to these formal properties of ego defenses, there are important things to say about the nature and function of ego defenses. Clinicians have long recognized the connection between ego defenses and emotions or per-

sonality traits. For example, displacement is a defense used to handle anger that cannot be directly expressed. Projection is a defense used to place blame on a person or group in one's environment so as to avoid finding fault with oneself. Denial is used to avoid confronting certain unpleasant facts. These examples imply that defenses are used to deal with emotions.

In the chapter by Plutchik *et al* (1979), a formal model was developed around these observations, and a self-report paper-and-pencil test for measuring ego defenses was described. Empirical data from nine studies were given to show that the hypothesis of a circular structure for ego defenses is a reasonably appropriate analog model. The test is shown to be related to anxiety and self-esteem in predictable ways and is also shown to discriminate between schizophrenic patients and a control group on seven out of eight ego defenses.

Basically, all ego defenses are coping strategies designed to deal with conflicts over particular emotions. If the expression of anger is dangerous, that is, produces threats or invites retaliation, then displacement expresses the anger toward a weaker scapegoat and avoids the danger. When feelings of sadness result from the experience of loss, this is sometimes handled by compensating or sublimating. For example, the bereavement may be handled by increasing one's work for charities. When attempts to "map" or understand the environment begin to fail, or are unsuccessful, then the resulting panic may be handled by arbitrary categorizations—in other words, by intellectualization. The same kind of analysis may be given to show that each basic emotion has an ego defense available to deal with it under conditions of major conflict.

Table 1.4 lists the eight basic emotions and the different languages one can use to describe them and their derivatives. There is a subjective language, a behavioral language, a functional language, and a trait language. In addition, there are diagnostic and ego-defense languages. It is likely that other derivative languages will in time be recognized. One possibility that is currently being considered is a coping style language.

A word should be said about this last point. Ego defenses, by their very nature, imply an unconscious or unaware aspect. We do not choose to repress our fear or displace our anger. The process simply occurs in some individuals under certain conditions. However, many adults are usually aware of their own style of dealing with problems, a style that may, in many cases, be a thoughtful, deliberate result of various life experiences. Thus, some people are perennial optimists and deliberately minimize the apparent seriousness of problems. *Minimization* is thus the conscious derivative of the unconscious process of denial. Similarly, some people handle conflicts by finding fault with other people. This process of fault-finding may represent the conscious derivative of the unconscious defense of projection.

It thus appears that the simple idea of eight basic emotions, when combined with the concept of mixtures and derivatives, leads to a complex world of ideas and reveals systematic connections among diverse concepts. Along the way, many research studies were stimulated by these ideas. The model provides a simple and elegant structure that has many implications, only some of

26

TABLE 1.4
EMOTIONS AND THEIR DERIVATIVES

Subjective language	Behavioral language	Functional language	Trait language	Diagnostic language	Ego-defense language
Fear	Escape	Protection	Timid	Passive type	Repression
Anger	Attack	Destruction	Aggressive	Aggressive type	Displacement
Joy	Mate	Reproduction	Sociable	Manic state	Reaction formation
Sadness	Cry	Reintegration	Gloomy	Depression	Sublimation
Acceptance	Groom	Incorporation	Agreeable	Hysteric	Denial
Disgust	Vomit	Rejection	Contemptuous	Paranoid state	Projection
Expectation	Map	Exploration	Curious	Obsessive–compulsive	Intellectualization
Surprise	Stop	Orientation	Impulsive	Psychopathic	Regression

which have been explored so far. Chapter 14 examines some important clinical implications of the model.

UNIVERSAL PROBLEMS OF ADAPTATION

This concluding section will consider some broad, but speculative, issues. They concern the possible relations between emotions and certain universal problems of adaptation, which all organisms must deal with or come to terms with. These problems may be labeled as follows: (*a*) the problem of hierarchy; (*b*) the problem of territoriality; (*c*) the problem of identity; and (*d*) the problem of temporality (Plutchik, 1979).

HIERARCHY

The concept of hierarchy refers to the vertical dimension of social life. This is seen almost universally as dominance hierarchies both in lower animals and in humans. In general, the major expressions of high hierarchical positions are first access to food, to shelter, to comforts, and to sex.

The vertical organization of social life is reflected in the age relations among people, in the relations between the sexes, and in the social and economic classes of society and is preeminent in military life. Generally speaking, hierarchical organizations reflect the fact that some people know more than other people, that some people are stronger or more skillful than other people, and that all people vary in affective dispositions. All organisms must face these realities and come to terms with them.

Of great importance is the fact that dominance hierarchies are connected primarily with certain types of basic emotions, namely, anger and fear. They are also connected to the personality derivatives of these emotions, that is, dominance and submission. Organisms high in the hierarchy are typically bossy and irritable, while those at lower levels tend to have anxiety. This has been demonstrated in baboons (Buirski, Kellerman, Plutchik, Weininger, & Buirski, 1973) and in humans (Kellerman, Buirski, & Plutchik, 1974). Depression appears to be related, in part, to perceived downward mobility within a particular hierarchy (Plutchik & Landau, 1973; Price, 1967). Thus, the concept of hierarchy may be reflected in many subtle and indirect ways.

TERRITORIALITY

The second universal adaptation problem for organisms concerns territoriality. In every animal species, each organism must learn what aspects of the environment ''belong'' to it.

From an evolutionary point of view, territories define an area or space of potential nourishment necessary for survival, or an area that is "safe" from attack or predation. Territories may be explicit or implicit. In the former case, territories may be expressed through scent markings, tree scratches, or boundary lines. In the latter case, they may be defined as the distance one organism allows another to approach before aggression is initiated.

How do boundaries develop? They probably develop through exploration of the environment. When an individual gets to know an environment, he may begin to have some control over it. But the control is possible only within certain limits or boundaries. When boundaries are penetrated by other organisms, this represents a potential threat to survival. It represents a potential loss of control. I propose the hypothesis that the basic emotions related to territoriality are exploration and its opposite, surprise. Or, to use a different but essentially equivalent terminology, the basic affective states centered around the issue of territoriality are control and dyscontrol.

IDENTITY

The third major problem that all organisms encounter, and which is generated by the nature of the social environment, is the problem of identity. In simplest terms, this refers to the basic question of who we are; alternatively, it refers to what group we belong to. This is a fundamental problem for all organisms because isolated individuals in society do not usually survive and certainly they do not propagate. Group membership, therefore, is a fundamental basis for survival.

There are endless examples in nature of specific behavior patterns that have been developed by different groups to increase the chances of survival. These include such things as cooperative hunting, group defense, social signaling, and social communication. However, in order for an individual to benefit by group membership, he has to know what group he belongs to. In lower animals, this knowledge is built in through genetic coding mechanisms. It is obviously too risky for survival to allow a long period of learning to intervene before an animal can determine its own group. Therefore, some genetic coding mechanisms enable an organism to recognize other organisms of the same type. Such recognition is based on a wide variety of cues, which include, for example, size, shape, color, markings, sound patterns, and, particularly in lower animals, chemical or olfactory cues. It is also likely that animals learn not only who their group is but also the nature of other groups with which they have intimate relations either in the form of prey-predator relations or in the form of species occupying the same ecological niche.

What is true for lower animals is also true for human beings. In the evolution of cultures, one may trace the development of different kinds of groups,

each of which creates a different problem connected with the handling of the identity relationship. These groups vary from the band, to the tribe, to the chiefdom, to the state. As the complexity of these social organizations increases from band to state, there is, for individuals, a corresponding increase in the problem of knowing the group to which each person belongs.

Another point of major relevance concerns the relation of basic emotions to the identity problem. It is evident that the two basic emotions connected with identity are acceptance and rejection. They both deal with the fundamental issue of who we allow to become part of our group and who we keep out, who is within the circle and who is outside the circle. All animals and humans throughout the course of their lives must struggle with this fundamental question.

TEMPORALITY

The fourth universal problem encountered by all organisms is the problem of temporality. This word refers to the fact of the limited duration of an individual's life. All organisms have a limited life span, part of which is spent in infancy, childhood, and adolescence learning fundamental skills about social living and about getting around in the environment. From an evolutionary point of view, the purpose of the acquisition of skills is to enable the individual to survive as a reproducing adult member of a group.

In lower animals there is probably no individual awareness of age, per se, and death. However, the reality of death creates the inevitability of loss and separation for those who are living, and it creates the need for social solutions to the problems of loss. Individuals without support from other members of their social group do not survive for very long. During the course of evolution, several solutions have evolved for the problem of loss and separation. One solution is the evolution of distress signals on the part of the animal or individual who has experienced the loss. These distress signals are essentially cries for help or social support. This is genetically programmed for all social organisms. The second evolutionary solution to the problem of loss is the evolution of sympathetic or nurturing responses in other members of the social group.

In humans, the problem of the limited span of existence has effected the evolution of a series of social institutions that are designed to deal with this problem. These include mourning rituals; birth, death, and reunion myths; preparation for an afterlife; and possibly certain aspects of religion.

In order to deal with the problem of loss and separation, that is, the problem of temporality, certain emotions have evolved during the course of evolution. The emotion that deals with loss is sadness or distress. The function of this emotion when expressed directly or indirectly as a cry for help is to try to

produce reintegration of the individual with the lost person or with a substitute. If the cry functions to produce only a partial or limited reintegration, this may result in a persistent, long-term distress signal that we call depression. If the signal works well and completely, it produces an opposite emotion—joy. Joy is the experience of rejoining or of possession and is thus the opposite of sadness.

IMPLICATIONS

This schema defining four universal problems of adaptation—which I have called problems of hierarchy, territoriality, identity, and temporality—has important implications. First, it provides a general way of looking at life problems at all phylogenetic levels. This is a functional approach to classification that has potential relevance to all animal levels. Second, it provides a set of implicit dimensions that one can use to try to assess the environmental and/or social demands on a given species. For any animal or group of animals, one can ask: How are problems of hierarchy, territoriality, identity, and temporality expressed for that group? What kinds of adaptations has the group made for dealing with each of these problems?

Another important implication of this schema is that it provides another kind of rationale for the existence of certain emotions, since emotions are reflections of the adaptations that animals make to the universal problems. Since these problems are universal, the emotions that are derived from them may be thought of as universal, basic, or primary. Also of great importance is the fact that the primary emotions have a dual or bipolar aspect, with each one entailing an opposite one. Thus, for example, a hierarchy has two poles: the top and the bottom, the dominant and the submissive, the angry and the frightened. Similarly, an identity problem creates the issue of who is in and who is out of the group, who is to be accepted and who rejected.

Finally, the schema presented here of basic life problems suggests the possibility that emotions are functional adaptations for establishing a kind of social equilibrium. This would imply that emotions enter into every social transaction and help to establish a balance of opposing forces. These balances are always temporary and frequently change as we move through life from one conflict to another.

In conclusion, the psychoevolutionary theory outlined in this chapter is broad and comprehensive. It tries to relate certain functional concepts connected with evolution to the origins and nature of emotions. It provides a formal structural model that describes the similarity and polarity relations among emotions. At the same time, the theory is quite explicit in showing that certain areas such as personality and diagnosis are derivative concepts based on emotions. The theory has stimulated research and provided the inspiration for the

development of a whole family of new tests: for moods, for personality traits, for ego defenses, and for coping styles. The theory is explicit enough to be empirically tested in order to confirm or disconfirm various elements of the model. The theory is thus an organizer of data, a bridge across disciplines, and a stimulator of research.

REFERENCES

Allport, G. W., & Odbert, H. S. Trait names: A psychological study. *Psychological Monographs,* 1936, *47,* Whole No. 211.

Anderson, N. H. Likeableness ratings of 555 personality trait words. *Journal of Personality and Social Psychology,* 1968, *9,* 272–279.

Bayley, N. Behavioral correlates of mental growth: Birth to thirty-six years. *American Psychologist,* 1968, *23,* 1–17.

Becker, W. C., & Krug, R. S. A circumplex model for social behavior in children. *Child Development,* 1964, *35,* 371–396.

Brenner, C. Affects and psychic conflict. *The Psychoanalytic Quarterly,* 1975, *44,* 5–28.

Buirski, P., Kellerman, H., Plutchik, R., Weininger, R., & Buirski, N. A field study of emotions, dominance, and social behavior in a group of baboons *(Papio anubis). Primates,* 1973, *14,* 67–78.

Campbell, B. G. *Human evolution: An introduction to man's adaptations.* Chicago: Aldine, 1966.

Chess, S. *An introduction to child psychiatry.* New York: Grune & Stratton, 1964.

Chess, S. Psychiatry of the first three years of life. In S. Arieti (ed.), *American handbook of psychiatry.* New York: Basic Books, 1966.

Conte, H. R. *A circumplex model for personality traits.* Ph.D. Dissertation, New York University, 1975.

Davitz, J. R. *The language of emotion.* New York: McGraw-Hill, 1969.

Davitz, J. R. A dictionary and grammar of emotion. In M. Arnold (ed.), *Feelings and emotions: The Loyola Symposium.* New York: Academic Press, 1970.

Delgado, J. M. R. Free behavior and brain stimulation. In C. C. Pfeiffer & J. R. Smythies (eds.), *International review of neurobiology,* Vol. VI. New York: Academic Press, 1964.

Delgado, J. M. R. *Emotions.* Dubuque, Iowa: Wm. C. Brown, 1966.

Dember, W. N. Motivation and the cognitive revolution. *American Psychologist,* 1974, *29,* 161–168.

Freedman, M. B., Leary, T. F., Ossorio, A. G., & Coffey, H. S. The interpersonal dimension of personality. *Journal of Personality,* 1951, *20,* 143–161.

Goodall, J. Mother–offspring relationships in the free ranging chimpanzees. In D. Morris (ed.), *Primate ethology.* Chicago: Aldine, 1967.

Guttman, L. A new approach to factor analysis: The radex. In P. F. Lazarsfeld (ed.), *Mathematical thinking in the social sciences.* Glencoe, Ill.: The Free Press, 1954.

Hebb, D. O. *Textbook of psychology.* Philadelphia: Saunders, 1972.

Jerison, H. J. *Evolution of the brain and intelligence.* New York: Academic Press, 1973.

Kellerman, H., Buirski, P. and Plutchik, R. Group behavior in a baboon troop: implications for human group process. In L. Wolberg and M. Aronson (eds.), *Group Therapy 1974,* New York: Stratton, 1974.

Kellerman, H., & Plutchik, R. Emotion–trait interrelations and the measurement of personality. *Psychological Reports,* 1968, *23,* 1107–1114.

Lazarus, R. S. Emotions and adaptation: Conceptual and empirical relations. In W. I. Arnold (ed.), *Nebraska Symposium on motivation.* Lincoln: University of Nebraska Press, 1968.

Lorenz, K. *On aggression.* New York: Harcourt Brace, 1966.

Lorr, M. & McNair, D. M. Expansion of the interpersonal behavior circle. *Journal of Personality and Social Psychology,* 1965, *2,* 823–830.

Mandler, G. *Mind and emotion.* New York: Wiley, 1975.

Marsella, A. J. *Cross-cultural studies of depression: A review of the literature.* Paper presented at the Symposium on Cross-Cultural Aspects of Depression, International Association of Cross-Cultural Psychology, Tilburg, Netherlands, 1976.

Neisser, U. The imitation of man by machine. *Science,* 1963, *139,* 193–197.

Norman, W. T. *2800 personality trait descriptors: Normative operating characteristics for a university population.* Ann Arbor, Michigan: Office of Research Administration, 1967.

Plutchik, R. Outlines of a new theory of emotion. *Transactions of the New York Academy of Sciences,* 1958, *20,* 394–403.

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

Plutchik, R. The affective differential: Emotion profiles implied by diagnostic concepts. *Psychological Reports,* 1967, *20,* 19–25.

Plutchik, R. Emotions, evolution and adaptive processes. In M. Arnold (ed.), *Feelings and emotions: The Loyola Symposium.* New York: Academic Press, 1970.

Plutchik, R. Cognitions in the service of emotions: An evolutionary perspective. In D. K. Candland, J. P. Fell, E. Keen, A. I. Leshner, R. Plutchik, & R. M. Tarpy. *Emotion.* Monterey, Calif.: Brooks/Cole, 1977.

Plutchik, R. Universal problems of adaptation: Hierarchy, territoriality, identity, and temporality. In J. B. Calhoun (ed.), *Perspectives on adaptation, environment and population,* New York: Praeger, 1979.

Plutchik, R. *Emotion: A psychoevolutionary synthesis.* New York: Harper and Row, 1980.

Plutchik, R., & Conte, H. R. *An empirical study of the similarity structure of emotions.* Unpublished manuscript, 1978. (Available from R. Plutchik.)

Plutchik, R., & Kellerman, H. *Manual for the Emotions Profile Index.* Los Angeles: Western Psychological Services, 1974.

Plutchik, R., Kellerman, H., & Conte, H. R. A structural theory of ego defenses. In C. E. Izard (ed.), *Emotions, personality, and psychopathology.* New York: Plenum, 1979.

Plutchik, R., & Landau, H. Perceived dominance and emotional states in small groups. *Psychotherapy: Theory, Research and Practice,* 1973, *10,* 341–342.

Plutchik, R., & Platman, S. R. Personality connotations of psychiatric diagnoses: Implications for a similarity model. *The Journal of Nervous and Mental Disease,* 1977, *165,* 418–422.

Price, J. The dominance hierarchy and the evolution of mental illness. *The Lancet,* 1967, *2,* 243–246.

Rado, S. *Adaptational psychodynamics: Motivation and control.* New York: Science House, 1969.

Rinn, J. L. Structure of phenomenal domains. *Psychological Review,* 1965, *72,* 445–466.

Roget's international thesaurus, 3rd ed. New York: Thomas Y. Crowell, 1962.

Russell, J. A., & Mehrabian, A. Evidence for a three-factor theory of emotions. *Journal of Research in Personality,* 1977, *11,* 273–294.

Schachter, S., & Singer, J. E. Cognitive, social and physiological determinants of emotional state. *Psychological Bulletin,* 1962, *69,* 379–399.

Schaefer, E. S. A circumplex model for maternal behavior. *Journal of Abnormal and Social Psychology,* 1959, *59,* 226–235.

Schaefer, E. S. Conveying conceptual models for maternal behavior and for child behavior. In J. Glidewell (ed.), *Parental attitudes and child behavior.* Springfield, Ill.: C. C. Thomas, 1961.

Schaefer, E. S., & Plutchik, R. Interrelationships of emotions, traits, and diagnostic constructs. *Psychological Reports,* 1966, *18,* 399–410.

Scott, J. P. *Animal behavior.* Chicago: University of Chicago Press, 1958.

Speer, D. C. Nonverbal communication of affective information. *Comparative Group Studies,* 1972, 409–423.

Stern, G. G. *Activities index*. Syracuse: Syracuse University Psychological Research Center, 1958.
Stone, L. A., & Coles, G. J. Correlational similarity: The basis for a new revised method of similarity analysis. *Studia Psychologica,* 1970, *12,* 258–265.
Wilson, E. O. *Sociobiology: The new synthesis*. Cambridge: Harvard University Press, 1975.