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6

Psychological Models of Emotion

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This chapter provides an overview of theories currently discussed in the psychology of emotion and the controversies and research issues they generate. As should become obvious in this review, many of the fundamental differences among the models relate to the thorny issue of the definition of the phenomenon called *emotion* and its conceptualization and operationalization. Not surprisingly, the disagreement as to the nature of emotion extends to the problem of delimitation of the psychological states or processes to be studied under this label from other affective phenomena. We first review the elements of the definition of emotion that seem to show at least some degree of convergence between different theorists.

DEFINITION AND DELIMITATION OF EMOTION

Although one occasionally encounters the position that organisms are always emotional, only more or less so, a sizeable number of emotion psychologists stress the *episodic* nature of emotion (Ekman, 1992a; Frijda et al , 1991; Scherer, 1993). The fundamental assumption of this position is that a noticeable change in the functioning of the organism is brought about by some triggering event, which can be external (such as the behavior of others, a change in a current sit-

uation, or an encounter with novel stimuli) or internal (such as thoughts, memories, or sensations). The emotion episode is supposed to last for a certain duration and then, with decreasing intensity, to more or less fade away. Therefore, it is normally easier to identify the onset than the offset of the changed state. The abruptness of both onset and offset of the episodes are expected to systematically vary for different kinds of emotion.

One of the major definitional issues is the question of what changes in different modalities are necessary and sufficient elements or components of the emotional episode. Although there are theorists who would restrict the use of the term *emotion* to a single modality (e.g., Clore [1994] would restrict it to conscious feelings of changed states), most current theorists subscribe to a multicomponential definition. These components generally include what has been called the "reaction triad" of emotion, namely, physiological arousal, motor expression, and subjective feeling. Some theorists extend the scope of necessary components to include motivational factors such as action tendencies and the cognitive processes that are involved in evaluating the eliciting events and the regulation of ongoing emotional processes (Buck, 1985, 1993; Ellsworth, 1991; Frijda, 1986, 1987; Scherer, 1984a,b, 1993).

Another point of definitional convergence is the assumption that emotions are normally triggered by internal or external stimuli or events that are of major significance to an organism. Thus, emotions have been called *relevance detectors* (Frijda, 1986). Relevance detectors require, of course, an evaluation of stimuli and events with respect to their *meaning* for the organism. Many theorists agree that the nature of this evaluation determines both the functional response of the organism—whether it is directed toward adaptation to or mastery of the event or situation—and the nature of the organismic and mental changes that will occur during the emotional episode.

Although there is much discussion of emotions as processes, which implies rapid changes over time, most theories and research still implicitly refer to *emotional states*, suggesting relative stability over time. This is mainly because few theorists have thus far attempted to directly address the nature of the changes occurring in the reaction modalities or in the emotion components during an emotional episode. To underline the unitary character of the emotional episode, I suggest that *interdependent and synchronized changes* in component processes are required as a necessary condition for the definition of emotion (Scherer, 1987, 1993).

Combining these elements of a definition of emotion (for which one finds increasing consensus in the literature) yields a working definition for the purposes of this chapter: emotions are episodes of coordinated changes in several components (including at least neurophysiological activation, motor expression, and subjective feeling but possibly also action tendencies and cognitive processes) in

response to external or internal events of major significance to the organism. This working definition demarcates the coverage of emotion in this chapter from other affective phenomena that are not dealt with by the models reviewed here. Table 6.1 contrasts emotions thus defined with other affective phenomena on a number of essential design features (see also Frijda, 1993). It provides a brief definition with examples of five different types of affective states and traits. The different constructs are then compared on the basis of a matrix of design features that typically include intensity and duration, the degree of coordination or synchronization of different organismic systems during the state, the extent to which the change in state is triggered by or focused on an event or a situation, the extent to which the differentiated nature of the state is due to a process of antecedent evaluation or appraisal, the rapidity of change in the nature of the state, and the degree to which the state affects behavior.

Many of the controversies in emotion psychology can be traced to a failure to clearly distinguish between the different classes of phenomena. General affective valence or preference should not be treated in the same manner as emotional episodes, nor should more enduring affective states such as attitudes. For example, it is hardly helpful to use the study of simple preferences, such as liking for certain types of stimuli, to address theoretical issues with respect to the *emotion* construct as defined above.¹ The confusion between different types of affective phenomena, rampant in discussions of the psychology of emotion, has unfortunately spilled over into other areas such as neuropsychological approaches where the label *emotion* is often used for positive/negative valence of different types of stimulation. Clearly, one cannot hope to discover the underlying mechanisms unless one has first clearly delimited the phenomena one is trying to explain.

Another frequently encountered source of confusion relates to the tendency, based on popular usage of the terms, to treat *emotion* and *feeling* as synonyms. Although this is standard philosophical practice, it becomes extremely dangerous once one attempts to dissect the nature of the *components* of emotion. In such attempts it is helpful to define the subjective experiential component of the emotional reaction as "feeling" or "sentiment." As shown below, confusion between the phenomenon of emotion as a whole, consisting of several components, and one individual component, conscious subjective feeling, is responsible for much of the controversy surrounding the classic James-Lange theory.

This discussion of the definition and delimitation of emotion is concluded with a strong plea for researchers to avoid definitional confusion of this sort in future work. The linguistic labels attached to specific types of affective states are not always helpful. As is true for many other areas of psychology, popular usage of

¹In this sense, Zajonc's insistence (1986) on the independence of affective preferences from "cognitive" processing does not appear to be very pertinent for theories of emotion.

Table 6.1. Design Feature Delimitation of Different Affective States*

| BRIEF DEFINITIONS OF AFFECTIVE STATES | INTENSITY | DURATION | SYNCHRONIZATION | EVENT FOCUS | APPRAISAL ELICITATION | RAPIDITY OF CHANGE | BEHAVIORAL IMPACT |
|---|-----------|----------|-----------------|----------------|--------------------------|-----------------------|----------------------|
| Emotion: relatively brief episode of synchronized responses by all or most organismic subsystems to the evaluation of an external or internal event as being of major significance (e.g., anger, sadness, joy, fear, shame, pride, elation, desperation) | ++ → +++ | + | +++ | +++ | +++ | +++ | +++ |
| Mood: diffuse affect state, most pronounced as change in subjective feeling, of low intensity but relatively long duration, often without apparent cause (e.g., cheerful, gloomy, irritable, listless, depressed, buoyant) | + → ++ | ++ | + | + | + | ++ | + |
| Interpersonal stances: affective stance taken toward another person in a specific interaction, coloring the interpersonal exchange in that situation (e.g., distant, cold, warm, supportive, contemptuous) | + → ++ | + → ++ | + | ++ | + | +++ | ++ |
| Attitudes: relatively enduring, affectively colored beliefs, preferences, and predispositions toward objects or persons (e.g., liking, loving, hating, valuing, desiring) | 0 → ++ | ++ → +++ | 0 | 0 | + | 0 → + | + |
| Personality traits: emotionally laden, stable personality dispositions and behavior tendencies, typical for a person (e.g., nervous, anxious, reckless, morose, hostile, envious, jealous) | 0 → + | +++ | 0 | 0 | 0 | 0 | + |

*Symbols indicate the degree to which the features are present, with 0 indicating the lowest (absence) and +++ indicating the highest; arrows indicate hypothetical ranges.

some terms has created semantic constructs that are less than optimal for exact scientific description. The use of a clearly identified design feature approach, as exemplified in Table 6.1, seems to be more promising in the long run.

HISTORICAL ROOTS OF CURRENT PSYCHOLOGICAL MODELS OF EMOTION

It is difficult to understand current theories and research objectives in the psychology of emotion—in particular the controversies in the field—without understanding the historical development of the current models. More than in other areas of psychology, the work on emotion has been strongly marked by the theorizing of a few major thinkers. A few examples of the continuity of some of the strands of argumentation that are used currently in debates about emotion are highlighted here.

Plato and the Cognition–Emotion Debate

Plato's suggestion that the soul has a tripartite structure, composed of the separate and opposing areas of cognition, emotion, and motivation, has influenced philosophers and psychologists for over two millennia. Aided by the "faculty" doctrines of eighteenth and nineteenth century philosophy, the urge to postulate separate systems for cognition, emotion, and motivation has been a near-constant source of controversy in the psychology of emotion (Hilgard, 1980). This ancient debate has been revitalized in recent years under the name of "cognition–emotion debate" (Lazarus, 1984a,b; Leventhal & Scherer, 1987; Zajonc, 1980, 1984a,b). Fifty years after Plato formulated the doctrine of the tripartite soul, Aristotle argued for the impossibility of such a separation and for the assumption of an interaction between the different levels of psychological functioning (Fortenbaugh, 1975). Echoing Aristotle, many modern theorists are trying to overcome thinking in separate systems and to highlight the interwovenness of cognitive, motivational, and emotional processes.

Descartes and the Mind–Body Debate

Descartes single handedly revolutionized the psychology and philosophy of emotion by insisting on dealing with mental and physiological processes at the same time. He thus laid the foundation for the mind–body debate about the relationships between mental and bodily phenomena, which continues unabated. Several current debates in emotion psychology, for example, about the nature of physiological patterning for specific emotional states or about the potential retroaction of expressive innervation of the muscles on mental states such as feeling, have

generated heated controversy. Much of this is because the relationships between cognitive events and bodily changes remain uncharted and are often neglected. It has only been in recent years that theorists have attempted to link the antecedent evaluation of events (which was described by Aristotle, Descartes, Spinoza, Hume, and many other philosophers as the determinant of the nature of the ensuing emotion) to potentially stable patterns of adaptive responses in the central, peripheral, and somatic nervous systems of organisms (Scherer, 1984a, 1987; Smith, 1989; Smith & Ellsworth, 1985; Stemmler, 1996).

Darwin and the Biology versus Culture Debate

Of all historical works, Darwin's seminal book *The Expression of Emotion in Man and the Animals* (1872/1998) has probably had the most sweeping and enduring influence on modern psychology of emotion. He is responsible not only for the strong emphasis on the expression of emotion in face, body, and voice but also for many of the current concerns of emotion psychologists such as intercultural studies and developmental approaches. Most importantly, his observation of the widespread universality of a large number of emotional phenomena, particularly expression, has been the basis of a psychobiological current of theorizing that has long dominated the psychology of emotion (Ekman, 1972, 1973, 1984, 1992a; Izard, 1971, 1991, 1992; Tomkins, 1962, 1963, 1984). This tradition has been strongly attacked by anthropologists and social psychologists both early on (Mead, 1975) and, with renewed fervor, recently (Fridlund, 1994; Russell, 1994). As is often the case, the answer seems to lie in the middle. One can make a strong argument that emotion elicitation and emotion reaction are affected by both psychobiological and sociocultural factors (Ekman, 1972; 1992; Ellsworth, 1994; Mesquita, Frijda, & Scherer, 1997; Scherer & Wallbott, 1994).

James and the Center–Periphery Debate

William James's revolutionary suggestion (1884) that the emotion *is* the perception of differentiated bodily changes, specific for each emotion, has had a mixed impact on emotion psychology. While it catapulted the study of emotion to the forefront of the concerns of the young science of psychology at the time, it also led to a number of enduring confusions and quite sterile cul-de-sacs in research. As mentioned above, if one focuses on *feeling* as one of the components of emotion and as a reflection of what is happening in other components or modalities, James's suggestion that emotion is equal to feeling, as determined by the patterning of expressive and physiological reactions, is certainly acceptable, at least in part, to many modern psychologists. However, James' use of the term *emotion*, thereby referring to the complete process, including antecedent evaluation, while addressing only one component of the reaction, has muddled the is-

sue. James himself became aware of this problem later and added that the bodily changes were determined by the overwhelming "idea" of the significance of the elements of a situation for the well-being of the organism (James, 1894, p. 518; see Scherer, 1996, pp. 282, 291–292).

The issue was further complicated by Schachter (1970), who proposed a theory of emotion that has dominated the textbooks for the last 30 years. Because there was little evidence for James's postulate of highly differentiated response patterning for specific emotions, Schachter suggested that an increase in general arousal would be sufficient to render the organism attentive to an emotion being experienced and to engage the organism in cognitive interpretations of the environment to find suitable emotion labels as justification for the increased arousal. Although this scenario might well happen under certain circumstances, it is highly improbable that this is the typical pattern for emotional processes. Consequently, the scenario is hardly a sufficient basis for a theory of emotion. Yet Schachter and Singer's ingenious experiment (1962), which has yet to be clearly replicated, plus Schachter's persuasive argumentation have maintained the popularity of this peripheral theory until quite recently.

These examples show to what extent the "giants" of the past have influenced theorizing and debate in emotion psychology and still do so today. They also indicate the necessity for current and future theorists to distance themselves from these early influences and to reevaluate the degree to which conceptualizations dating back hundreds of years provide a reasonable basis for present-day theorizing.

CURRENT PSYCHOLOGICAL MODELS OF EMOTION

Although there are several criteria with which to categorize the many current conceptualizations of emotion, the criterion of differentiation seems one of the most useful. Current emotion theories differ greatly with respect to both the number of emotions the theory is expected to explain and the principles that are evoked for the differentiation. In the following discussion, the currently used models are classified into four categories to highlight the principles that seem common to the respective approaches. Although there is obviously some variance between the models within each category, it is suggested that between-category variance is quite a bit larger than the within-category variance. It should be noted that both categorization and labeling are the result of the author's personal analysis of the bulk of theoretical work and may not be shared by other theorists.²

²In this discussion, the terms *theory* and *model* are used interchangeably and generously (in the sense that some of the approaches mentioned might fall short of the requirements for a theory in the full-fledged sense).

Dimensional Models

Unidimensional models

Proponents of unidimensional models, while acknowledging the existence of a multitude of fine distinctions between emotional states bearing different names, are convinced that one dimension is sufficient to make the important analytic distinctions. Depending on the theorist, this dimension is activation/arousal or valence, respectively. The idea that the major difference between emotional states is the relative degree of arousal from very little to very much was quite influential when general arousal models in physiology were popular. A pertinent example is the work of Duffy (1941), who is frequently cited as having advocated the abolishment of the term *emotion* in favor of the adoption of a continuum of terms to denote general excitation. Although such activation or arousal dimension models (with low versus high excitation poles) are no longer used much, the fundamental idea still permeates some of the theorizing and research in the area.

Many early psychologists argued that the pleasantness–unpleasantness dimension was the most important determinant of emotional feeling. This approach holds that the most important principle for emotion differentiation is valence, ranging from a bad, disagreeable, or unpleasant pole to a good, agreeable, or pleasant pole. This dimension allows one to distinguish between negative and positive emotions, a distinction that is intuitively appealing because it not only captures what is generally seen as the most important dimension of feeling but also reflects the two fundamental behavioral orientations of approach and avoidance (Schneirla, 1959). The distinction between positive and negative affect has been highly popular in sociopsychological treatments of emotional and affective states (e.g., Diener & Iran Nejad, 1986; Isen, Niedenthal, & Cantor, 1992) and it is currently one of the most accepted criteria for studying affect and mood states in social psychology, particularly social cognition (Clare & Parrot, 1991; Forgas, 1991; Schwarz, 1990) and personality. In the latter area, the idea of independent positive and negative dimensions, as in the so-called PANAS model (positive and negative affect scales) (Watson, Clark, & Tellegen, 1988) is increasingly popular.

Multidimensional models

One of the first suggestions for a multidimensional system was made by Wundt (1905), who advocated the use of both introspective and experimental methods, using physiological measurement, to study emotional feeling. He proposed that the nature of the emotional state was determined by its position on three independent dimensions: pleasantness–unpleasantness, rest–activation, and relaxation–attention. This three-dimensional model had a strong impact on early emo-

tion psychology. Thus, Schlosberg (1954) propagated a three-dimensional model in American psychology, and he used two-dimensional models to study facial expression (Schlosberg, 1952). One of the attractions of this type of modeling is probably the fact that a multidimensional analysis of meaning transcends the study of emotion. Thus, Osgood and collaborators (see Osgood, May, & Miron, 1975; Osgood, Suci, & Tannenbaum, 1957) showed that virtually all linguistic and nonlinguistic concepts can be placed into such a three-dimensional space (valence, activation, and power) with respect to their meaning structure.

Multidimensional models have been popularized by Plutchik (1960, 1982) and Russell (1980, 1983). Both of these writers have postulated a two-dimensional scheme, with the standard emotions placed on a circle or circumplex in this space (valence, activation). Such two-dimensional models are appealing in that they allow one to graphically illustrate similarities and differences between emotions in terms of neighborhood in space.³

Dimensional models have been at the basis of much recent physiological and neuropsychological emotion research, which often emphasizes the valence dimension (e.g., Lang et al., 1993). Davidson (1992, 1993) has suggested a model that links the phylogenetically continuous approach-avoidance mechanism to positive-negative valence, postulating specific brain localizations for these functions. Borod (1992, 1993) has comprehensively reviewed the dimensional models that are currently used in the neuropsychology of emotion. In conclusion, although theorists adhering to dimensional models do not deny further differences between emotions, they remain fundamentally convinced that the functional distinction between approach tendencies in positive emotional states and the avoidance tendencies in negative emotional states is the basis of the neurophysiological and psychological affect differentiation.

Discrete Emotion Models

Circuit models

Circuit models, committed to a neuropsychological approach to emotion, suggest that the number of fundamental emotions and their differentiation are determined by evolutionarily developed neural circuits. The first such attempts to demonstrate emotional circuits in the brain were made by Cannon (1927), Papez (1937), and Arnold (1960). More recently, the two most prominent protagonists of this tradition have been Gray (1990) and Panksepp (1982, 1989).

³Evidence for a circumplex arrangement (Russell, 1980, 1983) is difficult to establish unequivocally because the spatial arrangement resulting from proximity analyses depends strongly on the selection of appropriate labels or expressions. Thus, one can demonstrate that by choosing a large array of verbal labels, one can fill the complete two-dimensional space with clouds rather than circumplex donuts (Gehm & Scherer, 1988; Scherer, 1984b).

Panksepp argues for four fundamental circuits, or emotive command "systems," which are expected to produce well-organized behavioral sequences elicited by neural stimulation: rage, fear, expectancy, and panic. Each of these neural circuits has very clear behavioral outputs. It is expected, however, that various interactions among these systems can lead to "second order emotive states" consisting of blended activities across the primary systems. This adjustment of a circuit model is obviously necessary once one moves from the emotional behaviors of lower mammals to primates, especially humans. In contrast, Gray (1990) highlights the biological mechanisms underlying attention and reinforcement.

Basic emotion models

Among the most popular conceptualizations of the nature of emotion have been theories suggesting the existence of basic or fundamental emotions such as anger, fear, joy, sadness, and disgust. The theorists in this tradition suggest that, during the course of evolution, a number of major adaptive emotional strategies developed (this is similar to the claims of circuit models). These strategies are thought to consist of a limited number, generally between 7 and 14, of basic or fundamental emotions each of which has its own specific eliciting conditions and its own specific physiological, expressive, and behavioral reaction patterns. Thus, Plutchik (1962, 1980) has proposed a set of basic emotions according to fundamental, phylogenetically continuous classes of motivation as identified by ethological research (Scott, 1969).

Many of the discrete emotion models are derived from Darwin's *The Expression of Emotion in Man and the Animals* (1872/1998). In this ground-breaking work, Darwin used a number of major emotion terms in the English language as chapter headings and demonstrated for each of these their functionality, evolutionary history, the universality across species, ontogenetic stages, and cultures. The theorist most responsible for the application of Darwin's seminal work to psychology was Tomkins (1962, 1963, 1984), who extended Darwin's theorizing to argue that a number of basic or fundamental emotions could be conceived of as phylogenetically stable *neuromotor programs*. Although Tomkins did not describe the nature of these programs in detail, the assumption was that specific eliciting conditions (which Tomkins sought in different gradients of neural firing) would automatically trigger a pattern of reactions ranging from peripheral physiological responses to muscular innervation, particularly in the face (which Tomkins considered as the primary differentiating effector system).

This concept has been popularized by two scholars strongly influenced by Tomkins, Ekman and Izard, who extended the theory and attempted to obtain pertinent empirical evidence, particularly with respect to early ontogenetic onset of the discrete emotion patterns (Izard, 1994; Izard et al., 1980, 1995), the discrete patterning of prototypical facial expressions for a number of basic emo-

tions, and the universality of these patterns (Ekman 1972, 1973, 1980, 1992b, 1994; Ekman et al., 1987; Izard, 1971, 1990, 1994; Levenson et al., 1992). Given the limited number of such basic or discrete emotions, theorists in this tradition have had to postulate a mechanism of emotion mixing or *blending* to explain the large variety of emotional states that are popularly described by laymen and poets alike. In recent years, both Ekman and Izard have elaborated their theoretical ideas to account for both the large variety of emotional states (thus Ekman [1994] talks about "families of emotion") and the effects of the environment and culture on emotional development (Izard, 1994).

Given that the works of Tomkins, Izard, and Ekman have been responsible for the renaissance of work on emotion in post-war psychology, which was first dominated by behaviorism and then by cognitivism, much of present-day emotion psychology is in one way or another strongly influenced by the assumption of discrete fundamental emotions. Obviously, this idea is strongly supported by the existence of verbal labels with a very high frequency of usage, such as anger, fear, sadness, and joy, which serve to describe overarching concepts or prototypes.

Meaning Oriented Models

Lexical models

The structure of the semantic fields of emotion terms has often been used as the basis for model building in emotion psychology. The basic assumption is that the wisdom of the language somehow will help the theoretician to discover the underlying structure of a psychological phenomenon. Although it is debatable whether the denotative and connotative structures of the emotion lexicon in a particular language will neatly map to psychophysiological processes that are largely unconscious, this type of emotion modeling is intuitively appealing because it activates common cultural interpretation patterns. One such approach has been suggested by Oatley and Johnson-Laird (1987), focusing on goal structures. Ortony, Clore, and Collins (1988) performed a structural analysis of the emotion lexicon in order to demonstrate the underlying semantic implicational structure.

A different approach was used by Shaver and colleagues (1987), starting from work on conceptual structure (Rosch et al., 1976), to illustrate different levels of generality in the classification of emotional states. They used the method of cluster analysis to produce trees of emotion terms with differential degrees of generality. It is not always clear in the writings of the theorists in this tradition whether they are mostly interested in understanding the *labeling* of emotional states by lay persons, including the accompanying prototypical schemata, or whether they intend to extend the theoretical modeling to the emotion mechanism as a whole.

Social constructivist models

Another model of emotion claims that the meaning of emotion generally is constituted or constructed by socioculturally determined behavior and value patterns (Averill, 1980; Harré, 1986; Shweder, 1993). Although the proponents of this approach do not deny the psychobiological reaction components of emotion, they consider these secondary to the meaning conferred by the sociocultural context with respect to both the interpretation of the eliciting situation and the role of the emotion reaction in the person's sense-making and social interaction. Theorists in this tradition are also strongly interested in the emotion lexicon because they consider that the emotion labels available in a language reflect the emotional meaning structures in the respective culture.

Componential Models

Theorists of componential models start with the assumptions that emotions are elicited by a cognitive (but not necessarily conscious or controlled) evaluation of antecedent situations and events and that the patterning of the reactions in the different response domains (physiology, expression, action tendencies, and feeling) is determined by the outcome of this evaluation process. Although theorists in this tradition share these fundamental assumptions, their ideas diverge rather significantly with respect to both the conceptualization of emotion differentiation and the number of major emotions thus predicted.

One of the most restrictive of the componential models is that of Lazarus (1991). Together with Arnold (1960), Lazarus pioneered the notion of subjective appraisal, including the significance of an event for an organism and its ability to cope with the event, on the nature of the ensuing emotion (Lazarus, 1968, 1991). In his most recent modeling, Lazarus postulates a "theme"-based approach, which argues that a limited number of fundamental themes in appraisal generate a limited number of major emotions. While more explicitly modeling the elicitation process, this idea rejoins some of the fundamental assumptions of the discrete emotion theories, reviewed above.

At the other extreme of the componential models is the component process model proposed by Scherer (1982, 1984a,b, 1993), which assumes that there are as many different emotional states as there are differential patterns of appraisal results. Other theorists in this tradition (e.g., Ellsworth, 1991; Frijda, 1986, 1987; Roseman, 1984; Roseman, Wiest, & Swartz, 1994; Smith, 1989; Smith & Ellsworth, 1985; Smith & Lazarus, 1993) represent intermediate positions. Although these theorists generally do not endorse the idea of a small number of basic emotions, they tend to agree that there are overarching emotional prototypes or families. Thus, Scherer (1987, 1994) has suggested the concept of *modal* emotions, defined as frequently occurring patterns of appraisal or event types that are

universally encountered by organisms, such as sadness in the case of loss or anger in the case of blocked goals.

One of the major features of componential theories is the effort to render the link between the elicitation of emotion and the response patterning more explicit. In many of the other types of models described above, the existence of differential patterning is either denied, as tends to be the case in dimensional models (which often still adhere to ideas of general arousal or valence), or ascribed to fixed neurophysiological circuits or neuromotor programs (as in the discrete emotion models). Theorists in the componential model category have started to work out detailed predictions of specific physiological, expressive, and motivational changes as consequences of specific appraisal results (Scherer, 1984a,b, 1986, 1987, 1992; Smith, 1989).

A SYNTHESIS OF THE MODELS

As is often the case in science, none of the classes of theories can be considered completely erroneous. Because the proponents of these theories are able to muster theoretical and empirical support for their claims, it is likely that each of the models captures and explains at least some aspects of reality. When comparing competing theories, one must determine exactly which of the many aspects of reality are highlighted by the respective theories and to what extent these aspects can be mapped onto each other given their relationships in reality. It seems useful to compare models with respect to their major focus. In doing so, it is appropriate to consider the need to rely on *verbal labels* of emotion to describe the phenomena to be modeled, something that all emotion models have in common.

The bases of verbal labels of emotional states are the changes in conscious subjective feeling states. Although the feeling states may reflect all the changes characterizing an emotion process in all of the organismic subsystems, verbal labels often represent only a salient part of those changes, those that reach awareness (see Kaiser & Scherer, 1997). In many cases, this process of becoming aware of a change and labeling it may be restricted to individual emotion components. For example, the term *tense*, which is frequently used as an affect descriptor, seems to refer almost exclusively to a special tonic state of the somatic nervous system, the striated musculature. If a certain set of terms is preferred in one theory of emotion and another set of terms with different referents in terms of component coverage is preferred in another theory, it is not surprising to find disagreements between the theories. It can be argued that because of this and related reasons the different classes of theories mentioned above tend to focus on different components of the emotion process.

Table 6.2 presents the unique profiles of each class of emotion model with respect to its main focus and to the way in which it deals with elicitation and re-

Table 6.2. Differential Foci of Several Psychological Models of Emotion

| MODELS | MAJOR FOCUS | ELICITATION MECHANISM | DIFFERENTIATION MECHANISM |
|------------------|---|---|---|
| Dimensional | Subjective feeling | Rarely directly addressed; rudimentary approach-avoidance definition | Degree of similarity on feeling dimensions such as valence and activation |
| Discrete emotion | Motor expression or adaptive behavior patterns | Rarely directly addressed; typical situations or stimulus configurations | Phylogenetically continuous neuroanatomical circuits or motor programs |
| Meaning | Verbal descriptions of subjective feelings | Rarely directly addressed; cultural interpretation patterns | Socially shared, prototypical mental representations |
| Componential | Link between emotion-antecedent evaluation and differentiated reaction patterns | Appraisal mechanism based on a universally valid set of criteria, influenced by cultural and individual differences | Adaptive reactions in motor expression; physiological responses to appraisal results and the action tendencies generated by the results |

sponse differentiation. It can be reasonably argued that the dimensional theories are almost exclusively concerned with the subjective feeling component and its verbal reflection, which, as described above, lends itself to dimensionalization. The large number of studies in this tradition that employ factor analysis, cluster analysis, or multidimensional scaling of emotion words underlines this tendency. The semantically oriented meaning theories, in contrast, are primarily concerned with studying the lexicon available for verbally labeling emotional states, an activity that, as semantic research tends to do generally, yields tree structures or taxonomy grids. Discrete emotion theories, historically linked to the study of facial expression, concentrate on the action system and particularly on the motor expression component. Because facial expression is the most discrete modality within the reaction component, it is not surprising to find that of discrete emotion models theorists postulate clearly differentiated patterns in the form of basic emotions.

These theories not only focus on different components of the emotion process but they also tend to be driven by different theoretical preoccupations. For example, while appraisal theorists are generally concerned with the cognitive front

end, even though venturing predictions as to potential behavioral outcomes, circuit theorists and discrete emotion theorists mostly focus on the back end, the final response pattern subserving adaptational responses. The result of this, as one might expect, has been a remarkable confusion concerning the concept of emotion coupled with many fruitless debates on the nature of the phenomenon. If one considers emotion as a hypothetical construct referring to a process involving all of the above-mentioned components, few of the models described in this chapter can claim to explain emotion as a whole. At most, they can be considered subtheories, their range of validity being limited by the specific component processes they concentrate on. Because the components of emotion, and the underlying changes of the subsystems, can hardly be considered to be independent of each other, these partial theories need to be mapped onto each other. If one takes their respective foci of attention into account, they are actually much more compatible than is usually assumed.

The componential models, given the large number of facets of emotion that they encompass, might provide a suitable basis for such an attempt of mapping models onto each other. The dimensional structure of a "feeling space" as postulated by dimensional theorists does not contradict the postulate of component theorists that subjective feeling is one component of the total emotion process. On the contrary, one can even show ways in which major appraisal dimensions, such as goal conduciveness, urgency, and coping potential, map directly onto the feeling dimensions of valence, activation, and power/control (see Scherer, 1984b). As discussed above, componential models often acknowledge the existence of overarching emotion families or modal emotions, thus allowing one to bridge the gap to discrete emotion theories. Although component theories do not share the idea of a limited number of emotion-specific neuroanatomical circuits, they do postulate phylogenetically continuous, adaptive reaction patterns and action tendencies as produced by appraisal results.

With respect to meaning theories, component theorists share the social constructivists' insistence on the powerful role of sociocultural determinants of emotional experiences by assuming, for example, that cultural values can strongly affect appraisal, that the regulation of the emotion depends on norms and social context, and that the subjective experience reflects the sociocultural context. Component theorists do not, however, go as far as to maintain that emotional episodes are constituted entirely on the basis of cultural meaning structures. The findings of lexically oriented meaning theorists can also be easily integrated into component theories. Because the verbal labels can be expected to denote the conscious part of the feeling component (which is seen as reflecting the changes in all other components, including the cognitive, appraisal component), one would expect to find the semantic structure of the emotion lexicon to reveal both typical appraisal configurations and reaction prototypes.

CURRENT FOCI OF PSYCHOLOGICAL EMOTION RESEARCH

The current foci of interest in psychological theorizing and research on emotion can be grouped into three major categories: (1) the elicitation and differentiation of emotion through antecedent evaluation, (2) the emotion-specific response patterns of different modalities, and (3) the effects of emotion on other types of psychological functioning such as memory or judgment. These domains are briefly described here to demonstrate the ways that psychological models of emotion are put to use in research practice.

Emotion Elicitation and Differentiation

The issue of what determines whether an emotion is elicited and which kind of emotion will ensue can be approached from two different vantage points, an *exogenous* one, involving external events and situation changes outside of the organism or behaviors of self and others, and an *endogenous* one, based on the activation of memorized schemata or neurohormonal changes within the organism.

The exogenous point of view has been receiving renewed attention since the pioneering work of Arnold (1960) and Lazarus (1968) on the important role of the subjective appraisal of an event in emotion differentiation. Since the mid-1980s, many psychologists have proposed appraisal models of emotion (Ellsworth, 1991; Frijda, 1986; Oatley & Johnson-Laird, 1987; Roseman, 1984; Scherer, 1984a,b, 1986; Smith & Ellsworth, 1985), postulating that organisms evaluate events and situations in a number of given dimensions with the result of the appraisal process determining the nature of the ensuing emotion. This area has shown some remarkable convergence among the different appraisal theories that have received very strong and consistent support in experimental work designed to test the predictions (for a detailed review of this tradition, see Scherer, 1999).

One of the major criticisms leveled against appraisal theory is its presumed cognitive bias. Critics, however, have offered little with respect to alternative explanations of the elicitation and differentiation of the vast majority of emotional episodes. Appraisal theorists do not deny that emotions and particularly other affective states (as defined in Table 6.1) can be caused by other mechanisms, for example, the endogenous factors discussed below. Appraisal theorists have pointed out (Leventhal & Scherer, 1987; Scherer, 1984a) that the emotion-antecedent evaluation process can occur in a highly automatic fashion (for a discussion of the distinction between controlled and automatic processing, see Shiffrin & Schneider, 1977) and in a largely unconscious way. The idea of emotion-antecedent appraisal occurring at different levels of the central nervous system (e.g., the sensorimotor, schematic, or conceptual level) has been proposed

independently by a number of theorists approaching emotion from cognitive, clinical, and physiological perspectives (Mathews, 1988; Öhman, 1988). Several theorists are currently attempting to design experiments to more clearly distinguish the underlying processes and their different levels and relationships (such as top-down or bottom-up influences; see Van Reekum & Scherer, 1997). Given the strong link between these traditions and work in the neuropsychology of emotion (e.g., the highly pertinent dual path model of emotion elicitation suggested by LeDoux [1989]), the study of levels of processing is one of the most promising meeting points between psychologists and neuroscientists working on emotion.

The study of the endogenous factors likely to elicit and differentiate emotions is another such meeting point. The work done by Gray (1990) and Panksepp (1982, 1989) on neuronal circuits involved in the generation and differentiation of emotion and the potential effects of hormonal changes or drug intake are important examples of studies of endogenous factors. Another area of major interest is that of memory models that specify the mediating effects of neuropsychological mechanisms due to pathology (e.g., Damasio, 1994) or memory subsystems (Johnson & Multhaup, 1992). Another endogenous factor of interest, largely unexplored (except for important work on temperament), concerns the mediating effects of individual differences. For example, it is probable that specific features of an individual's central nervous system (e.g., cognitive speed or varying neurohormonal states) can affect the cognitive evaluation of situations or events (see Van Reekum & Scherer, 1997).

Patterning of Reaction Modalities

Much of the research on the psychology of emotion has been concerned with the patterns of changes in motor expression, physiology, and subjective feeling (the reaction triad described above). With respect to physiology and expression, one of the major goals has been to demonstrate empirically the *specificity of patterning*. As discussed earlier, many of the psychological models described in this chapter require at least some degree of specificity. The discrete emotion models are located at one extreme of the specificity debate, suggesting a rather high degree of neuromotor and neurophysiological patterning. It has generally been the work of the proponents of these models (such as Ekman, Davidson, Levenson, and Izard) that has yielded empirical results showing a fairly high degree of emotion-specific patterning. With respect to expression, the fact that judges are reliably able to decode patterns of facial and vocal expressions of emotion produced by trained encoders (Ekman, 1984, 1992b; Scherer, 1989) suggests that the assumption of specificity of patterning, even though somewhat difficult to establish for actual facial movements (Gosselin, Kirouac, & Doré, 1995) or acoustic features (Banse & Scherer, 1996), remains viable. Because similar

judgment approaches cannot be used to examine—even in an indirect fashion—physiological response patterning, researchers will need to demonstrate consistent configurations of physiological parameters characterizing specific emotional states. The degree to which the available evidence supports this assumption is strongly debated (Cacioppo et al., 1993; Levenson, 1992; Stemmler, 1996).

Surprisingly, the domain of subjective feeling states, which is the central response component for many emotion theorists, has received relatively little attention despite the burgeoning interest in consciousness. There have been few attempts to specify more clearly exactly how subjective feeling states could be conceptualized. Scherer (1987, 1993) has offered the definition of *subjective feeling* as a reflection in the central nervous system of all changes in both the central and peripheral systems during an emotional episode. This conceptualization does not require subjective feeling to be conscious. Rather, it can be assumed, as mentioned above, that only a small portion of the complete set of reflections of all ongoing changes reach the level of awareness or consciousness. An even smaller set of such aware reflections can in fact be verbalized (Kaiser & Scherer, 1997).

Traditionally, subjective feeling state has been measured exclusively via verbalization with a number of scales such as the Nowlis Mood Checklist or the Izard Differential Emotion Scale (DES). There has been very little effort to improve on the measurement of this important component of the emotion process (see Borod et al., Chapter 4, this volume). Some of the newer instruments, such as the positive-negative affect scales (PANAS; Watson & Tellegen, 1988) are directed toward valence rather than differentiated emotion states. It remains to be seen to what extent electroencephalography and neuroimaging methods will be used as nonverbal measures for subjective feeling (Davidson, 1992, 1993).

One of the major research issues in the domain of emotional reactions has been the interaction between different components. In particular, the question to what extent there is proprioceptive feedback from expressive innervation of the musculature about the quality and intensity of feeling states has been intensively studied (Cappella, 1993; Laird & Bresler, 1992; Leventhal & Tomarken, 1986; Matsumoto, 1987; Tourangeau & Ellsworth, 1979). Although the findings of some studies reporting feedback effects are hotly debated, the general pattern of the results suggests that a weak version of the proprioceptive feedback hypothesis might be viable.

Effects of Emotion on Other Psychological Functions

After a period of almost exclusive interest in emotion-free, cold cognition, there has been a remarkable surge of interest in hot cognition, that is, the way in which memory, learning, thinking, and judgment are affected by affective states. There is now rather consistent evidence showing that emotional states can have rather powerful effects on cognitive processing of various types, highlighting the need

to focus on the interaction between cognition and emotion rather than trying to separate the two. The phenomena of particular interest to this new research are the effects of implicit or unconscious processing (Kihlstrom, 1987; Mathews et al., 1989; Niedenthal, 1990). Although most of this research has been driven by the valence-oriented dimensional theories, one might expect interesting findings from experiments in which other emotion conceptualizations are used to influence cognitive functioning. The specific effects of anger on cognitive processing, for example, are almost part of the popular lore. Clearly, research into hot cognition is a promising meeting point for emotion psychologists and neuropsychologists.

CONCLUSIONS

It remains to be seen which types of psychological models and research paradigms will best predict the responses of an individual to a particular stimulus or situation. It seems essential that any theoretical model of the response process will have to account for the nature of the antecedent processing, particularly the evaluation of events triggering the emotion and the relationships with the resulting pattern of reaction in different modalities. As argued above, it may well be possible to achieve convergence between the various psychological models discussed in this chapter after acknowledgment of their different foci and respective explanations for various aspects of the emotion process. The componential model might serve as a useful basis for such an attempt at convergence given the breadth of its focus with respect to the components of emotion and its attempt to theoretically predict the appraisal-reaction link in an explicit, detailed fashion. A final criterion for a psychological model of emotion is the degree to which it can be incorporated into the conceptual and empirical structures of adjoining disciplines such as neurophysiology, allowing easy transfer of concepts and findings.

REFERENCES

- Arnold, M.B. (1960). *Emotion and Personality, Vols. 1, 2*. New York: Columbia University Press.
- Averill, J.R. (1980). A constructivist view of emotion. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Vol. 1 Theory, Research, and Experience* (pp. 305–340). New York: Academic Press.
- Banise, R., & Scherer, K.R. (1996). Acoustic profiles in vocal emotion expression. *Journal of Personality and Social Psychology*, 70, 614–636.
- Borod, J.C. (1992). Interhemispheric and intrahemispheric control of emotion: A focus on unilateral brain damage. *Journal of Consulting and Clinical Psychology*, 60, 339–348.

- Borod, J.C. (1993). Emotion and the brain—Anatomy and theory: An introduction to the special section. *Neuropsychology*, 7, 427–432.
- Buck, R. (1985). Prime theory: An integrated view of motivation and emotion. *Psychological Review*, 92(3), 389–413.
- Buck, R. (1993). What is this thing called subjective experience? Reflections on the neuropsychology of qualia. Special Section: Neuropsychological perspectives on components of emotional processing. *Neuropsychology*, 7(4), 490–499.
- Cacioppo, J.T., Klein, D.J., Bernston, G.C., & Hatfield, E. (1993). The psychophysiology of emotion. In M. Lewis & J.M. Haviland (Eds.), *Handbook of Emotions* (pp. 119–142). New York: Guilford Press.
- Cannon, W.B. (1927). The James-Lange theory of emotion: A critical examination and an alternative theory. *American Journal of Psychology*, 39, 106–124.
- Cappella, J.N. (1993). The facial feedback hypothesis in human interaction: Review and speculation. Special Issue: Emotional communication, culture, and power. *Journal of Language and Social Psychology*, 12(1–2), 13–29.
- Clore, G.L. (1994). Why emotions are never unconscious. In P. Ekman & R.J. Davidson (Eds.), *The Nature of Emotion: Fundamental Questions* (pp. 285–290). New York: Oxford University Press.
- Clore, G.L., & Parrott, W.G. (1991). Moods and their vicissitudes: Thoughts and feelings as information. In J.P. Forgas (Ed.), *Emotion and Social Judgments. International Series in Experimental Social Psychology* (pp. 107–123). Oxford: Pergamon Press.
- Damasio, A.R. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Avon.
- Darwin, C. (1872). *The Expression of Emotions in Man and Animals*. London: John Murray. (3rd. edition, P. Ekman [Ed.], London: HarperCollins, 1998.)
- Davidson, R.J. (1992). Prolegomenon to the structure of emotion: Gleanings from neuropsychology. *Cognition and Emotion*, 6(3–4), 245–268.
- Davidson, R.J. (1993). Parsing affective space: Perspectives from neuropsychology and psychophysiology. Special Section: Neuropsychological perspectives on components of emotional processing. *Neuropsychology*, 7(4), 464–475.
- Diener, E., & Iran Nejad, A. (1986). The relationship in experience between various types of affect. *Journal of Personality and Social Psychology*, 50(5), 1031–1038.
- Duffy, E. (1941). An explanation of "emotional" phenomena without the use of the concept "emotion." *Journal of General Psychology*, 25, 283–293.
- Ekman, P. (1972). Universals and cultural differences in facial expression of emotion. In J.R. Cole (Eds.), *Nebraska Symposium on Motivation* (pp. 207–283). Lincoln: University of Nebraska Press.
- Ekman, P. (1973). Darwin and cross-cultural studies of facial expression. In P. Ekman (Ed.), *Darwin and Facial Expression* (pp. 1–83). New York: Academic Press.
- Ekman, P. (1980). *The Face of Man: Universal Expression in a New Guinea Village*. New York: Garland.
- Ekman, P. (1984). Expression and the nature of emotion. In K.R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 319–344). Hillsdale, NJ: Erlbaum.
- Ekman, P. (1992a). An argument for basic emotions. *Cognition and Emotion*, 6(3–4), 169–200.
- Ekman, P. (1992b). Facial expression of emotion: New findings, new questions. *Psychological Science*, 3, 34–38.
- Ekman, P., Friesen, W.V., O'Sullivan, M., Chan, A., et al. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology*, 53(4), 712–717.

- Ellsworth, P.C. (1991). Some implications of cognitive appraisal theories of emotion. In K. Strongman (Eds.), *International Review of Studies on Emotion* (pp. 143–161). New York: Wiley.
- Ellsworth, P.C. (1994). Sense, culture, and sensibility. In S. Kitayama & M.R. Markus (Eds.), *Emotion and Culture: Empirical Studies of Mutual Influence* (pp. 23–50). Washington, DC: American Psychological Association.
- Forgas, J.P. (1991). *Emotion and Social Judgments*. Oxford: Pergamon Press.
- Fortenbaugh, W.W. (1975). *Aristotle on Emotion: A Contribution to Philosophical Psychology, Rhetoric, Poetics, Politics, and Ethics*. New York: Barnes & Noble Books.
- Fridlund, A.J. (1994). *Human Facial Expression: An Evolutionary View*. New York: Academic Press.
- Frijda, N.H. (1986). *The Emotions*. Cambridge and New York: Cambridge University Press.
- Frijda, N.H. (1987). Emotion, cognitive structure, and action tendency. *Cognition and Emotion*, 1, 115–143.
- Frijda, N.H. (1993). Moods, emotion episodes, and emotions. In M. Lewis & J.M. Haviland (Eds.), *Handbook of Emotions* (pp. 381–404). New York: Guilford Press.
- Frijda, N.H., Mesquita, B., Sonnemans, J., & van Goozen, S. (1991). The duration of affective phenomena, or emotions, sentiments and passions. In K. Strongman (Ed.), *International Review of Emotion and Motivation* (pp. 187–225). New York: Wiley.
- Gehm, T., & Scherer, K.R. (1988). Factors determining the dimensions of subjective emotional space. In K.R. Scherer (Ed.), *Facets of Emotion: Recent Research* (pp. 99–114). Hillsdale, NJ: Erlbaum.
- Gosselin, P., Kirouac, G., & Doré, F.Y. (1995). Components and recognition of facial expression in the communication of emotion by actors. *Journal of Personality and Social Psychology*, 68, 1–14.
- Gray, J.A. (1990). Brain systems that mediate both emotion and cognition. *Cognition and Emotion*, 4(3), 269–288.
- Harré, R.M. (Ed.) (1986). *The Social Construction of Emotions*. Oxford: Blackwell.
- Hilgard, E.R. (1980). The trilogy of mind: Cognition, affection, and conation. *Journal of the History of the Behavioral Sciences*, 16, 107–117.
- Isen, A.M., Niedenthal, P.M., & Cantor, N. (1992). An influence of positive affect on social categorization. *Motivation and Emotion*, 16(1), 65–78.
- Izard, C.E. (1971). *The Face of Emotion*. New York: Appleton-Century-Crofts.
- Izard, C.E. (1990). Facial expressions and the regulation of emotions. *Journal of Personality and Social Psychology*, 58(3), 487–498.
- Izard, C.E. (1991). *The Psychology of Emotions*. New York: Plenum Press.
- Izard, C.E. (1992). Basic emotions, relations among emotions, and emotion–cognition relations. *Psychological Review*, 99, 561–565.
- Izard, C.E. (1994). Innate and universal facial expressions: Evidence from developmental and cross-cultural research. *Psychological Bulletin*, 115, 288–299.
- Izard, C.E., Fantauzzo, C.A., Castle, J.M., Haynes, O.M., et al. (1995). The ontogeny and significance of infants' facial expressions in the first 9 months of life. *Developmental Psychology*, 31(6), 997–1013.
- Izard, C.E., Huebner, R.R., Risser, D., McGinnes, G.C., & Dougherty, L.M. (1980). The young infant's ability to produce discrete emotion expressions. *Developmental Psychology*, 16(2), 132–140.
- James, W. (1884). What is an emotion? *Mind*, 9, 188–205.
- James, W. (1894). The physical basis of emotion. *Psychological Review*, 1, 516–529.

- Johnson, M.K., & Multhaup, K.S. (1992). Emotion and MEM. In S.-A. Christianson (Ed.), *The Handbook of Emotion and Memory: Research and Theory* (pp. 33–66). Hillsdale, NJ: Erlbaum.
- Kaiser, S., & Scherer, K.R. (1997). Models of "normal" emotions applied to facial and vocal expressions in clinical disorders. In W.F. Flack, Jr., & J.D. Laird (Eds.), *Emotions in Psychopathology* (pp. 81–98). New York: Oxford University Press.
- Kihlstrom, J.F. (1987). The cognitive unconscious. *Science*, 237, 1445–1452.
- Laird, J.D., & Bresler, C. (1992). The process of emotional experience: A self perception theory. In M.S. Clark (Ed.), *Review of Personality and Social Psychology*. Newbury Park, CA: Sage.
- Lang, P.J., Greenwald, M.K., Bradley, M.M., & Hamm, A.O. (1993). Looking at pictures: Affective, facial, visceral, and behavioral reactions. *Psychophysiology*, 30(3), 261–273.
- Lazarus, R.S. (1968). Emotions and adaptation: Conceptual and empirical relations. In W.J. Arnold (Ed.), *Nebraska Symposium on Motivation*. Lincoln, NE: University of Nebraska Press.
- Lazarus, R.S. (1991). *Emotion and Adaptation*. New York and Oxford: Oxford University Press.
- Lazarus, R.S. (1984a). On the primacy of cognition. *American Psychologist*, 39, 124–129.
- Lazarus, R.S. (1984b). Thoughts on the relations between emotion and cognition. In K.R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 247–257). Hillsdale, NJ: Erlbaum.
- LeDoux, J.E. (1989). Cognitive–emotional interactions in the brain. *Cognition and Emotion*, 3, 267–289.
- Levenson, R.W. (1992). Autonomic nervous system differences among emotions. *Psychological Science*, 3(1), 23–27.
- Levenson, R.W., Ekman, P., Heider, K., & Friesen, W.V. (1992). Emotion and autonomic nervous system activity in the Minangkabau of West Sumatra. *Journal of Personality and Social Psychology*, 62(6), 972–988.
- 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.
- Leventhal, H., & Tomarken, A.J. (1986). Emotion: Today's problems. *Annual Review of Psychology*, 37, 565–610.
- Mathews, A. (1988). Anxiety and the processing of threatening information. In V. Hamilton, G.H. Bower, & N.H. Frijda (Eds.), *Cognitive Perspectives on Emotion and Motivation* (pp. 265–286). Dordrecht: Kluwer Academic Publishers.
- Mathews, A., Mogg, K., May, J., & Eysenck, M. (1989). Implicit and explicit memory bias in anxiety. *Journal of Abnormal Psychology*, 98(3), 236–240.
- Matsumoto, D. (1987). The role of facial response in the experience of emotion: More methodological problems and a meta-analysis. *Journal of Personality and Social Psychology*, 52(4), 769–774.
- Mead, M. (1975). Review of "P. Ekman: Darwin and facial expression." *Journal of Communication*, 25, 209–213.
- Mesquita, B., Frijda, N.H., & Scherer, K.R. (1997). Culture and emotion. In J.E. Berry, P.B. Dasen, & T.S. Saraswathi (Eds.), *Handbook of Cross-Cultural Psychology: Vol. 2, Basic Processes and Developmental Psychology* (pp. 255–297). Boston: Allyn & Bacon.
- Niedenthal, P.M. (1990). Implicit perception of affective information. *Journal of Experimental Social Psychology*, 26(6), 505–521.

- Oatley, K., & Johnson-Laird, P.N. (1987). Towards a cognitive theory of emotions. *Cognition and Emotion*, 1(1), 29–50.
- Öhman, A. (1988). Preattentive processes in the generation of emotions. In V. Hamilton, G.H. Bower, & N.H. Frijda (Eds.), *Cognitive Perspectives on Emotion and Motivation* (pp. 127–144). Dordrecht: Kluwer Academic Publishers.
- Ortony, A., Clore, G.L., & Collins, A. (1988). *The Cognitive Structure of Emotions*. New York: Cambridge University Press.
- Osgood, C.E., May, W.H., & Miron, M.S. (1975). *Cross-Cultural Universals of Affective Meaning*. Urbana: University of Illinois Press.
- Osgood, C.E., Suci, G.J., & Tannenbaum, P.H. (1957). *The Measurement of Meaning*. Urbana: University of Illinois Press.
- Panksepp, J. (1982). Toward a general psychobiological theory of emotions. *Behavioral and Brain Sciences*, 5(3), 407–467.
- Panksepp, J. (1989). The neurobiology of emotions: Of animal brains and human feelings. In A. Manstead & H. Wagner (Eds.), *Handbook of Social Psychophysiology* (pp. 5–26). Chichester, England: Wiley.
- Papez, J.W. (1937). A proposed mechanism of emotion. *Archives of Neurological Psychiatry*, 38, 725–743.
- Plutchik, R. (1962). *The Emotions: Facts, Theories, and a New Model*. New York: Random House.
- Plutchik, R. (1980). *Emotion: A Psychobioevolutionary Synthesis*. New York: Harper & Row.
- Rosch, E., Mervis, C.B., Gray, W.D., Johnson, D.M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology*, 8, 382–439.
- Roseman, I.J. (1984). Cognitive determinants of emotion: A structural theory. *Review of Personality and Social Psychology*, 5, 11–36.
- Roseman, I.J., Wiest, C., & Swartz, T.S. (1994). Phenomenology, behaviors, and goals differentiate discrete emotions. *Journal of Personality and Social Psychology*, 67(2), 206–221.
- Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39, 1161–1178.
- Russell, J.A. (1983). Pancultural aspects of the human conceptual organization of emotions. *Journal of Personality and Social Psychology*, 45, 1281–1288.
- Russell, J.A. (1991). Culture and the categorization of emotions. *Psychological Bulletin*, 110, 426–450.
- Russell, J.A. (1994). Is there universal recognition of emotion from facial expression? A review of the cross-cultural studies. *Psychological Bulletin*, 115, 102–141.
- Schachter, S. (1970). The assumption of identity and peripheralist–centralist controversies in motivation and emotion. In M. B. Arnold (Eds.), *Feelings and Emotions: The Loyola Symposium* (pp. 111–121). New York: Academic Press.
- Schachter, S., & Singer, J.E. (1962). Cognitive, social and physiological determinants of emotional states. *Psychological Review*, 69, 379–399.
- Scherer, K.R. (1982). Emotion as a process: Function, origin, and regulation. *Social Science Information*, 21, 555–570.
- Scherer, K.R. (1984a). On the nature and function of emotion: A component process approach. In K.R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 293–318). Hillsdale, NJ: Erlbaum.
- Scherer, K.R. (1984b). Emotion as a multicomponent process: A model and some cross-cultural data. In P. Shaver (Ed.), *Review of Personality and Social Psychology*, Vol. 5 (pp. 37–63). Beverly Hills, CA: Sage.

- Scherer, K.R. (1986). Vocal affect expression: A review and a model for future research. *Psychological Bulletin*, 99, 143–165.
- Scherer, K.R. (1987). *Toward a Dynamic Theory of Emotion: The Component Process Model of Affective States*. University of Geneva, Geneva, Switzerland: Geneva Studies in Emotion.
- Scherer, K.R. (1989). Vocal correlates of emotion. In A. Manstead & H. Wagner (Eds.), *Handbook of Psychophysiology: Emotion and Social Behavior* (pp. 165–197). London: Wiley.
- Scherer, K.R. (1992). What does facial expression express? In K. Strongman (Ed.), *International Review of Studies on Emotion*, Vol. 2 (pp. 139–165). Chichester: Wiley.
- Scherer, K.R. (1993). Neuroscience projections to current debates in emotion psychology. *Cognition and Emotion*, 7, 1–41.
- Scherer, K.R. (1994). Toward a concept of “modal emotions”. In P. Ekman & R.J. Davidson (Eds.), *The Nature of Emotion: Fundamental Questions* (pp. 25–31). New York: Oxford University Press.
- Scherer, K.R. (1996). Emotion. In M. Hewstone, W. Stroebe, & G.M. Stephenson (Eds.), *Introduction to Social Psychology: A European Perspective* (2nd ed.). Oxford, England: Blackwell.
- Scherer, K.R. (1999). Appraisal theories. In T. Dalgleish & M. Power (Eds.), *Handbook of Cognition and Emotion* (pp. 637–663). Chichester: Wiley.
- Scherer, K.R., & Wallbott, H.G. (1994). Evidence for universality and cultural variation of differential emotion response patterning. *Journal of Personality and Social Psychology*, 66, 310–328.
- Schlosberg, H.A. (1952). The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology*, 44, 229–237.
- Schlosberg, H.A. (1954). Three dimensions of emotion. *Psychological Review*, 61, 81–88.
- Schneirla, T.C. (1959). An evolutionary and developmental theory of biphasic processes underlying approach and withdrawal. In M.R. Jones (Ed.), *Nebraska Symposium on Motivation*, Vol. 7 (pp. 1–42). Lincoln: University of Nebraska Press.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In R.M. Sorrentino & E.T. Higgins (Eds.), *Handbook of Motivation and Cognition: Foundations of Social Behavior*, Vol. 2 (pp. 527–561). New York: Guilford Press.
- Scott, J.P. (1969). The emotional basis of social behavior. *Annals of the New York Academy of Sciences*, 159, 777–790.
- 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.
- Shiffrin, R.M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attention and a general theory. *Psychological Review*, 84, 127–190.
- Shweder, R.A. (1993). The cultural psychology of the emotions. In M. Lewis & J.M. Haviland (Eds.), *Handbook of Emotions* (pp. 417–434). New York: Guilford Press.
- Smith, C.A. (1989). Dimensions of appraisal and physiological response in emotion. *Journal of Personality and Social Psychology*, 56, 339–353.
- Smith, C.A., & Ellsworth, P.C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813–838.
- Smith, C.A., & Lazarus, R.S. (1993). Appraisal components, core relational themes, and

- the emotions. Special Issue: Appraisal and beyond: The issue of cognitive determinants of emotion. *Cognition and Emotion*, 7(3-4), 233-269.
- Stemmler, G. (1996). Psychophysiologie der Emotionen. [Psychophysiology of emotions]. *Zeitschrift für Psychosomatische Medizin und Psychoanalyse*, 42(3), 235-260.
- 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. (1984). Affect theory. In K.R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 163-196). Hillsdale, NJ: Erlbaum.
- Tourangeau, R., & Ellsworth, P.C. (1979). The role of facial response in the experience of emotion. *Journal of Personality and Social Psychology*, 37(9), 1519-1531.
- Van Reekum, C.M., & Scherer, K.R. (1997). Levels of processing for emotion-antecedent appraisal. In G. Matthews (Ed.), *Cognitive Science Perspectives on Personality and Emotion* (pp. 259-300). Amsterdam: Elsevier.
- Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.
- Wundt, W. (1905). *Grundzüge der physiologischen Psychologie* (5th ed.) [Fundamentals of Physiological Psychology]. Leipzig: Engelmann.
- Zajonc, R.B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 2, 151-176.
- Zajonc, R.B. (1984a). On the primacy of affect. In K.R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 259-270). Hillsdale, NJ: Lawrence Erlbaum.
- Zajonc, R.B. (1984b). The interaction of affect and cognition. In K. R. Scherer & P. Ekman (Eds.), *Approaches to Emotion* (pp. 239-246). Hillsdale, NJ: Erlbaum.