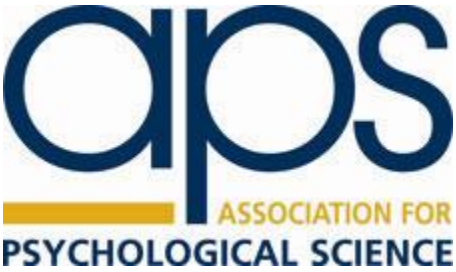

Basic Emotions, Natural Kinds, Emotion Schemas, and a New Paradigm

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ABSTRACT—*Research on emotion flourishes in many disciplines and specialties, yet experts cannot agree on its definition. Theorists and researchers use the term* emotion *in ways that imply different processes and meanings. Debate continues about the nature of emotions, their functions, their relations to broad affective dimensions, the processes that activate them, and their role in our daily activities and pursuits. I will address these issues here, specifically in terms of basic emotions as natural kinds, the nature of emotion schemas, the development of emotion–cognition relations that lead to emotion schemas, and discrete emotions in relation to affective dimensions. Finally, I propose a new paradigm that assumes continual emotion as a factor in organizing consciousness and as an influence on mind and behavior. The evidence reviewed suggests that a theory that builds on concepts of both basic emotions and emotion schemas provides a viable research tool and is compatible with more holistic or dimensional approaches.*

> "The thesis I am about to develop here is that [humans'] departure from the normal pattern of animal mentality is a vast and special evolution of feeling in the hominid stock . . . so rich and intricately detailed that it affects every aspect of our existence . . . "
>
> (Susanne Langer, 1967)

Many psychological scientists affirm that discrete emotion like joy, sadness, anger, and fear influence thought, decision making, and actions (Bechara, Damasio, & Damasio, 2000; Bower, 1991; Clore, Schwarz, & Conway, 1994; Fredrickson, 2000; Lerner & Keltner, 2000). Moreover, experts in affective science generally agree on the components and characteristics of an emotion. Yet, there is no consensus on a definition of the term *emotion*, and theorists and researchers use it in ways that imply different processes, meanings, and functions (Izard, 2006). Some emotion researchers have challenged the utility of discrete emotion concepts and pointed to broad affective dimensions or core affect as necessary and complementary constructs (J.A. Russell, 2003; Watson, Wiese, Vaidya, & Tellegen, 1999).

Theorists disagree on the processes that activate discrete emotions (see Ellsworth & Scherer, 2003) and on their role in our daily activities and pursuits (cf. Chartrand, Maddux, & Lakin, 2005). In the recent debate about emotions as natural kinds, the terms *emotion* and *basic-emotion theories* often conflated distinctly different concepts of basic emotions and emotion schemas (Barrett, 2006). There is also controversy about the validity and usefulness of the dominant view of emotions as natural kinds, usually defined as categories or families of phenomena having common properties that are given by nature (Barrett, 2006; Panksepp, 2007, this issue). In this article, I present a new look at a theory that offers resolutions for some of these issues and the possibility of improving terminology and conceptual analysis in affective science.

I address five issues relating to emotions and their role in human functioning: (a) the classification of basic emotions as natural kinds, (b) the nature of emotion schemas, (c) the development of emotion–cognition relations that lead to emotion schemas, (d) the nature of discrete emotions in relation to affective dimensions, and (e) a new paradigm that assumes continual discrete emotion in mental processes. I will present evidence and arguments showing that a discrete emotions framework that builds on concepts of basic emotions and emotion schemas remains a viable research tool that complements more holistic or dimensional approaches. Finally, I propose a new paradigm that assumes that emotions organize consciousness. It also assumes that even unattended emotions of low intensity operate as causal influences.

I will begin with the issue of emotions as natural kinds. Examining this issue requires a clear distinction between basic

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emotions and emotion schemas. Failures to make this distinction in critiquing emotion theories (e.g., those of Ekman, 1994, 1999, 2003; Izard, 1977, 1993; Panksepp, 2000, 2005) have lead to potentially misleading conclusions about discrete emotion theories (e.g., Barrett, 2006). Two things may have contributed to an apparent lack of awareness of the distinction between basic emotions and emotion schemas or of the importance of such a distinction. Early proponents of discrete emotion theories may have underplayed the emergence of emotion schemas in ontogeny and their dramatically increasing prominence in consciousness and causal processes after the infancy and toddler periods. Moreover, in much of the extant literature, the term *emotion* was often applied both to basic emotions as well as to emotion schemas (e.g., Ellsworth & Scherer, 2003; Frijda, 1986, 1993; Izard, 1977). Later in this article, I will clarify and sharpen the long-standing distinction between basic emotions and emotion schemas in differential emotions theory (DET; Izard, 1977), especially with regard to their emergence and development.

For sake of clarity, I will depart from common practice and use the term *basic emotions* to refer to those emotions that have been characterized as having evolutionarily old neurobiological substrates, as well as an evolved feeling component and capacity for expressive and other behavioral actions of evolutionary origin. I will also use the term *emotion schema* for the processes involved in the dynamic interplay of emotion, appraisals, and higher order cognition. The term *emotion schema* emphasizes a cognitive content that does not characterize a basic emotion or basic-emotion episode (cf. Ekman, 2003). *Emotion* as a standalone term refers to both basic emotions and emotion schemas.

BASIC-EMOTION THEORIES AND THE ISSUE OF NATURAL KINDS

> "What we observe is not nature itself, but nature exposed to our method of questioning."
>
> (Heisenberg, 1958/1999)

The question of natural kinds has mainly been a concern of philosophers, and it has waxed and waned since the pre-Socratic philosopher Empedocles (490 BCE–c. 430 BCE) proposed the theory of four elements. After thousands of years, philosophers have not reached consensus on the requisite criteria for inclusion in such a category (Griffiths, 2004). Thus, there remains disagreement among contemporary philosophers and psychologists as to whether the general category of emotion or any discrete emotion meets the criteria for classification as natural kinds (Barrett, 2006; Charland, 2002; Collier, 1996; Griffiths, 2004).

In disagreement with a number of neuroscientists and emotion researchers (e.g., Buck, 1999; Damasio, 1999; LeDoux, 1996; M.D. Lewis, 2005; Panksepp, 1998, 2005, 2007), some theorists have suggested that the emotion categories described in basic-emotion theories do not meet bio-evolutionary criteria for classification as natural kinds and that the natural-kind view has outlived its scientific value (Barrett, 2006; J.A. Russell, 2003). Some of the conceptual frameworks identified as basic-emotion theories are also theories of nonbasic emotions, such as emotion schemas.

Generally, natural kinds are considered as a category of phenomena that are given by nature, have similar observable properties, and are alike in some significant way. Basic emotions may be categorized as natural kinds on the basis of a common set of characteristic properties. These properties include emotion-specific universal capacities to regulate and motivate cognition and action independent of the cyclic processes that characterize homeostasis and physiological drive states like hunger and thirst (Izard, 1971; Tomkins, 1962). Complex emotion phenomena like emotion schemas are not natural kinds because they have properties that differ across individuals and cultures.

Hopefully, considering basic emotions as natural kinds will stimulate a reassessment and sharpening of distinctions among current conceptualizations of emotions and emotion-related phenomena. Such a reevaluation may also help show the futility of attempting to define emotion as an entity or essence. A heuristic that might derive from considering the question of natural kinds is the conceptualization of an emotion as a set of components and characteristics. Experts who did not agree on a unitary definition of emotion showed considerable agreement on emotion components and characteristics (Izard, 2006).

BASIC EMOTIONS ARE NATURAL KINDS

> "For I regard human emotions and their properties as on the same footing with other natural phenomena. Assuredly human emotions indicate the power and ingenuity of nature, if not human nature, quite as fully as other things which we admire, and which we delight to contemplate."
>
> (Spinoza, 1677/1957, pg. 114)

The cumulative evidence suggests that the following basic emotions meet criteria for classification as natural kinds: interest, joy/happiness, sadness, anger, disgust, and fear. Others have proposed similar lists and argued for their categorization as basic emotions (Ekman, 1999) or specifically for their classification as natural kinds (Panksepp, 2000). This list is shorter than those of other basic-emotion theorists (Plutchik, 1962; Tomkins, 1962) and is shorter than an earlier list of mine (Izard, 1977). In the remainder of this section, I propose that basic emotions are natural kinds on the basis of critical common properties, including their unique capacities to regulate and motivate cognition and action. Finally, I argue by analogy that the case for basic emotions as natural kinds is similar to that for the four basic tastes.

Components and Characteristics of Basic Emotions

A basic emotion may be viewed as a set of neural, bodily/expressive, and feeling/motivational components generated

rapidly, automatically, and nonconsciously when ongoing affective–cognitive processes interact with the sensing or perception of an ecologically valid stimulus to activate evolutionarily adapted neurobiological and mental processes. The resulting basic emotion preempts consciousness and tends to drive a rather narrowly focused stereotypical response strategy to achieve an adaptive advantage (cf. Buck, 1999; Ekman, 1994; Izard, 1977; Öhman & Mineka, 2001; Panksepp, 1998; Tomkins, 1962, 1963; cf. Edelman, 2006). However, this stereotypical basic-emotion response system is subject to developmental change. After the infancy and toddler periods of development, it can be more readily modified or inhibited by cognitive and motor activity or by additional information processing that results in the activation of a new emotion and its regulatory capacities (Cunningham et al., 2004; Ekman, 2003; Izard, 1977; Izard, Hembree, & Huebner, 1987). A basic emotion has five components or characteristics that support its classification as a natural kind.

First, basic emotions involve internal bodily activity and the capacity for expressive behavior that derive from evolutionarily adapted neurobiological systems, and they emerge early in ontogeny (Buck, 1999; Damasio, 1999; Darwin, 1872/1965; Dimberg, Thunberg, & Elmehed, 2000; Ekman, 1994; Izard, 1971; Langer, 1967; Lundqvist & Öhman, 2005; Öhman & Mineka, 2001; Panksepp, 2000; Plutchik, 1980). Cross-cultural data relating to patterns of facial behavior (Ekman, 1994; Izard, 1994) added some support to Darwin's (1872/1965) hypothesis on the innateness and universality of emotion expressions. As acknowledged by critics (Barrett, 2006; J.A. Russell, 1995), these cross-cultural data show that at least some emotion expressive signals are indeed universal and thus best explained in terms of evolutionary processes.

The neural substrates for a few basic-emotion expressions (e.g., interest, joy) are functional at birth or in the early months of life (Izard et al., 1995), and the others become functional over the course of the first 2 years (cf. Camras et al., 1998, 2002). Infants ranging from 2 to 8 months of age expressed more interest to a live human face than to a mannequin and more to the mannequin than to a face-shaped object with scrambled facial features. The pattern of heart-rate deceleration while the infants viewed the different stimuli was similar to that for interest expression (Langsdorf, Izard, Rayias, & Hembree, 1983). The acute pain of inoculation elicited prototypical pain and anger expressions in 4- to 6-month-old infants, and the proportion of time that they displayed the basic anger expression increased significantly with age from 4 to 19 months (Izard et al., 1987). Infants displayed anger expressions to goal blockage by 4 months of age (Stenberg & Campos, 1990), and their anger and sadness expressions were distinct in terms of related activity in the autonomic nervous system and the hypothalamic–pituitary–adrenal system (M. Lewis, Ramsay, & Sullivan, 2006). Infants ranging from 4 to 5 months old showed anger but not sadness expressions to loss of contingent stimulation (Sullivan & Lewis, 2003). Ten-month-olds showed different patterns of electroencephalograph asymmetry (different right and left frontal activation) during anger and sadness expressions (Fox & Davidson, 1988).

Both theory and research suggest that the capacities for emotion expressions and emotion recognition coevolved (cf. Fridlund, 1997) and that emotion perception, like emotion expression, affects one's feelings and actions. When experimenters used multiple methods to assess emotion recognition, 4-month-old infants showed differential patterns of affective responsiveness and visual attention to basic-emotion expressions of sadness, anger, and fear (Montague & Walker-Andrews, 2001). A mother's sadness expressions while her 9-month-old infant child was playing with attractive toys increased the infant's sadness expressions and decreased joy expressions and play behavior (Termine & Izard, 1988). However, familiarity with the target person and parent–child relations can affect the infant's perception of and responsiveness to emotion expressions (Montague & Walker-Andrews, 2002).

Recent evidence relating to adult facial and vocal expression of emotions also support the hypothesis of the universality of expressions of a limited set of basic emotions (e.g., Elfenbein & Ambady, 2002; Scherer, Johnstone, & Klasmeyer, 2003) and for their recognition via processing in evolutionarily old brain stem and amygdala systems (Adolphs, 2006; Öhman, 2005). Contemporary researchers support the universality hypothesis even though, unlike Darwin (1872/1965), they do not always allow for individual differences in emotion expression and emotion recognition.

Meta-analytic studies of functional magnetic resonance imaging (fMRI) data (which are typically only correlational) revealed nearly equal support for discrete emotions and the dimensional view of the structure of emotions in the brain (Barrett & Wager, 2006). Support for discrete emotions may become stronger with advances in fMRI technology that enable detection of the activity in brain stem and hypothalamic microcircuitry involved in emotion (e.g., fear, rage) response systems that may include emotion-related action sets or action tendencies (cf. Merker, 2007). Despite the limitations of current fMRI methodology and laboratory procedures for eliciting basic emotions, the extant evidence, including that from meta-analytic studies, provides support for the hypothesis that basic emotions are natural kinds.

Second, activation or elicitation of a basic emotion may depend in part on perception (or minimal/rudimentary appraisal) of an ecologically valid stimulus (e.g., a mother's face to elicit her infant's interest and her smile to elicit joy). A basic emotion does not depend on or include complex appraisals or higher order cognition such as thought and judgment (Ekman, 2003; Izard, 1977; cf. LeDoux, 1996; Öhman, 2005).

Third, a basic emotion has a unique feeling component that can be conceptualized as a phase of the associated neurobiological process (Langer, 1967; cf. Merker, 2007). Feelings derive from sensory processes that tell the organism

what is happening. Edelman (2006) argued that the human brain is capable of making very fine discriminations among internal states and that the resulting qualia are distinct from each other because they derive from integrative interactions of quite different neural arrangements. The feeling state of a basic emotion, which derives primarily from subcortical neural systems in the upper brain stem, has specific motivational properties (Buck, 1999; Izard, 1971; Lane, 2000; Merker, 2007; Panksepp, 2005; Tomkins, 1962).

Some theorists have argued that feelings emerged earlier in evolution than did perceptual processes and that the two followed relatively independent pathways (Humphrey, 2006; cf. Langer, 1967). The notion of separate processing channels for sensation and perception is consistent with findings from recent research. In normal adults, the threat of shock modulated information processing in the brain stem and apparently led to fear/anxiety feelings. This processing of feelings was unaffected by cognitive manipulations (Baas, Milstein, Donlevy, & Grillon, 2006).

Thus, a discrete emotion feeling is innate and its distinctive quality is invariant over the life span (Izard, 1984; Izard & Ackerman, 1997). Since the hypothesis of the innateness of emotion feelings was formulated (Izard & Malatesta, 1987; cf. Langer, 1942, 1967), no one has challenged it by demonstrating that it is possible to teach a child how to feel happy or sad or that such feelings can be constructed via conceptual processes.

Fourth, as discussed in more detail later, a basic emotion has unique regulatory properties that modulate cognition and action (Lundqvist & Öhman, 2005; cf. Merker, 2007). The resulting changes in cognition and action will in turn modulate the emotion (Cole, Martin, & Dennis, 2004; Darwin 1872/1965; Tomkins, 1962; cf. Campos, Frankel, & Camras, 2004).

Fifth, a basic emotion has noncyclic motivational capacities that include the power to influence cognition and action (Darwin, 1872/1965; Izard, 1971; cf. Campos et al., 2004; Cole et al., 2004; Eisenberg & Spinrad, 2004). Because of their relative independence of cyclic homeostatic processes and specific physiological needs, basic-emotion feelings provide an ever-ready source of motivation to serve adaptive functions. The regulatory and motivational properties of basic emotions are included among the criteria for classification as natural kinds because they represent the most important ways in which basic emotions are alike. These five characteristics and their associated structural components can be considered a cluster of properties that define basic emotions as natural kinds (Buck, 1999; Damasio et al., 2000; Panksepp, 2000, 2007; cf. Barrett, 2006; Rorty, 1980, 2004; cf. Charland, 2002, 2005; Griffiths, 2004).

Neurobiological Substrates and Feeling–Cognition Interactions in Basic Emotions

Substantial evidence indicates that basic emotions have evolutionarily based neurobiological roots and at least partially dedicated neural systems (Buck, 1999; Damasio, 1999; Damasio et al., 2000; Darwin, 1872/1965; Huber, 1931; Öhman, Flykt, & Esteves, 2001; Öhman & Mineka, 2001; Panksepp, 1998, 2000, 2005).

Emotion processes occur in brain stem areas dedicated to particular emotion responses, which in turn recruit higher levels of appraisal mediated by limbic and cortical structures (M.D. Lewis, 2005). Lewis drew this conclusion despite his strong defense of the notion that the conjoint operations of cognitive processes and emotion response systems rapidly cohere into a functional unity. In keeping with DET, Lewis believes that, in terms of cognitive information, the activation of a basic emotion requires only perception, which is (at best) a very primitive form of appraisal. I hypothesize that the percept needs to register only in phenomenal consciousness for the basic emotion to become functional (cf. Block, 2001, 2005; Lambie & Marcel, 2002; Rosenthal, 2002). Extensive meta-analytic reviews of fMRI data, despite their limitations for studying basic emotions, show about as much support for emotion-specific neural systems as they do for more global affective systems (Barrett & Wager, 2006).

Regulatory and Motivational Capacities of Basic Emotions

Even in early development, basic emotions are functional and motivational in unique ways. Basic emotions differentially recruit, organize, and motivate cognitive and motor response systems (Izard & Ackerman, 2000; Izard et al., 1995; Potegal & Davidson, 2003). They serve regulatory functions by sustaining, amplifying, or attenuating the activity of these systems (Campos et al., 2004; Cole et al., 2004; Goldsmith & Davidson, 2004; Izard, 1991, 1993). Basic emotions have cue-producing functions that provide information for individual and social functioning (Clore & Tamir, 2002; Izard, 1971). Beginning in infancy, basic-emotion expressions serve distinct social communicative functions via face, voice, and body signals that motivate others in distinct ways (Ekman, 2003; Huebner & Izard, 1988; Izard et al., 1995; Scherer, 1982; Sorce, Emde, Campos, & Klinnert, 1985).

The underlying neural systems of basic emotions can preempt the young child's other response systems to regulate cognition and action and react to the demands of the internal milieu or those of an organism–environment interaction (Izard, 1993; cf. M.D. Lewis, 2005; Panksepp, 2000, 2005). This preemptory power enables basic emotions to serve adaptive functions in situations that afford opportunities to develop social support systems and in challenging or threatening conditions that require protective behavior.

The regulatory capacities inherent in basic emotions have immediate effects on thought and action (Cole et al., 2004; Eisenberg et al., 1995; Eisenberg & Spinrad, 2004). For example, the favorable results of effective emotion regulation on empathic responding have been clearly demonstrated (Fabes, Eisenberg, Karbon, Troyer, & Switzer, 1994; Hoffman, 2000). In contrast, the behavior of children with conduct disorder and of adult

psychopaths shows the effects of emotion dysregulation or a deficit in emotion regulation (Conduct Problems Prevention Research Group, 1992, 1999).

In sum, each basic emotion has distinct universal and unlearned regulatory and motivational characteristics. For example, the basic emotion of interest focuses and sustains attention and motivates exploration and learning (Langsdorf et al., 1983; Silvia, 2006). In contrast, the basic emotion of fear inhibits approach and motivates escape or protective behavior (Tomkins, 1962, 1963). No other emotion serves these particular functions of interest and fear.

A Perspective on Basic Positive and Negative Emotions

In early development, basic positive emotions (interest, joy/contentment) occur frequently to facilitate exploration and learning, as well as affiliative and attachment behavior. Through the life span, the basic emotion of interest may continue to occur frequently in response to novelty, change, and the opportunity to acquire new knowledge and skills.

In normative conditions, basic negative emotions (sadness, anger, disgust, fear) have a low base rate and a short duration. They play a critical role in person–environment relations only when circumstances demand a rapid automatic response, as when an infant senses a distasteful substance or when a barefooted adult accidentally steps on a squirming object by the pond and immediately perceives it as a snake. The occurrence of basic emotions depends on a limited number of ecologically valid stimuli. In contemporary cultures in which people can live without undue concerns for safety, health, and life's necessities, basic emotions continue to work effectively in critical situations. However, basic negative emotions do not drive much of the behavior involved in love, work, and play (cf. Diener & Seligman, 2004). Their influence is strongest in infancy and decreases rapidly with maturation, emotion socialization, cognitive development, and social learning.

Negative basic emotions typically become less frequent with maturation and cognitive development and are rather uncommon in social settings by age 3 or 4 (Denham et al., 2003). Still, they are relatively more frequent in early development when strong rapid responses are more likely to prove necessary for action or for recruiting protective nurturance. They are also relatively more frequent in reactive aggressive children who characteristically have difficulty regulating emotions (Hubbard et al., 2004). The functionality of basic positive and negative emotions in early development provides support for the view of basic emotions as natural kinds.

Basic Emotions and Basic Tastes: An Analogy

It is possible to argue by analogy that the capacity to discriminate among basic-emotion feeling states, like discriminating among basic tastes, is innate and invariant across the lifespan. Feelings, like tastes, derive from sensory processes and have emerged via natural selection and evolution (Langer, 1967; cf. Edelman, 2006, for a discussion of an adaptive advantage of qualia). For many species, including humans, the capacity to discriminate and experience the basic tastes (sweet, salt, sour, bitter) develops and becomes functional prenatally or within a few weeks after birth. Although social and cultural factors can shape a wide variety of taste sensitivities, preferences, and aversions, learning and experience are not required for the development of the basic taste discriminations (Scott, 1981). Decerebrate and normal rats show virtually identical taste reactivity (Grill & Norgren, 1978). Anencephalic neonates responded to sweet, sour, and bitter substances (sucrose, citric acid, quinine) with appropriate acceptance–rejection responses and with different facial-affective responses. They sucked, swallowed, and smiled to sucrose, and they spit or vomited and cried to quinine (Steiner 1973, 1979).

The data relating to the underlying neural and behavioral processes suggest that the emergence of discriminable basic-emotion feelings is analogous to that for basic tastes and that both basic tastes and basic-emotion feelings are mediated at least in part by phylogenetically old subcortical structures (cf. Damasio et al., 2000; Panksepp, 2005). To assure survival and adaptation through the course of evolution, basic-emotion feelings, like basic tastes, had to retain a reliable impact on consciousness and action systems (cf. Langer, 1967; Panksepp, 1982, 2005).

Implications for a Research Agenda

Accepting the hypothesis that basic emotions are natural kinds would leave a plethora of questions for emotion researchers, including the many aspects of a fundamental question about feelings raised 4 decades ago. Langer (1967) argued that "Organic activity is not 'psychological' unless it terminates, however remotely or indirectly, as something felt." She then maintained that the central question is "how feelings enter into physical (essentially electrochemical) events that compose an animal organism" (Langer, 1967, p. 3). To this broad question, we could add queries about individual differences in thresholds for the activation of emotion feelings and their role in human development, empathy, adaptive behavior, traits of temperament or personality, psychopathology, social communication, and the sense of self and well-being.

EMOTION SCHEMAS IN DISCRETE EMOTIONS THEORY

> "I think that everyone will agree from what has been said, that the emotions may be compounded one with another in so many ways, and so many variations may arise therefrom, as to exceed all possibility of computation."
>
> (Spinoza, 1677/1957, pg. 63)

In the vernacular as well as in much of affective science, the concepts of basic emotions and emotion schemas are often

conflated or not accurately linked to theoretical frameworks (e.g., Barrett, 2006). To understand the characteristics of emotion schemas and their prominent role in human behavior, one must clearly distinguish them from basic emotions. It is equally important to appreciate how individual differences and social and cultural factors influence the development of emotion schemas.

DET distinguishes between basic emotions, which are defined as natural kinds, and emotion schemas, which are defined in terms of the dynamic interaction of emotion and cognition. Emotion schemas are similar to affective–cognitive structures (Izard, 1977), emotional interpretations (M.D. Lewis, 2000, 2005), ideo-affective organizations (Tomkins, 1962), and the appraisal–emotion/feeling–cognition phenomena described in many appraisal theories simply as emotions (see Ellsworth & Scherer, 2003, for a review). After the period of early development, emotion schemas (not basic emotion per se) constitute by far the most prominent source of human motivation. Any basic-emotion feeling may become part of an emotion schema as the basic-emotion feeling and related cognition become interacting constituents of a regulatory and motivational process (Izard, 1977; Izard, Ackerman, Schoff, & Fine, 2000; Tomkins, 1979, 1987; cf. Buck, 1999, Frijda, 1993).

Emotion schemas, the most common emotion experiences in older children and adults, involve higher order cognition and may involve complex appraisals (e.g., Roseman, 2004; Scherer, Dan, & Flykt, 2006). Emotion schemas are usually given common language or vernacular labels like joy or happiness, sadness, anger, and fear by scientists and laypersons alike (cf. J.A. Russell, 2003). When emotion researchers use one of these common labels, the context may show that they are actually referring to a construct like an emotion schema (as defined here) and not to a basic emotion. A number of researchers do distinguish basic emotions and other (nonbasic) emotions in terms of prototypical affect versus mood (e.g., Ekman, 2003), emotion episode versus attributed emotion (J.A. Russell, 2003; cf. Weiner, 1985), appraisal-based emotion versus emotion without appraisal processes (e.g., Ellsworth & Smith, 1988; Roseman, 2004; Scherer et al., 2006; see Ellsworth & Scherer, 2003, for a review), momentary episodic emotion versus long-term and traitlike emotion (Diener, Smith, & Fujita, 1995), or basic versus complex emotions (Griffiths, 2004).

Theorists who proposed the nonbasic emotion constructs of attributed emotion, appraisal-based emotion, complex emotion, and emotion schema generally agree that the key components of nonbasic emotions are feeling/affect and cognition (or cognitive processes). They differ in terms of how they describe the nature and participation of these two components. DET differs from the other theories in emphasizing that all emotion feelings, whether they are a component of a basic or nonbasic emotion, are products of evolution, have specific rather than global dimensions, and cannot be learned. Thus, an emotion schema consists of an evolved feeling plus learned labels and concepts. DET also differs from other theories in defining mood as emotion extended over time (in either phenomenal or reflective consciousness) rather than as objectless "core affect" (J.A. Russell, 2003) or as primarily negative affect (Ekman, 2003). Theorists generally agree that basic emotions are few in number, relatively infrequent, and short in duration and that nonbasic emotions (emotion schemas) are virtually infinite in number and usually longer in duration (cf. Damasio, 1999; James, 1890/1950; Kagan, 1978).

Frequently recurring emotion schemas or stable clusters of emotion schemas may be construed as emotion traits or as the motivational component of temperament or personality traits (Diener et al., 1995; Goldsmith & Campos, 1982; Izard, 1972; Magai & Hunziker, 1993; Magai & McFadden, 1995; cf. Tomkins, 1987). Current measures of children's temperament include discrete emotion scales (Rothbart, Ahadi, Hershey, & Fisher, 2001). Moreover, a set of coherent emotion schemas may be similar to an affective style or to a form of psychopathology such as anxiety and depressive disorders (Buck, 1999; Davidson, 1994, 1998; J.A. Gray, 1990; J.R. Gray, Schaefer, Braver, & Most, 2005; Izard, 1972; Magai & McFadden, 1995; Rothbart, Ahadi, & Evans, 2000; Rothbart et al., 2001; cf. Carver, 2004, 2005).

A person processing a sadness schema, for example, experiences a sadness feeling or motivation and generates sadness-related thoughts influenced by temperament or personality and contextual factors. The newly elicited thoughts may mix with sad memories. The nature of the perceptual–cognitive content of the schema plays a significant role in its duration. Although there are important differences at the cognitive and action levels between an anger schema and a basic anger episode, for example, the quality of the anger feelings is the same. Activation of an anger schema will affect ongoing cognition (including coping strategies), as well as action or action tendencies. Another example may help clarify the meaning of the term emotion schema. In anger-prone children (characterized by persistent or traitlike anger schemas), activation of an anger schema may cause the child to perceive anger-evoking cues that others see as neutral. Such anger-perception bias tends to make children more likely to engage in unprovoked aggression (cf. Schultz, Izard, & Bear, 2004). Thus, emotion schemas may become complex emotion–cognition–action systems.

Emotion Schemas Are Not Natural Kinds

Emotion schemas that derive from the interaction of perception, emotion, and evaluative appraisals and that involve higher order cognition cannot meet some of the criteria for classification as natural kinds (c.f., Charland, 2002; Griffiths, 2004; Panksepp, 2000). Although the feeling component of an emotion schema is a product of evolution (cf. Edelman, 2006; Langer, 1967), its perceptual–cognitive components are influenced by a vast array of individual and cultural differences in emotion–cognition relations.

Emotion schemas, unlike basic emotions, increase in number with development, occur relatively frequently, and last for longer periods of time. They provide most of the motivation

for the constructive endeavors and pursuits of daily life and for dealing with the ordinary challenges, frustrations, and threats within a given culture. By virtue of their emotion-feeling component, emotion schemas, like basic emotions, are regulatory, motivational, and functional. Emotion schemas are like moods (defined here as emotion feelings extended over time) in that they include a discrete emotion-feeling component and may last for long periods of time. They are unlike moods that are defined largely in terms of undesirable or negative affective states (cf. Ekman, 2003). As noted earlier, stable coherent families of emotion schemas may become organized as personality traits (Izard et al., 2000).

Emotion schemas may be activated by appraisals, memories, and noncognitive processes (e.g., changes in hormone levels; Izard, 1993) and have both an emotion feeling and a cognitive component. Developmentally, they emerge from learned associations or connections between emotion feelings on the one hand and perceptions, images, and concepts/thoughts on the other. They may be continually modified by new information that is processed as an emotion schema runs its course. When the emotion and information processes extend across feeling, cognition, and overt behavior, the resulting network of intersystem connections may become an emotion–cognition–action schema. Emotion schemas are a natural outcome of emotion and social–cognitive development, and their cognitive content typically changes over time. Their feeling component may derive from an early emerging basic emotion or from a later developing emotion like shame or contempt.

Evidence suggests that the emotion feeling and cognitive components of an emotion schema may have domain-specific neural substrates but they still operate in dynamic interplay to provide a functionally unified process (M.D. Lewis, 2005). In any case, the capacity for some independence between emotion and cognitive systems becomes apparent under certain conditions. Lesions to neural systems or disruption of neural processes change or eliminate emotion responding to particular stimuli (Bechara et al., 1995; Damasio, Tranel, & Damasio, 1990). Thus, the possibility of a degree of functional independence for emotion and cognitive systems in the intact brain should remain a question for future research (Izard, 2004). We still do not know how to explain why the feeling–cognition mix in an emotion schema is at times merely glowing and at other times flaming hot.

The capacities that enable individuals to frame emotions neurobiologically and develop emotion schemas may be built into the neural systems that underlie both emotion and perceptual–cognitive systems. Built-in neural capacities that enable the growth and development of interactions and connections among emotion, cognition, and action seem essential to the development of flexible and effective adaptive capabilities. Emotion and cognition appear inseparable in emotion schemas, but there remain distinct components and characteristics of emotion and cognition. One can predict and influence the other (Ackerman, Abe, & Izard, 1998; Ellsworth, 2003; Izard & Ackerman, 2000; Keltner, Ellsworth, & Edwards, 1993; M.D. Lewis, 2005). A substantial body of research in social and personality psychology and behavioral neuroscience has yielded findings consistent with the present conceptualization of emotion schemas, their components, and their relations to discrete emotions (motivations) and actions (e.g., Carver, 2004, and Harmon-Jones & Allen, 1998, reviewed later).

The Development of Emotion Schemas

Young infants can form rudimentary emotion schemas. The first emotion schemas formed are probably those involving links between feelings of interest and joy and concepts or images of human faces (Izard, 1978; cf. Montague & Walker-Andrews, 2002; Walker-Andrews & Haviland-Jones, 2005). After a child acquires language, a basic-emotion feeling can become part of diverse emotion schemas by making connections between the feeling and the words associated with emotion labeling and the emotion experience. Once activated in a child who has acquired language or in an adult, any emotion feeling typically and immediately recruits relevant cognition. The subsequent interplay of the emotion feeling and cognition defines the overall experience of an emotion schema (e.g., Izard, 1977, 1992). Some emotion states may begin with the activation of a basic emotion and become an emotion schema via emotion regulatory processes that enable innumerable intersystem connections between feelings and evaluative, reflective, and analytical thought (cf. Cole et al., 2004; Eisenberg & Spinrad, 2004).

In later child and adolescent development, emotion feelings and increased cognitive ability provide the foundation for the construction of many new and more elaborate emotion schemas including so-called self-conscious and moral emotions that are present in earlier development in simpler forms (Abe & Izard, 1999; Ellsworth, 2003; Hoffman, 2000; Izard, 1992, 1993; H.B. Lewis, 1971; M. Lewis & Michalson, 1983; cf. Buck, 1999; Frijda, 1986, 1993). The common feature in all emotion schemas is an evolved emotion feeling and its distinctive regulatory and motivational capacities.

Acquiring adaptive emotion schemas, particularly in early development, may be tantamount to transforming what might have emerged as a basic-emotion episode (and its more or less automatic prototypical response) into a more readily modifiable emotion schema (cf. Ekman, 2003; Frijda, 1988, 1993; Scherer, 2005). With further cognitive and moral development, an emotion schema may include consideration of the consequences of impulsive actions that are driven by negative basic emotions. Unfortunately, the development of emotion schemas can and do go awry. Maladaptive connections between emotion feeling, cognition, and action can lead to behavior problems and psychopathology (Izard et al., in press; Izard, Youngstrom, Fine, Mostow, & Trentacosta, 2006).

In some respects, the development of emotion schemas may be similar to the development of flavor appreciation. Sensory

bio-psychologists who study taste have done less research on the broader category of flavor than on the discrete basic tastes. This is so, in part, because none of the myriad flavors is simply a function of the gustatory sense. Flavors and flavor appreciation are influenced by the olfactory, haptic, and visual senses and, as in the case of emotion schemas, by countless cultural factors.

DISCRETE EMOTIONS AND AFFECTIVE DIMENSIONS

Psychologists have studied and debated the relation of discrete emotions to broad affective dimensions for more than a century (Davidson, Ekman, Saron, Senulis, & Friesen, 1990; Diener & Iran-Nejad, 1986; J.A. Gray, 1990; Izard, 1971; Lang, Bradley, & Cuthbert, 1998; Spencer, 1890; Woodworth & Schlosberg, 1954; Wundt, 1907). Following the early work of Wundt (1907), Woodworth and Schlosberg (1954) demonstrated that the placement of emotion-specific facial expressions in two dimensional space could be predicted by ratings of discrete emotion expressions on the dimensions of valence (pleasantness vs. unpleasantness) and acceptance versus rejection. Scientists still debate the issue of the relative usefulness of discrete emotion categories relative to dimensions such as valence and arousal and broad motivation systems such as approach–withdrawal for studying emotion- or affect-related responding (e.g., Carver, 2004; J.A. Russell, 2003).

Some researchers see discrete emotions or "categorical" approaches as highly limited in scientific value (Barrett, 2005, 2006; J.A. Russell, 2003) and suggest that correlations among indices of discrete emotions show that they lack independent effects (e.g., Barrett, 2006). Correlation shows only that two variables covary, and this is exactly what is expected for sadness and anger schemas in many circumstances of daily life (Diener & Iran-Nejad, 1986), as well as in depression (Izard, 1972; Marshall & Izard, 1972; Watson & Clark, 1984).

A Case for Discrete Emotions

Many studies have shown that discrete emotion variables have different predictors and contribute to different behavioral outcomes. For example, the discrete emotions of sadness and anger have different causes and effects (Potegal & Davidson, 2003; Potegal, Hebert, DeCoster, & Myerhoff, 1996), and the affective experiences of sadness and anger schemas, rather than their cognitive content, determine their effects (Keltner et al., 1993). The differential effects of discrete sadness schemas (as well as fear and shame schemas), but not of anger schemas, characterized economically disadvantaged children as a result of their being diagnosed and given special assistance for reading problems (Ackerman, Izard, Kobak, & Brown, 2006).

Discrete Emotions Are Functional

Discrete emotions concepts help scientists, as well as people in general, get a handle on feelings and intentions. Children as young as 28 months use the vernacular emotion labels of happy, sad, mad, and afraid (Bretherton & Beeghley, 1982). By 3 years of age, children can discriminate among causes of these emotion concepts (Trabasso, Stein, & Johnson, 1981).

Numerous studies show the early functionality of reliably identified discrete emotion expressions in young children. For example, high levels of sadness and anger expression in 1.5-year-old toddlers predicted negative personality traits at 3.5 years (Abe & Izard, 1999), and these traits remained stable into the adolescent years (Abe, 2005). Yet, infant emotional vitality, in terms of anger and fear expressions that communicated effectively with the caregiver, was linked to enhanced cognitive and language outcomes for children through 3 years of age (Robinson & Acevedo, 2001).

In Western cultures (and probably in others as well), people need the category label of *joy* (or its equivalent) to explain the pride of achievement, *sadness* to explain the experience of a life-changing loss, *anger* to explain the frustration of blocked goal responses, and *fear* to explain flight to one another for safety (Eibl-Eibesfeldt, 1972; Izard, 1991; Izard & Ackerman, 2000). People need the notion of a pattern of sadness and anger schemas to explain reactions to the terrorist disaster of 9/11/2001 (Carver, 2004; Fischhoff, Gonzalez, Lerner, & Small, 2005), and they need a pattern of fear and anger schemas to explain the effects of the perceived risks of terrorism (Lerner, Gonzalez, Small, & Fischhoff, 2003). To paraphrase Bertrand Russell (1945), a discrete emotion category is a convenient way to collect a set of components and characteristics into a useful bundle.

Discrete Emotions Affect Empathy and Social Competence

Knowledge of specific discrete emotions or emotion schemas is necessary for *empathy*, which is usually defined as the ability to respond to the unique emotion experience of another person (Decety & Jackson, 2006; Hoffman, 2000). Empathy may provide the emotion motivation that drives altruistic behavior observable in human toddlers and chimpanzees (Hoffman, 2000; Warneken & Tomasello, 2006). Some scientists have suggested that empathy has a fairly well-defined functional neural architecture (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003).

Identifying and talking about emotions in the family has substantial benefits in terms of child development (e.g., Dunn & Brown, 1994), as does emotion coaching relative to particular discrete emotions (Gottman, Katz, & Hooven, 1997). Preschool and kindergarten children's emotion knowledge measured in terms of their understanding of the expressions, feelings states, causes, and effects of joy, sadness, anger, and fear has proved to be a robust predictor of critical behavioral outcomes. Emotion knowledge predicted not only social competence but academic achievement and academic competence as well (Denham, 1998; Denham et al., 2003; Izard et al., 2001; Mostow, Izard, Fine, & Trentacosta, 2002; Trentacosta & Izard, 2007).

Moreover, a number of effective preventive interventions for children include lessons about specific emotions (e.g., Denham & Burton, 2003; M.T. Greenberg, Kusche, Cook, & Quamma,

1995). One teacher-implemented preventive intervention for young children at risk is based solely on discrete emotions theory and devotes all its lessons to helping children understand the expressions, feeling states, and functions of discrete emotions and learn emotion regulation techniques (Izard, 2002; Izard et al., 2006). Children in the treatment (emotions course) group of an experimental trial showed greater emotion knowledge and emotion regulation and less anger expression, aggression, anxious or depressed behavior, and negative interactions with peers and adults than did children in a control group. Another experimental trial yielded tentative evidence that emotion knowledge mediated the effect of treatment on emotion regulation and that emotion competence (defined as an aggregate of those two variables) mediated the effect of treatment on social competence (Izard et al., in press). Also, adult psychotherapies that concern discrete emotions as causal processes have been validated (L.S. Greenberg & Paivio, 1997; Lynch, Chapman, Rosenthal, Kuo, & Linehan, 2006). Discrete emotions like interest and joy and sadness and anger are an essential part of human experience; part of our conceptual world; part of what we measure as temperament and personality; part of our explanation of ourselves; and a part, though a widely different and variable part, of every known culture (cf. Scollon, Diener, Oishi, & Biswas-Diener, 2004; Shweder, 1994).

Some Limitations of Dimensional Approaches

Although there may be some general characteristics of basic emotions and emotion schemas that justify grouping them by valence or direction of motivated action, broad descriptive terms such as positive and negative emotions, as I and others have used them, are arbitrary. In real-world contexts, any emotion can have positive/adaptive or negative/maladaptive effects (Izard, 1977). For example, smiling and laughter can be derisive, sadness may elicit empathy and social support, anger may increase moral courage or help in defense of self and loved ones, and fear may facilitate our banding together for safety. Thus, in many situations, a measure of an emotion's adaptiveness or its effect in motivating constructive or adaptive behavior may provide more useful information than its location as a point on a dimension or arc on a circumplex (Youngstrom & Izard, in press).

A significant body of research has raised questions about dominant conceptualizations of affective dimensions that tend to identify the approach system and avoidance systems with positive and negative discrete emotions, respectively. For example, in three studies, Carver (2004) examined the relations among psychological (trait/dispositional) measures representing the neurobiological behavioral approach system (BAS) and the behavioral inhibition system (BIS; J.A. Gray, 1990, 1994a, 1994b) on the one hand and indices of personality and discrete emotions elicited by fictitious and real-life (terrorism) scenarios on the other. The relevance of Carver's (2004) findings on emotions (which I see as equivalent to emotion schemas) seem consistent with the present propositions relating to the functions of emotions. The first of Carver's (2004) studies showed that, contrary to Grey's theoretical prediction, frustrative nonreward did not lead to BIS activity but to the discrete emotions of sadness and anger or to sadness and anger schemas (as defined in this article). Study 1 also showed that a measure of fun seeking predicted end-of-session sadness and frustration or anger better than did the index of the BIS. Study 2 showed that, contrary to the dominant view, the BAS involves negative emotions (e.g., anger schemas) as well as positive emotions. Study 3 examined predictors of anger elicited by scenarios relating to the terrorist attack on the World Trade Center. Although the BIS was a strong predictor of fear as the dependent variable, the index of anger was also a predictor. Furthermore, the index of fear made a significant contribution to the prediction of anger, and the BIS was marginally significant.

The findings reviewed complement theory (Carver & Scheier, 1990; Levenson, 1999) that questions the status of approach and avoidance as unipolar affective dimensions of positive and negative valence or as constructs that relate to only positive and negative emotions. The findings also complemented other research on that issue. For example, evidence from electroencephalograph studies showed that motivational direction (approach or avoidance) should not be confounded with affective valence. Anger, an emotion generally considered as negative in valence, often operates as an approach motivation. An "anger approach" (that corresponded with greater left-anterior than right-anterior cortical asymmetry) was sometimes associated with constructive behavior (Harmon-Jones & Allen, 1998; cf. Allen, Harmon-Jones, & Cavender, 2001).

Both Discrete Emotions and Dimensional Approaches Are Useful

Some discrete emotion theorists have used both discrete emotion concepts and dimensional approaches (e.g., Ackerman et al., 2006; Izard, 1971). Self-report data on emotion feelings and dimensions of affective experience support the notion that categorical and dimensional approaches may be seen as complementing rather than contradicting each other (Diener & Iran-Nejad, 1986; Watson & Clark, 1984). Each approach can explain variance in emotion-related constructs or behavioral outcomes. Findings from both discrete emotion and dimensional approaches should be useful when translating research into preventive interventions concerned with helping children control specific emotions (such as anger) and the pattern of affects involved in different types of aggression in school children.

To advance emotion science and establish probabilistic relations between reliably measured affective variables, we probably will need both the dimensional and discrete approaches. Theoretically, they may in some cases be roughly analogous to physicists' wave and particle constructs, both of which are needed to explain the quantum behavior of the electron. Developmental research reminds us that concepts start

broad and become more differentiated with maturation, experience, or both (P.C. Quinn, 2002). Toddlers may identify the feelings associated with facial expressions as good or bad before they use discrete emotion labels like happy or sad (Izard et al., 2006; cf. J.A. Russell & Bullock, 1986). We need to balance our concern with particulars (separate emotions, individual emotion experiences) on the one hand and with more holistic constructs or broad dimensions (positive emotionality vs. negative emotionality, approach–avoidance motivation) on the other. Researchers still have not met challenges to both approaches that were recognized early on. Dimensional systems do not fully capture information provided by discrete emotion concepts, and the discrete emotions may appear as a dimension when they occur in patterns and in temporal proximity. The question as to why discrete emotions are interrelated and frequently occur in dynamically interacting patterns may be equally or more interesting than the question of the structure of emotions (Diener & Iran-Nejad, 1986; Izard, 1972).

In sum, researchers continue to make effective use of both the dimensional and discrete emotions approaches to advance affective science. Approach–avoidance motivational concepts are powerful tools for explaining a host of behaviors, but discrete emotions provide the individual with information on how to approach or avoid (Youngstrom & Izard, in press). Both explanatory systems are needed, at least until we have strong evidence that one can replace the other. Some problems in emotional development (e.g., the emergence of social skills that depend on appropriate emotion expression and emotion recognition) may remain opaque to global or dimensional approaches (Izard, 2002, Izard et al., 2006; Shafritz, Collins, & Blumberg, 2006). On the other hand, some questions raised by neuroscientists relating to phenomena such as affective style and affective disorders seem well suited to a dimensional or more global approach (Davidson, 1998). In sum, the dimensional and discrete emotions framework can be used as complementary research tools.

PROPOSAL FOR A NEW PARADIGM

> "Everyone shapes his actions according to his emotions. . . . Experience teaches us no less clearly than reason that men believe themselves to be free, simply because they are conscious of their actions and unconscious of the causes . . . Therefore, those who believe that they speak or keep silence or act in any way from free decision of their minds, do but dream with their eyes open."
>
> (Spinoza, 1677/1957, pp. 31, 33)

Some existing theoretical formulations maintain that all emotions are a function of conceptual acts on positive or negative core affect (J.A. Russell, 2003) and view emotions only as responses and as having no explanatory power (Barrett, 2005, 2006). These theories suggest attractive possibilities for directions in research, but alternatives that include clearly defined discrete emotion variables are needed for sake of balance. The new paradigm assumes that emotions are the primary motivational system. It also assumes that discrete emotions are always present in the human mind and always an influence in cognition and action. Thus, this proposal for a new paradigm stands in contrast to the positions described above. Contrasting the critical differences between these proposals and the present one should help in understanding the key hypotheses of the paradigm proposed here.

Emotion Feelings: Evolution and Development Versus Conceptual Act

J.A. Russell (2003) and Barrett (2006) proposed that emotions emerge from conceptual analysis of core affect (the only affect given by nature) when "conceptual knowledge" is brought to bear to categorize a momentary state of core affect" (Barrett, 2006, p. 49). I agree that conceptual processes play a critical and continuous role in our emotional life. Humans, even in early infancy, are very good at forming concepts (P.C. Quinn & Eimas, 2000), and these concepts become associated with emotion feelings. Once young children can label emotions, conceptual processes begin to play an essential and rapidly growing role in determining the content of emotion schemas. However, I do not agree that thinking creates emotion feelings. Both theory and research show that cognitive processes can activate emotions (see Ellsworth & Scherer, 2003, for a review), but they do not show that conceptual acts can determine how we actually experience emotions (Edelman, 2006; Merker, 2007). Emotion feelings, like other sensations, can not be learned (Izard & Malatesta, 1987; cf. Humphrey, 2006).

The idea of the primacy of conceptual act in the generation of a discrete basic emotion (e.g., Barrett, 2006; J.A. Russell, 2003) is inconsistent with three sets of findings from neuroscience. The first set supports the hypothesis of an evolved fear system that does not depend on conceptual processes for its activation (Öhman et al., 2001; Öhman & Mineka, 2001). The second set demonstrated that discrete emotion expressions and feelings could be evoked by direct brain stimulation (e.g., Krack et al., 2001; Okun et al., 2004; Panksepp, 2007). The third set of findings showed that emotion, or its marker signals in bioregulatory processes, precede conceptual understanding in decision-making tasks (Bechara et al., 2000). Although the idea of core affect bears some resemblance to Damasio's concept of background feeling, the corresponding explanations of the activation of emotion are orthogonal. Damasio (1999), like James (1890/1950), maintained that some form of bodily expression always occurs before the feeling state.

Experimental evidence shows that emotion information processing sometimes precedes conceptual processes. In a study of automatic and controlled processing of faces, racial bias was associated with a greater difference in amygdala activation caused by Black and White faces. This automatic response (probably mediated by upper brain stem circuitry) occurred within 30 ms, which is 100 ms before controlled processing

mediated by the prefrontal cortex kicked in and modulated the automatic amygdala/emotion response (Cunningham et al., 2004). The rapidity of adult's preconscious amygdala responses to outgroup faces (<50 ms) challenges the idea of the primacy of conceptualization in the generation of emotion processes. Other evidence from neurobiological studies suggests that emotion-related cognition (appraisals, interpretations) may emerge at about the same time as emotion feelings but could not precede them or have primacy in emotion activation (M.D. Lewis, 2005; cf. Öhman et al., 2001).

Conceptual processes cannot explain the apparent sharing of feelings and the development of intersubjectivity between a mother and her young infant (Stern, 1985), a process that some consider innate (Tomasello, Carpenter, Call, Behne, & Moll, 2005). It would be difficult to show conceptual primacy as a factor in the 3-month-old infant's basic negative emotion expressions when its mother stops a playful interaction and assumes a still face (Hembree, 1986; Tronick, Als, Adamson, Wise, & Brazelton, 1978). Changes in the infant's basic-emotion expressions are apparently driven directly by changes in mother's facial expressions (Muir & Hains, 1993). Such data support the idea that infants are emotionally precocious (Sroufe, 1996). Neural systems involved in emotion processes are the most active in the brain during first months of life (data described in Damasio, 1999). In addition, evidence that children without a cerebral cortex display discrete basic-emotion expressions and behavior suggestive of the associated feelings can not be explained in terms of conceptual processes (Merker, 2007).

Thus, a conceptual act is not necessary to enable neural processes in periaqueductal grey and other mesodiencephalic mechanisms to produce basic-emotion expressions and feelings (Merker, 2007; cf. Edelman, 2006). Even in the case of the later developing emotion schemas (e.g., shame, guilt, contempt) that apparently depend on a concept of self and social-relational processes, it is not clear how cognition could determine their distinctive feeling states (Hobson, Chidambi, Lee, & Meyer, 2006). The evidence suggests that the feeling component of emotion schemas evolved and are holistic by nature. Otherwise, it would be necessary to explain how a conceptual act puts the constituents of a feeling together.

That conceptual processes play an enormous role in our emotional life is not controversial. Humans, even in early infancy, are very good at forming concepts (P.C. Quinn & Eimas, 2000; P.C. Quinn, Westerlund, & Nelson, 2006). Though conceptual processes do not determine how we actually experience emotions, they play an essential role in determining the content of emotion schemas across the life span, and that role increases with age. After language acquisition, categorization and other conceptual processes become powerful tools in labeling and sharing emotion feelings and in the development of emotion schemas that will become integral to personality traits and to the self-concept. Thus, the emotion schemas that begin in early development and that result from feeling–thought interactions ultimately constitute a complex and highly flexible motivational system for human behavior.

Discrete Emotions Feelings Versus Core Affect

The concept of core affect, as well as the conceptual act hypothesis for generating emotions or specific feeling states, has been challenged by research on the determinants of the position of feeling in affective space. Scherer et al. (2006) showed that it was possible to predict the proposed dimensions of core affect (e.g., valence and arousal) from multiscale appraisal data and that the reverse prediction was not possible.

A Significant Point of Agreement: Affect/Emotion Always in Mind

Though the new paradigm proposed here differs substantially from those suggested by Barrett (2006) and J.A. Russell (2003), the implications of the differences between them may pale in significance when viewed in the light of an important point of apparent agreement. This paradigm-shifting point is that there is no such thing as an affectless mind; affect or emotion is always present. Furthermore, I propose that all mental processes are influenced by the ever-present affect or emotion. A growing body of research shows that perception, cognition, decision making, judgment, and action are influenced by emotion (Bechara et al., 2000; Bower, 1991; Clore, 1992; Forgas, 1995; Lerner & Keltner, 2000; M.D. Lewis, 2005; B. Quinn, in press; Zajonc, 1998).

The idea that emotion and cognition continually interact and influence each other reciprocally is a venerable one. At least since the early 17th century, philosophers have argued that emotion (passions, affections, feelings) plays a critical role in mental processes and implied that emotion feeling is always present in the organism. In *Novum Organum*, Francis Bacon observed that "The human understanding is no dry light, but receives infusion from the will and affections; whence proceed sciences which may be called 'sciences' as one would ... Numberless in short are the ways, and sometimes imperceptible, in which the affections color and infect the understanding" (Bacon, 1620/1968). Bacon's theme was revived by Creighton (1921), who argued cogently for a continual presence of emotion or feeling in mentation. He proposed that "In actual life the feelings do enter in and often largely control the reason" (p. 466). Langer (1942) extended Creighton's analysis and maintained that language "fails miserably in any attempt to convey the ever-moving patterns, the ambivalences and intricacies of inner experience, the interplay of feelings with thoughts and impressions, memories ..." (pp. 100–101).

Although it is interesting and encouraging that there is some agreement across theories on the long-standing idea of continuous affect/emotion, there remain significant differences in the conceptions of the nature of that affect or emotion (i.e., discrete emotions vs. core affect). There are also differences among the

ideas about the relation of the continual affect or emotion to motivation and the activation of other emotions. J.A. Russell (2003) and Barrett (2006) suggest that core positive and negative affect is a key factor in these processes. I hypothesize that discrete emotions organize both phenomenal and reflective consciousness and influence mental processes in emotion-specific ways.

The present proposal for a new paradigm stems from a fresh look at the nature of emotion, especially the emotion of interest. Three propositions help frame the paradigm: (a) The emotion of interest or a succeeding emotion or pattern of emotions that it helps generate is the principle force in organizing consciousness; (b) the activation of a new emotion involves nonlinear interaction between ongoing emotion and cognition; and (c) in most circumstances free of stress or threat, interest is most likely to be the emotion in the human mind that continually influences mental processes. Even in difficult times, interest often interacts with negative emotions to facilitate coping processes.

A Fresh Look at the Nature of Emotions

In a recent survey, 39 internationally known experts in emotion research were asked to give a definition of emotion (Izard, 2006). Thirty-three of them replied. They represented several disciplines and specialties and many, if not all, current theoretical approaches to the study of emotion. Not unexpectedly though, several noted that (a) it was not really possible to define emotion, (b) definition depends on the particular emotion, and (c) definitions would vary widely. As expected, there was indeed no consensus.

A follow-up survey requested the emotion experts to indicate the extent to which they agreed that an emotion contained each of six components and the degree to which an emotion could be described by each of nine characteristics. These components and characteristics were identified in one or more of their "definitions." Twenty-four of the experts responded. Through the use of a 10-point scale, they showed moderate (5–6) to high (7–9) agreement on all these specific characteristics and components. The most highly endorsed components were "neural systems dedicated at least in part to emotion processes" (8.9) and "response systems" (8.6). The most highly endorsed characteristics were "recruits response systems" (8.9) and "motivates cognition and action" (8.2). Thus, the lack of consensus on a unified definition did not prevent considerable agreement on the defining features or components and characteristics of emotions.

The Nature of the Emotion of Interest and its Relation to Cognition and Behavior

> "I don't want to be happy. I want to be alive and active."
> (George Bernard Shaw, cited in *The Eternities*, 2007)

Although one can glean or infer things that seem relevant to interest as an emotion in classical philosophy, Darwin, and James, the first full description of interest as an emotion belongs to Silvan Tomkins (1962). A philosopher by training, Tomkins may have been inspired by Aristotle's claim that human beings have a natural desire to know and by Locke's idea that a child's "native propensities" include curiosity (Aristotle, trans. Irwin & Fine, 1995; Locke, 1695/1989). Tomkins maintained that interest is essential to the development of intelligence and the maintenance of creative activity. His eloquent description still stands without equal, though others have made significant contributions (Ellsworth, 2003; Fredrickson, 1998; see Silvia, 2006, for a review). Interest is described in some discrete emotion theories as a basic emotion that focuses attention and as a component of an interest schema that includes goals and values (Izard, 1977; Tomkins, 1962). Interest schema as defined here is similar conceptually to Plutchik's (1980) "anticipation" and conceptually and neurobiologically similar to Panksepp's (1998, 2000) seeking/anticipatory systems, which depend on dopamine circuits.

The concepts of interest and interest schema may also be related to Biederman and Vessel's (2006) "hunger for information" or "infovore" system. Information seeking, which can be seen a manifestation of a form of interest, is supported by the release of opioids or endomorphins in the association areas of the brain as a result of learning or comprehending (Biederman & Vessel, 2006). Other interest-related activities may be supported by a neural network that runs between the prefrontal cortex and the ventral striatum. The ventral tegmental area of the striatum supplies dopamine for the pursuit of novelty (Depue & Collins, 1999; M.D. Lewis, 2005; Panksepp, 2000).

Interest is apparently operative at birth and can be objectively measured in the neonatal period (Langsdorf et al., 1983). Predominant interest schemas together with occasional joy/contentment are the pattern of emotions that characterizes the flourishing adult (Fredrickson & Losada, 2005). Bertrand Russell (1930) described a type of happiness that closely resembles the contemporary conception of interest as emotion or motivation and argued that such "happiness" explains the lives of scientists.

Distinguishing Features of the New Paradigm

Two additional points distinguish the present proposal for a new paradigm. The first relates to the process of emotion activation or the emergence of discrete emotion experiences. The second concerns the nature of the affect or emotion that is continually in the mind.

Nonlinear Versus Linear Processes in Emotion Activation

Many contemporary theorists maintain that the activation of a new emotion follows a linear process such that a discrete emotion emerges only after appraisal or conceptual processes (e.g., Barrett, 2006, p. 49; see Ellsworth & Scherer, 2003, for a review). In contrast, I maintain that the activation of a new discrete emotion is a nonlinear process involving a dynamic interaction

between ongoing emotion feeling and cognition. Current evidence suggests that both ongoing emotion and cognition and their interaction are involved in the activation of a new emotion (cf. M.D. Lewis, 2005). Thus, the background for the activation of a new emotion experience is the flow of ongoing emotion and cognition in the individual. A new emotion derives from the processing of new information by the neural systems or networks that underlie emotion and cognition.

In the activation of a new basic emotion, the causal cognitive information may consist of only a percept of an ecologically valid stimulus. Given the principle of continual emotion and, hence, continual emotion–cognition interaction, the percept will be influenced by the ongoing emotion. In a similar vein, some theorists have proposed that the percept itself contains an emotional element (M.D. Lewis, 2005; Waynbaum, 1907/1994). In early development, the influence of cognition in the causal process may be minimal (Izard et al., 1995; Schore, 2005; Walker-Andrews & Haviland-Jones, 2005).

For the activation of emotion schemas, the cognitive information may consist of complex appraisals, imagery, memory, and anticipation, and all of these components are influenced by ongoing emotion. The emotion information in the activation process derives from the interaction of the ongoing emotion in the individual and the nascent emotion. Thus, the causal processes of emotion schemas may consist of dynamic (nonlinear, reciprocal) interactions among all virtually simultaneously operating sources of information: emotion, perception, appraisal, and higher cognition (cf. M.D. Lewis, 2000, 2005). The net effect of emotion feeling or its underlying neural substrates and cognition in activating a new emotion schema varies with individual differences, the social context, and culture.

A number of appraisal theorists have proposed that emotion influences the causal processes (Ellsworth, 1994; Roseman & Smith, 2001; Sander & Scherer, 2005; Scherer, 2000). Others have also demonstrated specifically how emotions influence appraisals (Keltner et al., 1993). The generation of both basic emotions and emotion schemas may also involve noncognitive information from spontaneous or endogenous changes in neural systems underlying emotions and drive states (Izard, 1993).

Emotions Versus Core Affect in the Organization of Consciousness and Behavior

If you hypothesize that an emotion like sadness or anger derives from a conceptual act in relation to core affect, would it be possible to show how the specific feeling state happens? Can it be learned via language and culture? Particularly in view of the inadequacy of even an adult's language in describing feelings (Langer, 1967), it appears impossible to teach a young child to feel happy, sad, angry, or fearful (Fodor, 1980; Izard & Malatesta, 1987). If individuals cannot learn how to feel anger and fear and yet can tell the difference between these emotion feelings, then these qualitatively distinct experiential states must have emerged through natural selection and evolution (cf. Edelman, 2006). However, there remains a need for a framework for studying and explaining more precisely the emergence of the various emotion feelings in developmental time.

The present proposal for a new paradigm suggests that it is not core affect but the basic emotion of interest or an interest schema that is most likely to be present in the healthy individual in ordinary conditions. That a simple change in the perceptual field can contribute to the activation or maintenance of interest helps account for its tendency to be omnipresent. Its ubiquity is further enhanced by its effectiveness in engaging and sustaining the individual in person–environment interactions that facilitate exploration, learning, and constructive endeavors and in detecting events and situations (sources of information) that lead to new emotions (Izard, 1977; Tomkins, 1962; cf. Fredrickson, 1998; Silvia, 2006).

Interest as Optimum Factor in Organizing Consciousness and Behavior

> "Conscious states . . . are unitary but change serially in short intervals. . . . They are modulated by attention. Above all, they reflect subjective feelings and the experience of qualia."
>
> (Edelman, 2006, p. 86)

By virtue of the regulatory and motivational functions of emotion, the dominant emotion in consciousness has the unique effect of determining the selectivity of perception, a process that any theory of mind and emotion must explain (James, 1890/1950; Solley & Murphy, 1960). Because emotions determine perceptual selectivity and thus influence the processing of information from particular events and situations, they are both proactive as well as reactive in relation to cognition and behavior.

In the well-adapted person in ordinary conditions, the basic emotion of interest or an interest schema is continual in consciousness until it leads to the processing of new information or a memory that elicits a new and different emotion. The ongoing interest schema, the new emotion, or a dynamic interaction between the two may become dominant. Depending on the individual and the context, the new mental experience may be joy, pride, or a negative emotion. If the new emotion is joy or contentment, a pattern of positive emotion schemas can emerge and be extended over time to facilitate constructive and creative activity (Fredrickson & Losada, 2005). Psychopathology develops when emotion feelings or patterns of emotion feelings become connected to maladaptive thought and actions, as seen in anxiety disorders or depression (L.S. Greenberg & Paivio, 1997; Izard, 1972, Izard et al., 2000; Izard & Youngstrom, 1996).

Interest and interest schemas account for persistence in play, work, and creative endeavors (e.g., Deci, 1992; Fredrickson, 1998; Izard, 1991; see Silvia, 2006, for a review). Interest is represented in some conceptions of the dimension of positive

affect, in which it is defined using the terms *alive* and *active* (Watson & Tellegen, 1999). Experts in research on well-being have become concerned with delineating its positive affective component into more discrete emotions, including curiosity, a defining property of interest (Lyubomirsky, King, & Diener, 2005.) It seems reasonable to hypothesize that, for many people, interest is an important emotion in the sense of well-being. "Enjoyment at work" is a major component of well-being (Diener & Seligman, 2004), and such enjoyment of productive activities seems to imply the presence of interest. In contrast to the benefits of moderate to high levels of interest, a very low level of interest is a discriminating symptom of a major depressive disorder (American Psychiatric Association, 1994).

Conceptual Framework for the Assumption of Interest as Continual Emotion

There are five corollaries to the assumptions that emotions are the primary motivational forces in human behavior and are continually present in mental processes and that interest is the normative emotion in consciousness. First, interest, like other emotion experiences, varies widely in intensity, from very low to extremely high. Second, an emotion's level of intensity is a determining factor of its level of influence in consciousness. Third, emotions continue to have motivational impact at all levels of intensity. As already noted, emotions can influence decisions even when they are not conceptualized (Bechara et al., 2000). Fourth, in the normal mind, cognition does not occur in the absence of all emotion (Bacon, 1620/1968; Damasio, 1999; Langer, 1967; Spencer, 1890). Fifth, interest-driven selective attention to novelty, change, disruptions, and challenges leads to other positive emotions or to negative emotions, depending on the information that is processed (cf. Lundqvist & Öhman, 2005).

In summary, interest-driven processing of both cognitive information and noncognitive information via spontaneous neurobiological activities (Izard, 1993) determine the emergence of emotion feelings. This interest-driven information processing can amplify, sustain, or attenuate the ongoing interest in consciousness, elicit a new emotion, or activate a pattern of emotions. The role of memory in determining change in emotion states depends on the nature and strength of remembered concerns relative to new information (cf. Frijda, 1986, 1993). Any emotion or pattern of emotions can become dominant or alternately occupy different levels of awareness. In provocative situations, feeling and discursive thinking may seem to compete for peak awareness. The two collaborate harmoniously in productive endeavors, though some disharmony may contribute to creativity.

All changes in mental states occur in a continual dynamic interplay of emotion, perceptual, and cognitive processes. A newly emerging emotion (or change in the ongoing emotion feeling) is influenced not just by the eliciting event or situation but by the ongoing emotion in the organism; the individual's age, sex, cognitive ability, and temperament/emotionality; the social context; and by appraisal elements that become coupled with emotion response systems (cf. M.D. Lewis, 2005).

Implications of the Proposed Paradigm

Three significant consequences would follow from the validation of the premise that emotion is continually present in the organism and interacting with perception, cognition, and often with momentary states of another emotion. First, the assumption of a continuing emotion in the organism is quite compatible with the proposition that emotions are the primary motivational systems for human behavior. It is also consistent with the idea that all mental processes (including simple perception and complex appraisals that contribute to the activation of a new emotion) would be subject to the influence of the ongoing interest (or other emotion) already in the organism.

Second, the question of how emotion is activated or elicited would have to be reformulated. We would no longer ask how an emotion is activated. We would have to ask how the ongoing emotion in consciousness is changed. Is the ongoing emotion truncated and replaced by a different emotion? Or does the ongoing emotion join the new emotion as part of a pattern of interacting emotions that influence perception, cognition, and action in complex ways (Ackerman, Izard, Schoff, Youngstrom, & Kogos, 1999; Izard, 1972; Izard et al., 2000; Izard & Youngstrom, 1996)?

Third, we would also have to reframe the question of how emotion is regulated. Focusing only on the new emotion would fail to take into account the effects of the ongoing emotion, as well as trait emotionality or emotion factors in temperament or personality and the socio-cultural context.

The proposed paradigm has other implications for psychological research. It sounds a note of caution in framing experiments. Episodes of a basic discrete emotion as defined here are difficult to obtain in the laboratory, and they are typically brief. After a brief basic-emotion episode, other basic emotions or emotion schemas may emerge. Selection of measurement methods for studying basic emotions should take into account the likelihood that, although an effective stimulus elicits the target emotion, other emotions may follow within a few seconds (Ekman, 2003; Izard, 1972; Polivy, 1981). The likelihood that emotion activation via imagery or memories results in multiple emotions or emotion schemas may help account for some of the inconsistency in the findings on brain–emotion relations across labs (Barrett & Wager, 2006). So might the use of relatively mild emotion-eliciting events. In laboratory rats, ecologically based fear stimuli (odors of predators) activated a quite different fear circuit than that elicited by conditioned stimuli (Rosen, 2004).

CONCLUDING REMARKS

The theoretical issues and empirical evidence discussed in this article leave many unanswered questions for future research and

analysis. They include significant questions about the nature of emotions and their role in human development and in individual and social functioning.

Much work is also needed on the development of a taxonomy and terminology for emotion-related phenomena. Inconsistency and differences in explicit or implicit definitions of the term *emotion* dominates the literature on the topic. This lack of consistent terminology creates misunderstandings and slows scientific progress. Perhaps emotion researchers should raise the standards for operational specification of affective terms and discourage the unqualified use of the term *emotion*. Affective science needs a scientific vocabulary in which each emotion concept is anchored by its empirically derived functional correlates. The emotion terminology problem continues to contribute to misunderstanding of concepts and misattributions to theoretical formulations (e.g., Barrett, 2006).

Affective science also needs a standard nomenclature for the components of an emotion. Most theorists and researchers agree that an emotion schema has components (e.g., neural processes, internal and external expressions, a feeling state, and cognition) but they have not agreed on what to call them (Izard, 2006). For some theorists, the term *emotion* may refer to only one of its components. Though we may not have the success of the quantum physicists who coined the names for the particles identified as "elementary" in the 1970s and 1980s, affective scientists should be able to move well beyond the vernacular in identifying types and components of emotions.

New approaches that focus on the functional correlates of basic emotions, emotion schemas, and on the functional correlates of their properties (components and characteristics) should continue to advance affective science. Data from studies of functional correlates of emotions might be equally or more informative than those from research on neural correlates (cf. Humphrey, 2006). The search for the functional correlates and effects of emotion experiences may have been stymied by a tendency to view all of them as episodic, limited in range of effective intensities, and absent or inconsequential in most mental processes. Hopefully, a paradigm based on the premise of the continual presence of consequential emotions and distinct conceptions of both brief episodic basic emotions and the normally more common and temporally variable emotion schemas will facilitate progress in affective science.

A challenge that has now emerged conjointly from a number of theoretical formulations is for affective scientists to develop hypotheses and methods that enable them to test the proposition that affect or emotion is continual in the human mind and always interacting with perceptual–cognitive processes. It should prove experimentally feasible to extend existing findings that show that different levels of the intensity of an emotion have different levels of effects and perhaps that even quite subtle emotion feelings have measurable as well as personally and socially significant consequences.

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