

## Basic Emotions, Relations Among Emotions, and Emotion–Cognition Relations

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From the cognitive theory perspective that emotions are cognition dependent and contain cognitive components, Ortony and Turner (1990) questioned the validity of the concept of basic emotions. They argued that the so-called basic emotions were neither psychologically or biologically “primitive” nor “irreducible building blocks” for generating the “great variety of emotional experiences.” In the biosocial theory tradition, researchers have identified multiple noncognitive activators of emotion and demonstrated the usefulness of defining the essential components of emotion as phenomena that do not require cognitive mediators or constituents. In this framework, emotions are seen as basic because their biological and social functions are essential in evolution and adaptation. Particular emotions are called *basic* because they are assumed to have innate neural substrates, innate and universal expressions, and unique feeling–motivational states. The great variety of emotional experiences is explained as a function of emotion–cognition interactions that result in affective–cognitive structures.

From the vantage point of a cognitive theory, Ortony and Turner (1990) maintained that researchers “cannot find basic emotions” because “we do not have, and probably cannot have, a satisfactory criterion of basicness” (p. 329). Their arguments stemmed from the cognitive theory perspective that emotions are cognition dependent and contain various forms of cognition. Ortony and Turner argued that the so-called basic emotions were not “psychologically primitive” or “biologically primitive.” They questioned whether any of the so-called basic emotions met their suggested criterion for biologically basic emotions—“those for which appraisal and some other response is hardwired” (p. 324). Finally, they held that there were no basic emotions that are “irreducible constituents” for generating (or explaining) the “whole range of emotions” (p. 317).

A number of emotion theorists, especially those influenced by Darwin, contemporary ethology, and neuroscience, assume that emotions are specific neuropsychological phenomena, shaped by natural selection, that organize and motivate physiological, cognitive, and action patterns that facilitate adaptive responses to the vast array of demands and opportunities in the environment (e.g., Izard, 1977; Plutchik, 1980). The assumption that emotions are basic in evolution and adaptation and serve essential biological and social functions gives the concept of basic emotion a different connotation than the one attributed by Ortony and Turner (1990). This assumption also suggests a different perspective on the issue of basicness and leads to a set of criteria for basic emotions that can be subjected to empirical

validation and to a model for explaining the great variety of emotional experiences.

### Different Perspectives on the Primacy of Emotions

Some differences between cognitive and biosocial theories are critical to the issue of basic emotions. Of particular relevance is the difference pertaining to the definition of emotion experience. Cognitive theories hold that emotion experience includes various cognitive components including the activating appraisals, subsequent desires, and intentions. *Differential emotions theory* (DET; Izard, 1977, 1989), one of the biosocial theories cited by Ortony and Turner (1990), views emotion experience as a feeling state or motivational condition, a direct and immediate product of the particular neural processes associated with that emotion. Thus, emotion experience as a feeling state is a motivation but not a motive, if *motive* is defined as a cognitively articulated goal. The importance of this definition of emotion is clear when it is realized that all of Ortony and Turner’s arguments are based on the assumption that emotion is a function of construal and includes various kinds of cognition as components.

### On Defining Cognition and Emotion

If cognition is not to be equated with the entire domain of information processing (including that in DNA molecules), it needs working boundaries and, perhaps, division into subclasses or types. Some theorists have addressed this issue and suggested the notion of separate systems for affective and non-affective information processing (Izard, 1989; LeDoux, 1987; Zajonc, Murphy, & Inglehart, 1989). By defining emotion as cognition dependent and as containing kinds of cognition such as appraisals, intentions, and desires, Ortony and Turner (1990) made it as subject to cultural determinants as are the processes of meaning analysis and attribution. Thus their definition

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greatly restricts the prospects of finding basic or universal emotions.

According to DET, emotion feeling at some level of intensity is always present in consciousness, influencing appraisals and other cognitive and noncognitive activators of the sequence of emotion feelings in the stream of consciousness. Each new feeling state in the sequence automatically and selectively cues or motivates conscious and unconscious cognition, but these are viewed as consequences of the feeling (motivation), not integral to it.

### *Possible Over-Inclusiveness of Ortony and Turner's Concept of Emotion*

From a biosocial perspective, Ortony and Turner's (1990) inclusion of cognitive processes makes the term *emotion* lack coherence and unity. For example, it contains qualitatively distinct phenomena—a feeling state and cognitive processes that are not felt.

Ortony and Turner (1990) applied the term *emotion* to concepts ranging from anger and fear, which characterize a wide range of species, to relief, pride, envy, jealousy, and other language-dependent, uniquely human phenomena. Empirical studies have found that there is semantic overlap between envy and jealousy (Smith, Kim, & Parrott, 1988) and that both are described by two or more of the emotion categories that biosocial theorists consider basic.

### Basic Emotions in Evolutionary–Biopsychological Perspective

Ortony and Turner (1990) claimed that biosocial theorists might consider emotions (such as anger and fear) to be basic because they are the most “frequently occurring and frequently referred to in western cultures” (p. 325). Actually, fear is the least frequently experienced negative emotion by men and women in the American, German, Swedish, and Japanese cultures (Izard, 1971, Chapter 12).

In an evolutionary–biopsychological perspective, emotions are called basic because of their hypothesized role in evolution (e.g., Plutchik, 1980), their biological and social functions (Izard, 1989), and their primacy in ontogenetic development (Izard & Malatesta, 1987). A considerable body of theory and evidence support the case for a concept of basic emotions as defined by these criteria. For example, interest motivates play, exploration, and learning (Renninger & Wozniak, 1985); sadness elicits empathic and altruistic behavior (Barnett, King, & Howard, 1979); disgust motivates avoidance of contamination (Rozin & Fallon, 1987); and numerous studies of animals and humans link anger to defense initiatives (Berkowitz, 1990) and fear to escape or protective behaviors that maximize safety and security (Bowlby, 1973).

In this conception of emotions as motivations, emotions are *basic* in the fundamental sense of that term: They are the basis for something—coping strategies and adaptation. DET is open to the question of the number of basic emotions and the best labels for them.

### DET Criteria for Basic Emotions

Particular emotions are also called basic because they are assumed to have innate neural substrates, a unique and universally recognized facial expression, and a unique feeling state (Izard, 1972). These are assumptions with varying degrees of empirical support.

#### *Neural Substrates*

There is a scarcity of studies on emotion-specific neural substrates, particularly in humans, but the techniques for such investigations (positive emission tomography, magnetic resonance imagery, and high-resolution electroencephalography) are just now moving into basic research laboratories. The recent work of Gray (1982) and Panksepp (1982) that was cited by Ortony and Turner (1990) can be seen as a good beginning.

One type of evidence for emotion-specific neural substrates is generally overlooked. That there are universal and innate facial expressions means that at least some components of emotion-specific neural substrates are biologically primal. Facial expressions are fired by phylogenetically old brain mechanisms that are clearly involved in emotions (e.g., Steiner, 1979).

#### *Facial Expressions*

In contrast with Ortony and Turner (1990), I maintain that because expressive behaviors served critical communicative functions and were crucial for the evolution of emotions (Andrews, 1963; Darwin, 1872/1965), they may be considered essential components of prototypical emotions. By *prototypical emotion*, I mean emotion (neural processes, expression, feeling state) as it emerges in evolution and in ontogeny. The expression may be a full-face configuration or a single, unambiguous action unit. In ontogeny, once the maturation of neural inhibitory mechanisms and cognitive development enable the regulation and dissociation of expressions, observable expressions are no longer an essential feature of emotion. However, this does not rule out the possibility that micromomentary expressions and nonobservable patterns of muscle action potentials (MAPs) may remain as a functional component (cf. Cacioppo, Losch, Tassinari, & Petty, 1986).

As Ortony and Turner (1990) acknowledged, certain facial expressions of emotions are innate and universal and homologous to expressions in nonhuman primates. Some of these expressions (including full-face, complete configurations) are present at birth and all the others except contempt emerge in the first few months of life. Their functional relations to infant and caregiver behavior (Izard & Malatesta, 1987) and their power to elicit emotion experiences (Duclos et al., 1989) suggest that their connections to corresponding feeling–motivational states may be innate, or biologically prepared. Ortony and Turner's questioning whether chimpanzees experience envy or rats embarrassment does not appear to confront this evidence.

Ortony and Turner (1990) argued that the expressions of the intense positive emotions of relief and pride are indistinguishable from that of extreme distress. However, there is no empirical data indicating that there is a reliably identifiable facial expression for relief or pride, and *distress*, as they define it, may characterize several negative emotions.

Ortony and Turner (1990) also argued that some components of emotion expressions may be basic even though the emotions themselves are not. This is similar to the idea, discredited by many, that some components of words (semantic primitives) are simpler and more basic than the words themselves. Regardless of the merit of this controversial notion in semantics, its generalization to the biopsychological phenomena of emotions is questionable. The components of an emotion constitute an organized, functional system (Izard, 1977). Although a given component may become subject to regulation, or even dissociation (Izard, 1990), the functions of a given emotion, or any of its components, are direct or indirect products of the emotion as a system. For example, the dissociated expressive component of an emotion can continue to function as a signal of feeling or intention only because of its association in ontogeny (and phylogeny) with the neural and experiential components of the system. The expression obtains its significance from its linkage to the other components. An emotion, as an organized system of components, is the basis of critical adaptive functions (Izard, 1989). Hence, calling a component of expression (or any other component) more basic than other components or than the emotion itself appears incongruous.

Errors and ambiguities in Ortony and Turner's (1990) description of facial expressions of particular emotions detracted from their arguments against the relevance of expressive behavior to the concept of basic emotions. For example, they failed to distinguish between what DET's coding system identifies as an interest signal (slight corrugator action pulling browheads together) and an anger signal (frown made by more intense action of corrugator, procerus, and glabella depressor). They called both of these signals "furrowed brow" or "frown" and then argued that it signaled a "mental state" that could equally well be "puzzlement, concentrated attention, [or] frustration" (pp. 321-322). Insofar as the former is like interest and the latter like anger, Ortony and Turner have identified the two emotions DET matches with the two expressive patterns that are included in their "furrowed brow." Nevertheless, insofar as Ortony and Turner were arguing that some components of emotion expressions are ambiguous when in isolation and that expressions are dissociable from emotion experience, they are quite consistent with DET research methods and theory (Izard, 1990). That components or full configurations of expressions eventually become controllable and dissociable increases the overall flexibility and adaptive utility of the emotions system (Izard, 1990).

### *Emotion Experience*

DET has defined emotion experience as feeling, what William James (1916) saw as the essence of emotion and the roots of individuality. Although it is generally conceded that linguistic self-report is the only direct route to data on feelings and the concepts that represent them, DET holds that feeling states must be studied by multiple methods that yield convergent data. Thus, a combination of psychophysiological indexes, data from microanalytic coding of facial behavior, and behavioral ratings of coping actions that are consistent with self-report would constitute robust evidence for a specific feeling state (cf. Cacioppo et al., 1986).

As Ortony and Turner (1990) noted, reliance on language alone makes the search for a definitive list of basic emotions concepts difficult, at best. Nevertheless, several factor analytic studies have found a good, though not perfect, fit between DET's basic emotion categories and verbal descriptors of basic emotion expressions (e.g., Fuenzalida, Emde, Pannabecker, & Stenberg, 1981). Verbal report has been part of convergent data suggesting functional relations between cognitively induced basic emotion experiences and MAPs in muscles of corresponding emotion expressions (see Cacioppo et al., 1986), memory (Bower, 1981), and behavior predicted by DET to be functionally related to the particular emotion that was induced (Barnett et al., 1979).

Conceiving the emotions as a separate system and emotion experience as a feeling state that does not require cognitive mediation or include cognition as a component has support from neuroscience. Emotion can be activated by a thalamoamygdala (subcortical) pathway that can operate independently of neocortex and therefore independently of any type of cognition requiring cortical processing or integration (LeDoux, 1987). The emotional behavior (indexes of sympathetic arousal or avoidance) released by the amygdala can be seen as indicators of an intervening feeling-motivational state generated by the subcortical pathway. Evidence reviewed by Jacobs and Nadel (1985) also indicates that the brain mechanisms of the emotions system mature earlier than some of the mechanisms (e.g., hippocampus) required for contextual learning and for autobiographical, declarative memory. This evidence is consistent with the notion of the ontogenetic primacy of emotions and the functioning of emotion feeling-motivational states in advance of cognitive development (Izard & Malatesta, 1987).

The DET model of an emotion feeling-motivational state independent of cognition is consistent with clinical observations and empirical data on unconscious motivation. Emotion that is independent of cognition or that has become dissociated from relevant memory can explain what has been called *unconscious motivation*. For example, emotion feeling states in certain phobias or free-floating anxiety may exist without appropriate contextual information, including the memory that originally generated the emotion. The net result would be unconscious motivation (cf. Jacobs & Nadel, 1985). Given the ease and frequency with which cognitive processes become unconscious (Kihlstrom, 1987); unconscious motivation as defined by DET can be, and probably is, rather common.

Three other types of evidence suggest that emotion processes can operate independently of cognition. Emotions have been induced by unanticipated pain (see Izard & Malatesta, 1987), manipulation of facial expressions (Duclos et al., 1989), and changing the temperature of cerebral blood (Zajonc et al., 1989). In all these conditions the immediate cause of the emotion was noncognitive. Because emotions can be activated in these ways and by various drive states, hormonal changes, and other emotions (Izard, 1989), emotion feeling states from noncognitive causes are probably common. The neural mechanisms of the emotions system operate continually, evaluating the information from all these sources. The salient features of the information, whether from pain or appraisal processes, determine the specific quality of the emotion feeling-motivational state.

### “Hardwired” Connections and Basic Emotions

In contrast to biosocial theory's grounds for calling emotions fundamental, Ortony and Turner (1990) proposed that “biologically basic emotions are those for which the connection between the valenced appraisal and some other response is hardwired” (p. 324). They did not give an example of a basic emotion that met this criterion or of an appraisal and response that is hardwired. DET suggests that what is innate or biologically prepared are connections among neural programs for facial expressions, feeling states, and noncognitive activators of emotion. In contrast, connections between appraisal (construal and meaning analysis) and emotion components would seem to require learning. In any case, environmental demand for flexibility in adaptive response systems, particularly in preverbal infants, appears to be better served by having hardwired connections among expressions and feelings that serve communicative and motivational functions (Izard & Malatesta, 1987).

On the basis of their criterion, Ortony and Turner (1990) questioned the status of some specific basic emotions. They held that interest was not an emotion because it was not inherently valenced. DET hypothesizes specific facial movements that signal interest, and these movements have been shown to be related to an increase in cognitive and physiological responses to positive or preferred stimuli (Langsdorf, Izard, Rayias, & Hembree, 1983). Furthermore, interest items on emotion-adjective checklists are positively related to the broad dimension of pleasantness (Izard, 1972).

Ortony and Turner (1990) questioned the status of anger as a basic emotion on the supposition that anger has as an essential component of the affect of distress, defined as displeasure about some undesirable event. They then argued that because one could not be angry in this sense without being distressed in this sense, distress is more basic than anger. There may be two problems with this argument. First, it appears circular. Second, biosocial theories do not view distress as defined by Ortony and Turner as a basic emotion but as a broad emotional dimension that might characterize several negative emotions.

### Generation of “New Emotion Experiences”

Contrary to one of the major thrusts of Ortony and Turner's (1990) article, most biosocial theories have not been concerned with the problem of generating new, “nonbasic” emotions. They do not accept the color mixing analogy or the idea that “distinct emotions can be blended or merged to form new emotions” (p. 326).

Differential emotions theory has described a way of accounting for what it views as the virtually limitless variety of *emotion-related* experiences. In person–environment interactions an emotion feeling–motivational state interacts with cognitive processes to form an affective–cognitive structure—an associative network of feeling, images, appraisals, thoughts, and goals (Izard, 1977). The feeling–motivational state, the primal component of an affective–cognitive structure, contains inherent cues for cognition and action, biasing the selection of the cognitive components and action strategies. Thus, joy is more likely to cue thoughts and actions related to relaxing and sharing;

anger, strategies for surmounting barriers; fear, protective strategies that lead to safety and security.

Perhaps the first, and simplest, affective–cognitive structure is the associative bond between an infant's feeling of enjoyment and an image of the face of its mother (or primary caregiver). The social smile is regularly elicited by the infant's perception of caregivers in daily ministrations and face-to-face play. The formation of this affective–cognitive structure begins at about 3 weeks of age, when the social smile emerges and the infant is capable of perceiving the contours of the face, but well before appraisal processes enable discrimination among faces. At this age (and until about 4 or 5 months), the infant smiles at faces indiscriminately. With the emergence of perceptual discrimination, recognition memory, and storage–retrieval capacities, the bond can be established between the feeling of joy and an image of Mother's face. With the advent of verbal representation this initial affective–cognitive structure (joy–image bond) can differentiate into the complex affective–cognitive network called *love*, a network of feelings, memories, and anticipations that are activated by an image of a beloved mother's face.

Emotion–cognition interactions in fear-eliciting situations, if highly intense or frequently recurring, may become specific affective–cognitive structures, such as fear of dogs, fear of germs, and so on. The common and invariant factors in all these affective–cognitive structures are certain neural processes and the accompanying feeling state of fear (and possibly facial MAPs). To remain adaptive, an emotion must always motivate and cue mental and motor activities that are relevant to its basic functions. What varies are the cognitive processes and action sequences that become associated with the invariant factors.

The same explanation can be applied to the proliferation of experiences associated with any discrete emotion. Rozin and Fallon (1987) have demonstrated that once cognitive development enables children to grasp the concept of contamination, they can learn to experience disgust with virtually any food.

One of Ortony and Turner's (1990) examples of the development of a new emotion was that of “uncanny fear” (p. 327). They suggested that adding “uncanny feeling” to fear created uncanny fear. There are several problems with this formulation. First, there is no hard evidence bearing on the meaning of *uncanny feeling*. By dictionary definition, the uncanny can inspire wonder, excitement, or fear. Did Ortony and Turner mean that the feelings of wonder plus excitement plus fear equal a new kind of fear? If so, this is a process much like that implied by the color-mixing metaphor that they rejected. If excitement is considered an emotion (Tomkins, 1962, and DET view it as intense interest), then excitement plus fear is a cluster or pattern of basic emotions, part of the cluster that constitutes the affective phenomenology of anxiety (Izard, 1972). If they meant that the newly added element was the verbal representation of the uncanny event, then this is what DET has described as a fear-based affective–cognitive structure.

Ortony and Turner's (1990) explanation for generating new emotions bears some similarity to the DET model for explaining the great variety of emotion-related experiences or affective–cognitive structures. In many cases what they called new emotions are identified by DET as affective–cognitive structures.

The DET model for explaining the great variety of affective–

cognitive structures as a function of independent–interactive systems has implications for understanding and treating psychological disorders. Dimensions of personality and the affective phenomenology of anxiety and depression can be analyzed in terms of affective–cognitive structures containing a complex of images, thoughts, memories, and clusters or patterns of discrete emotions that are considered basic (Izard, 1972). The aim in treating phobias, for example, becomes a matter of decoupling fear feeling and inappropriate ideas about harmless situations or objects, a process similar to that in the therapeutic procedure called *exposure in vivo*.

### Concluding Remarks

Differences in theoretical approaches serve a useful function in science. They ensure that knowledge will be increased on many fronts at once, and they foster a kind of hybrid vigor in research. The gain from diversity could be greater if we tried harder at two things. First, we should carefully examine the basis and significance of differences, be clear about what they are, ignore trivial ones, and use the significant ones to guide empirical research. Second, we should seek to identify our common ground and work toward enlarging it. Clearly, knowledge of the emotions has been, and will continue to be, advanced by multiple approaches.

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