1 Self-Organization of Discrete Emotions, Emotion Patterns, and Emotion-Cognition Relations

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A core principle of differential emotions theory (DET) is that emotions operate as systems (Izard, 1971; Izard et al., 1965). An emotion is a complex system in the sense that it emerges from interactions of constituent neurohormonal, motoric, and experiential processes. Although person-environment transactions play a role in the development of healthy emotions, the potential for each component of each discrete emotion system self-organized in phylogeny and emerged as an evolutionary adaptation. Individual emotions also coassemble with other emotions to form contingent emotion patterns that stabilize over repetitions and time. Thus, discrete emotions are both the product and stuff of system organization. The systems are self-organizing in the sense that recursive interactions among component processes generate emergent properties.

This system perspective of DET fits well with the general emphasis of dynamic systems (DS) theories of development on the self-organization of the structure of behavior. Both DS theories of development and DET have the central theoretical goal of understanding organization and pattern in complex systems, without recourse to some deus ex machina (Izard, 1977; Smith and Thelen, 1993; Thelen, 1989). For both theories, structure and complexity emerge from constituent processes to yield behavioral performances that vary among individuals and within individuals over time. Understanding the individual variation is a main theoretical concern of both DET and DS theories of development.

Given these commonalities, is there anything to be gained by translating DET into the language of dynamic systems? Does the DS framework add body to DET, or is it simply a new bottle for old wine? We explore this issue in this chapter in several ways. First, we apply core dynamic concepts in describing the generation and operation of discrete emotions and emotion patterns from the perspective of DET. That is, we explore the ''fit'' of

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the theories. Next we discuss the emotion of shame and shame patterns as specific examples of self-organizing systems. Finally, we discuss aspects of DET that distinguish it from a dynamic systems perspective.

The Emotion Systems

Differential emotions theory describes each discrete emotion as a system. Sets or patterns of co-occurring emotions constitute higher-level systems. All the discrete emotions and patterns of emotions operate within the more inclusive emotions system. Finally, the emotions system functions as the primary motivational system within the superordinate self-system or personality. Personality development emerges through interactions of emotions and cognition and their linkage in affective-cognitive structures. The flexibility in relations among components of any system in this systems hierarchy derives from its complexity. A discrete emotion system is the simplest in the hierarchy and has the least flexibility in relations among its components (Izard, 1992). The contribution of innate structure and hardwiring to system assembly is greatest for a discrete emotion.

This section describes the assembly of this hierarchy of systems and relations. First, we identify and explain core processes of dynamic models and note their equivalents or approximations in DET. Then we apply the processes as an aid in understanding the self-organization of discrete emotions systems, systems of emotion patterns, and affective-cognitive structures. Finally, we consider individual variability in emotion systems.

Core Processes

Each of the emotion systems and their interrelations with the cognitive system derive from constituent processes that form the core of the dynamic systems approach to emotion (M. D. Lewis and Granic, 1999). These processes constitute the self-organization of a dynamic system. For our purposes, the processes include: (a) recursion among system elements, (b) emergence of unique forms and patterns, (c) consolidation of the forms over repetition and time, and (d) constraints on system formation.

In framing DET with DS concepts, *recursion* describes reciprocal interactions among the elements of a system in the form of positive and negative feedback that affects the element interrelations. *Emergence* concerns the generation of unique and idiosyncratic emotion patterns (e.g., systems) and affective-cognitive structures from nonlinear recursive cycles. Emergent forms and patterns represent ''attractors'' for the emotions sys-

tem as a whole. Attractors are unique configurations or organizations of simpler elements that represent preferred solutions to organismic, environmental, and historical influences (i.e., previous solutions). The preference becomes stronger, and the ''attraction'' deepens and broadens, as similar solutions repeat over time. Emergent forms such as emotion patterns and affective-cognitive structures *consolidate*, stabilize, and become more accessible as the couplings among the elements strengthen. Consolidation increases the predictability and determinacy of emotion experiences and emotion-cognition-action sequences. Though determinacy increases over repetition, the set of possible attractors is never infinite. Instead, the set of preferred solutions is always *constrained* by organismic variables (e.g., physiological reactivity), initial organizations of system elements, the extent to which attractors are developmentally embedded, and task demands. These constraints contribute to individual differences in system emergence and organization.

In DET, this framework applies to the development of psychopathology as well as to the development of healthy personality. Given a low threshold for anger activation in frustrating situations, for example, child-environment interactions may foster the emergence of an ''attractor'' that represents maladaptive ''solutions'' to environmental challenges. Similarly, the principles that apply to the development of adaptive attractors also apply to the development of maladaptive attractors. For example, high-stress situations, inadequate parental guidance, and proneness to negative emotionality contribute to the repetition and consolidation of deviant emotion-cognition-action sequences. Once consolidated, these sequences may occur rapidly and with little opportunity for cognitive interpretation of the context and modification of action.

Discrete Emotion Systems

A discrete emotion consists of a system of interacting neural, expressive-behavioral, and experiential components. These components influence each other reciprocally through feedback loops. The basic structure of each discrete emotion system self-organized phylogenetically through evolution, is hard-wired ontogenetically, and its biological roots constrain the relations among its components.

The innate organization of individual emotion systems provides numerous adaptive advantages (Izard and Malatesta, 1987). Emotion systems are highly sensitive to changes in the internal and external environments. They have the capacity to respond rapidly, automatically, and unconsciously to

imminent threat and, more moderately, to higher-order cognitive evaluations of complex situations (cf. M. D. Lewis and Douglas, 1998). Although each discrete emotion has innate structure and function, a degree of flexibility characterizes the relations among its components. For example, an emotion expression can be dissociated from the emotion feeling. Each emotion operates as a system that participates in the self-organization of patterns of emotions and emotion-cognition relations.

An emotion begins when a noncognitive or cognitive process activates certain neural evaluative processes (Izard, 1993). In fear, for example, the activating information or impulse travels from sense organs to thalamus, neocortex, and amygdala. The amygdala determines the emotional significance (fear-worthiness) of the stimulus. If the neural evaluation indicates danger, impulses travel from the amygdala to the hypothalamus, which triggers autonomic nervous system activity, such as increased heart rate, and to the brain stem central grey, which triggers behavioral responses such as freezing (Bechara et al., 1997; LeDoux, 1996). Feedback from either the expressive-behavioral activity or the subjective state can influence subsequent neural evaluative processes. Changes in the latter can, in turn, moderate the expressive and experiential components of emotion.

Several types of interactions characterize the relations between the expressive and experiential components of emotion. Since Darwin (1872/1965) and James (1890/1990), we have known that regulating emotion expression has a regulatory effect on emotion feeling. In the past twenty years, numerous experiments have confirmed an expression feedback effect that is probably recursive in nature (Izard, 1990; Laird, 1974; Matsumoto, 1987; cf. Zajonc, Murphy, and Inglehart, 1989).

Emotion Patterns as Higher-Level Systems

A situation activates a discrete emotion that organizes and motivates behavior. Simultaneously, the activated emotion, in concert with contextual variables, typically recruits other emotions. In effect, the individual responds to many conditions and situations with multiple emotions. These emotions self-organize as a coherent set or pattern of interacting emotions (Ackerman et al., 1997; Izard, 1972; Izard and Youngstrom, 1996). Thus the first discrete emotion activated by a new situation may have minimal effects before other emotions come into play. The set as a whole emerges as a pattern of emotions or motivational complex. Organization as a pattern means that the emotions interact freely and influence each other recipro-

cally. Each emotion in the pattern has the capacity to moderate (attenuate, amplify) the others. Thus, the pattern that emerges and the resulting emotion experiences are unique to the person and situation.

The concurrent activation of two or more emotions in complex situations provides an adaptive advantage. A single emotion fosters a limited number of behavioral alternatives. For example, a person cannot effectively explore a situation when fear is the dominant emotion. Fear greatly narrows the field of perception and attention to the threatening object and possible escape routes (Derryberry and Tucker, 1994; Easterbrook, 1959). This narrowing dramatically inhibits curiosity and exploration. The activation of another emotion (e.g., interest) increases the available options. Thus, multiple emotions yield a greater variety of choices and an increased capacity to confront a complex situation.

A core principle of DET is that each discrete emotion retains its inherent organizational and motivational properties even while it operates within a self-organized set of interacting emotions. The behavioral effects of each emotion, however, may be moderated by the motivational effects of other discrete emotions in the pattern. For example, in the sad-mad component of the depressive pattern, anger mobilizes energy that attenuates the slowing function of sadness and increases the likelihood of active coping. In general, the complexity of cause-effect or emotion-behavior relations increases as each emotion in a pattern recruits its own cognitive accompaniments. Thoughts associated with anger are different from those associated with contempt.

Frustration or the presence of a barrier blocking the goal path provide other examples of situations that elicit multiple emotions. These conditions usually elicit anger, but they can invoke other emotions as well. The activation of the other emotions in an anger-eliciting situation follows from their lawful relations with anger and the cognition and behavior associated with it. The resulting pattern of emotions is not a random set. The emotions that co-occur in situations of frustration and restraint have privileged relations with the emotion of anger. These interemotion relations constrain the emerging pattern. Here the privileged status results from some similarity in the goals of the emotions in the pattern.

Similarity of goals among emotions is one factor that fosters their sequential activation, interaction, and self-organization as a pattern. Thus anger, disgust, and contempt co-occur and assemble as a pattern because each represents a type of hostile motivation designed to overcome (anger), reject (disgust), or dismiss or disdain (contempt) the stimulus. The emotions share the hostile motivation of overcoming (or rejecting or dismiss-

ing) the stimulus. The frequent co-occurrence of the anger-disgust-contempt pattern in situations that initially elicit any one of the individual emotions supports the notion that they form a hostility triad (Izard, 1972, 1977). The form of a rapid or impulsive response to a frustrating or goal-blocking event might be determined solely by anger. In other cases, however, all three of the emotions in the hostility triad may influence the form of the response.

In addition to the effects of similarity of goals, dynamic relations among emotions influence their self-organization into coherent patterns. Thus anger may coassemble with fear because the former can attenuate the latter. The attenuating effect results partly from the incompatibility of the two emotions. In a situation that has already activated fear, the activation of anger can reverse cognitive and behavioral processes. Fear activates cognition and action designed to avoid or escape the threatening situation. Anger, on the other hand, fosters approach tendencies and confrontation. Fear may energize flight or reduce energy to the point that the individual feels shaky and jittery or even experiences momentary freezing. Anger reliably has the opposite effect. Anger increases blood flow to the striate muscles, the voluntarily controlled muscles of action (Cannon, 1929).

Finally, socialization processes create links between emotions and help explain the co-occurrence and patterning of emotions. Socialization processes create links between emotions. The child whose anger repeatedly results in the loss of her favorite toy or game may eventually enable anger experience to activate sadness. We return to these principles in the section on emotion patterning.

Affective-Cognitive Structures

An emotion links to an image or thought to form an affective-cognitive structure (Izard, 1977, 1992; Tomkins, 1962). The information in emotion provides a key to understanding the linkages between emotion and cognition. The conscious component of an emotion, the motivational or feeling state, contains information. In keeping with the way we have defined emotion, this is noncognitive information. Put another way, emotion feeling produces cues for cognition and action (Izard, 1971). Information in emotion is noncognitive in that it derives from the evolutionary-biological characteristics of the emotion itself. The felt action tendency in anger and the withdrawal tendency in sadness exemplify a type of emotion information or behavioral cue (Izard, 1991; cf. Frijda, 1986; Lang, 1979).

Thus we propose that emotions contain cues for perceptual and cognitive

processes as well as action tendencies. With positive emotions, perceptual and cognitive tendencies may be more characteristic than action tendencies. In many adults, the emotion of interest leads to intellectual pursuits more frequently than to physical activities (Renninger, Hidi, and Krapp, 1992). Several experiments have demonstrated associations between positive emotion and particular types of thought or information processing (Fredrickson, 1998; Isen, 1984).

Thus the information inherent in the emotion itself plays a major role in determining the nature of an affective-cognitive structure. Nevertheless, the information in emotion is broad-gauged and cues only a type or category of thought. Joy spawns expansive and free-ranging cognition whereas fear has virtually the opposite effect. The specific content of the cognition that links to an emotion has determinants in culture, socialization, and idiosyncratic experience.

Single and more often multiple occurrences of an emotion-thought sequence may lead to the stabilization of an affective-cognitive structure. The recurring thought component in the sequence does not need to be identical. Development of the structure requires only recurring thoughts of the same type that are congruent with the goal associated with the emotion.

Once stabilized, an affective-cognitive structure attracts similar structures to form a related set. These coupled sets of affective-cognitive structures further consolidate and stabilize as traits of personality. A complex set of such structures that relate to each other at varying strengths forms a broad dimension of personality (e.g., extroversion). A more limited and tightly bonded set of strongly related thought-feeling structures emerges as a specific trait (affiliation, nurturance).

Our concept of affective-cognitive structure is similar to Tomkins's (1962) concept of ideoaffective organization and to Lewis's (Lewis and Douglas, 1998) construct of emotional interpretation. Lewis gives an elegant and detailed description of the self-organization of cognition in relation to emotion, a process that produces emotional interpretations. The latter assemble as characteristics of personality, and the processes of assembly constitute the processes of personality development.

Individual Differences

Individual differences in behavioral performance comprise a key feature of DS approaches to development. Such differences represent robust evidence against a priori instructions for structuring behavior or hard-wired programming of the structure, and for the emergence of a novel structure

contingent on task and context. The central focus of DET also concerns the contingency of discrete emotions and emotion patterns and the variability of emotion experiences and affective-cognitive structures across and within individuals. Although the set of discrete emotion solutions to the organismic-environmental press is finite, similar objective situations may be associated with discretely different emotions in different individuals. Furthermore, similar situations may be associated with different emotions at one time or another for a particular individual. Thus, the set of possible variations in patterns of emotions, affective-cognitive structures, and intensity of emotions is large.

The individual differences are rooted in neurohormonal, sensorimotor, affective, and cognitive systems that activate and regulate discrete emotions (Izard, 1993). Each of these general systems constitutes a source of individual differences in the self-organization of emotions patterns and emotion-cognition relations. The noncognitive systems, in particular, establish the sensitive dependence of emotion systems on initial conditions within individuals, a key feature of chaotic and dynamic systems. Neurohormonal and affective processes, for instance, influence thresholds, levels of arousal, and energy levels and flows that condition the nature and intensity of emotion experiences. Fatigue and negative mood, for example, limit joy experiences. The cognitive system, by contrast, may play a particularly strong role in the consolidation and stabilization of particular emotion system attractors. The repeated coupling of affective and cognitive elements stabilizes affective-cognitive structures. Because the cognitive story is developed elsewhere in this book, we focus on noncognitive systems here.

Genetic processes operate through the neurohormonal system to determine the initial settings of the thresholds for each of the discrete emotions (cf. Rothbart and Derryberry, 1981). Robust evidence testifies to the existence of individual differences in the activation thresholds of discrete emotions (Izard, Hembree, and Huebner, 1987; Kagan, Reznick, and Snidman, 1988; Tangney, 1990). A given emotion threshold controls the individual's proneness to experience that emotion and consequently influences the likelihood of its inclusion in a pattern (cf. H. Lewis, 1971; Tangney et al., 1992). A person's profile of emotion thresholds sets the stage for the self-organization of a particular pattern of emotions in a personally significant situation. This concept of an emotion threshold profile may provide a precise way of thinking about an individual's emotional reactivity or emotion-based dimensions of temperament or personality.

A second source of individual variation is the recursive feedback loop linking emotion expression and emotion experience (see Izard, 1990; Mat-

sumoto, 1987; Winton, 1986; and Zajonc et al., 1989, for reviews). Although researchers disagree as to the mechanism of action, many agree that even experimenter-directed contractions of the facial muscles of emotion expression have real effects on emotion feelings. The effects suggest that the motor mimicry that occurs in infant-mother face-to-face play, social referencing, and empathy may automatically and unconsciously initiate the emergence or amplification of an emotion feeling and the formation of a new pattern of emotions.

A third source of individual differences concerns affective processes. Affects include physiological drive states and emotions, and both types of motivational processes play a role in the organization of patterns of emotions and emotion-cognition relations. In some circumstances, affects exert their effects through noncognitive processes. For example, unanticipated pain in young infants elicits expressions of anger and sadness (Izard et al., 1987). This pain-anger-sadness sequence occurs well before infants have any conception of the agent of harm and before they show any signs of pain anticipation. In contrast, when a child forms an association between an agent and an aversive experience, anticipation of pain produces fear and the emotions of the anxiety pattern (Izard and Youngstrom, 1996).

Other drive states, particularly when occurring at high intensity, also influence the self-Organization of patterns of emotions. The sex drive and sexual pleasure recruit interest and joy. Intense or chronic hunger may elicit the irritability characteristic of low-level anger.

Individual differences in emotion thresholds affect the processes of interemotion regulation (one emotion influencing another), processes that may occur independent of cognition. Joy may occur spontaneously to provide a respite from a long period of intense play in the child or intellectual activity in the adult. Anger may emerge to prevent the sadness of depression from totally disengaging an individual from the social surround. Shame as a strong motivation to repair the self-image may also emerge in the depression pattern and break the cycle of withdrawal and loneliness. The person's thresholds for joy, anger, and shame will determine the timing of these interemotion regulatory processes.

The Shame Systems

In this section, we develop an account of the emotion of shame as a specific example of a self-organizing system that can be nested within other systems. Shame is a particularly interesting emotion system for these purposes because it emerges developmentally and because its prevalence varies so

widely across individuals and cultures (Izard, 1971). Developmental and individual variability establishes shame as an emergent phenomenon organized from constituent elements but not reducible to those elements.

Shame as a Self-Organizing System

Shame is a dependent emotion in the sense that its activation (but not its inherent motivational properties) depends on cognitive development (i.e., self-representations) and appraisal processes. Although shame depends on cognition for its activation, it has status as a discrete emotion system for DET. The strong hard-wired potential for the components of shame (neural, behavioral, and experiential) resulted from evolutionary processes that account for its universality. Unlike the independent emotions, such as anger and fear, shame does not have a consistent and specific expressive signature (Ackerman, Abe, and Izard, 1998). Tomkins (1963) described shame as an emotion involving indignity, defeat, and alienation. An individual feeling shame views herself as an object of contempt and thus feels belittled (H. Lewis, 1971). In shame, the individual experiences a sudden loss of control (Erikson, 1950, 1956) coupled with a heightened state of self-awareness (Izard, 1991).

In contrast to the early onset of the independent emotions, shame develops in late toddlerhood and early childhood. Shame cannot emerge until the child has developed a sense of self. This sense of self includes the ability to distinguish self from others and to identify and compare self and others as potential causal agents. Both cognitive and noncognitive processes activate shame and trigger neural processes that evaluate a stimulus and generate a behavioral response.

In the shame experience, recursive feedback from expressive-behavioral activity influences further evaluative processes, initiating a cycle. The influence of this recursive cycle of elements is particularly evident in the emergence of shame because the shame experience requires self-referential activity. For example, blushing may occur as an immediate, automatic physiological response to shame, which can trigger more shame (Tomkins, 1963). The external evidence of shame, the blushing face, brings attention to the person and often heightens self-consciousness and the feeling of shame. This self-reflective attention to the feeling is critical to the shame experience. Shame is, therefore, an emerging discrete emotion system, self-organized by recursive interactions among constituent elements and processes.

As with other discrete emotions, the experience of shame serves adap-

tive functions. In particular, shame may enhance adaptation by motivating the acquisition of knowledge or skills that strengthen the self and decrease its vulnerability to future shame experiences (Izard, 1977; Tomkins, 1963). Shame may also contribute to social order and the preservation or regulation of social relationships (Retzinger, 1995). Indeed, Gilbert and colleagues (1994) compared the human experience of shame to the submissive behavior of an animal confronting a more powerful predator. In this interpretation, shame relates to rank and power and serves the protective function of initiating submission to more powerful beings (cf. Öhman, 1986). Something similar may be involved when a parent or teacher uses harsh shaming techniques in the socialization process.

These ideas about the universality and evolutionary roots of shame suggest that the structural elements that allow shame experiences (e.g., neurohormonal systems) are innate, though the emerging network of representations of shame-activating events organizes itself over time. Thus, the developmental onset and frequency of shame experiences are likely to vary, and are contingent on experiential, social (e.g., parenting), and personal variables. These variables encourage the consolidation, stabilization, and strengthening of the affective-cognitive structures (i.e., attractors) that include the emotion of shame.

For example, shame may arise initially in early parent-child interactions where the child feels belittled by the parent in some way (Schore, 1991). Given the onset of a particular shamelike reaction by a child to a social violation, parents may shape shame experiences as a socializing tool. Parental linking of affective reactions with cognitive attributions (e.g., self as inept) and appraisals construct shame-cognition links that act as attractors in response to the affective uncertainty induced by perceived social rule violations. Although shame is usually experienced in interpersonal relationships, some researchers suggest that shame also can be experienced even when a person is alone. Here, the individual feels shame simply by thinking about the violation of certain social norms and expectations (Miller and Tangney, 1994).

The behavioral outcomes of shame depend on cognitive appraisals of the context and on traits of personality. Individuals who have a low sense of self-worth, for example, are likely to react to shame by withdrawing (Harter and Jackson, 1993). By contrast, individuals who have unrealistically high self-concepts often react to shame experiences with aggressive behavior (Baumeister, Smart, and Boden, 1996). We develop these points further in the context of higher-level patterns.

In the three subsections that follow, we provide examples of higher-

level systems involving shame. Such systems are patterns or assemblies of emotions that self-organize according to principles described earlier.

Patterning Processes Involving Shame

A recursive feedback cycle involving cognitive appraisal, neural-evaluative processes, and expressive behavior generates shame. The shame, in interaction with appraisals and traitlike affective-cognitive structures (e.g., self-concepts), can trigger additional discrete emotion systems. The emotions interact with shame through feedback loops. Through repetition of activity in such feedback loops, an emotion pattern self-organizes and stabilizes as an attractor that represents a consistent and robust response to particular situations.

Emotions theorists have long recognized the patterning of shame and other discrete emotions. Tomkins (1963) suggests, for example, that examination of a facial expression enables prediction of the behavioral outcome (i.e., withdrawal or aggression) of a shame-fear or shame-anger pattern. The facial expression can reveal whether the emotion experienced along with shame is anger, fear, or sadness. Thus, facial expressions may signal the emotions that recursively magnify or attenuate shame.

The process of pairing shame with other emotions begins with the emergence of self-awareness, when shame first develops as a discrete emotion. One mechanism that couples shame with other emotions involves parental shaping and socialization of emotion displays through shaming practices. If a child is frequently shamed for displaying a certain emotion, shame and the other emotion become coupled. The child's unsuccessful attempts to inhibit the forbidden emotion open the door to shame. This socialization-based mechanism is central in the development of shame-fear and shame-anger patterns.

Patterns Involving Fear and Shame

A prime example of two emotions that couple easily is fear plus shame. Many boys, for example, are taught to feel ashamed of being afraid. This coupling is particularly likely in environments where masculinity and pride in physical prowess are highly valued. Consistent shaping of the *fear-shame* link by parenting practices and other social influences consolidates the pattern.

Consolidation of a pattern changes the dynamics of emotion activation. In the present case, the pattern consists of the focal or event-related emo-

tion of fear and the linked emotion of shame. The *perception* of threat or danger activates the fear. By contrast, the *feeling* of fear activates the shame. The consolidation of the pattern automatizes the activation of the shame element of the pattern. This means that any situation of uncertainty, ambiguity, or perceived harm that elicits fear in the child may automatically elicit shame. Thus, in pattern dynamics, shame may lose its dependence on cognition. It remains a dependent emotion, but its dependence becomes affective instead of cognitive.

The automatic, affectively activated shame in the fear-shame pattern has several consequences. For example, the shame feedback can shift the locus of concern from external to internal, from situational context to self. This shift in attention and concern can attenuate the fear as the fear-shame system and its cognitive and behavioral accompaniments self-organize. The automaticity in the pattern and the shift or oscillation in locus of concern minimize the role of cognitive appraisals in interpreting the significance of the fear stimulus and experience.

In addition to parenting practices, situations that elicit social and evaluation anxiety may also forge a link between fear and shame. Everyone experiences heightened self-awareness and embarrassment from time to time, and everyone occasionally feels humiliated or ashamed. Because shame is primarily a ''social'' emotion, such instances usually occur in social and interpersonal situations. Given the considerable unpleasantness of the shame experience, the experience invites fear and avoidance of social interaction. For shame-prone individuals, the fear of negative evaluation and failure (cf. Beck, Emery, and Greenberg, 1996) may be overwhelming.

In such cases, the fear-shame pattern becomes a *shame-fear* pattern. The distinction has implications for understanding such phenomena as social anxiety and social phobia. In the fear-shame pattern, perception of danger activates fear, and the fear feeling, in turn, activates shame. The child is ashamed of being afraid. In the shame-fear pattern, shame activates fear. In a child who has concepts of self as inept or inadequate, the self-exposure and increased vulnerability resulting from the shame experience may be perceived as self-in-danger. The child is afraid of being ashamed. As the shame-fear pattern consolidates and stabilizes over time, it becomes an attractor for social situations fraught with ambiguity or uncertainty. Support for our interpretation of social anxiety as fear generated by shame and shame anticipation comes from clinical investigations that discuss the prevalence of shame in these fear-centered disorders (American Psychiatric Association, 1994).

The Shame-Anger Pattern

Shame frequently pairs with anger. Individuals characterized by a trait-like shame-anger pattern often behave aggressively (Tangney et al., 1996). In the recursive processes of the pattern, shame both activates and amplifies anger. By contrast, anger may diminish the shame experience and protect the individual against what shame brings to light (Retzinger, 1995). The intensity of the angry reaction to shame depends on several factors. These include: (a) the significance of the person who caused the shame experience and of the others who witnessed it, (b) whether the rejection concerned one aspect of the individual or the entire self, and (c) whether the rejection came as a surprise or not. When social criticism activates shame in a person with an unrealistically inflated self-concept, the violence serves to refute the criticism and prevent further rejection. Insofar as the violence increases dominance over others, it decreases the sources of shame (cf. Baumeister et al., 1996).

As with shame experiences, the frequency of shame-anger patterns varies among and within individuals. Childhood experiences play a strong role in the consolidation of the pattern, and these as well as genetically set thresholds for the component emotions help determine the child's proneness to experience the pattern. Early emotional abuse, for example, is associated with shame-anger patterns in college students (Hoglund and Nicholas, 1995). In addition, type A personality profiles are associated with the shame-anger pattern. Malatesta-Magai and colleagues (1992) suggest that the source of this experience is the early socialization of shame paired with anger. Other research suggests that individuals with unrealistically positive self-concepts that are unstable and dependent on external validation are especially prone to the shame-anger emotion pattern.

As with shame-fear, consolidation and stabilization of the shame-anger pattern increase the automaticity of the activation of the anger component in the pattern. The automatic activation of anger minimizes the role of cognitive appraisals in interpreting the anger activators, and it may thereby increase the probability of impulsive behavior, including aggression. Although the concept of automatic activation of anger in the shame-anger pattern requires further validation, a few empirical and clinical investigations lend some support. Retzinger (1987, 1991), for example, recorded rapidly alternating cycles of shame and anger at five-second intervals. These results confirm and extend earlier clinical investigations of H. Lewis (1971, 1987), who found that the occurrence of anger frequently followed

shame activated by a real or perceived rejection. Lewis suggests that, once shame is evoked, anger is quick to follow.

The co-occurrence and patterning of shame and anger have a strong tendency to become self-perpetuating. Retzinger (1995) suggests that unacknowledged shame may act as both an inhibitor and generator of anger, rendering the individual incapable of expressing anger but intensifying the feeling of anger. This pattern may escalate and lead to aggressive behavior.

In a study of shame and anger by Tangney and her colleagues (1992), shame related to indirect aggression, suggesting that the spiral often relates to a seething and resentful type of anger. However, Tangney and colleagues (1996) also found a relation between shame and more direct forms of aggression, including both physical and verbal attacks. Other specific examples of the aggressive outcomes of the shame-anger pattern concern borderline personality disorder and spousal abuse. Fisher (1985) describes the former as a shame-based pathology whereby the individual is prone to humiliation and reacts to the humiliation with anger. In incidents of spousal abuse, the abuser may feel shamed by a spouse's criticism and may react with violence (Lansky, 1987) as a form of self-defense against the criticism.

Conclusion

These second-order systems or emotion patterns acquire a network of representations of activating events. This network of representations and linked emotion patterns consolidates and stabilizes as dimensions or traits of personality. Variations in emotion thresholds, behavioral goals, socialization, and other person-environment transactions account for individual differences in these traits.

Theoretical Distinctions

In the previous sections, we discussed the core DET constructs of discrete emotions, emotion patterns, and affective-cognitive structures in the language of dynamic systems theories of development. We found that the core dynamic principles of recursion, emergence, consolidation, and constraint are useful in describing aspects of DET, including processes that generate and constitute emotion systems. Application of DS principles also contributed to our theoretical emphasis on recursion in the amplification and attenuation of discrete emotions in patterns. Finally, we found that the

theoretical thrust of DS theories of development on individual variability is consistent with a main thrust of DET. Application of DS principles to specific discrete emotions and patterns and the identification of specific processes and structures that constitute local reactions to emotionally evocative stimuli will undoubtedly enhance DET. Nonetheless, at this point, the primary benefit of the intertheoretical discussion in itself has been to redescribe metaphors and constructs that have been enduring staples of DET.

A more productive strategy might be to focus on theoretical boundary conditions. Perhaps the most interesting and potentially informative use of DS theories of development in understanding emotions is in focusing on the theoretical differences and clashes with DET, rather than on the similarities. Some of these differences are just in emphasis, but others may reveal fundamental issues to be resolved and perhaps reconciled – or not. Some differences address the theoretical spirit of DET and DS theories of development, while others address more local applications of DS principles to emotion theory (cf. M. D. Lewis and Douglas, 1998).

Five theoretical distinctions seem important. These distinctions bear on limitations of both theories, and the correct direction of modification is uncertain. First, a number of dynamic systems theories of development (e.g., Fogel, 1993; Thelen, 1989) reject the notion of prior instructions and the influence of hard-wired programming that yield fixed and universal products (for an exception, see M. D. Lewis, 1995; Lewis and Douglas, 1998). Indeed, a prime motivation for applying dynamic systems modeling to developmental processes has been to reconceptualize development as the emergence of behavioral structure as a function of local contingencies. In DS theories of development, structure is a product of local processes rather than a prior cause of behavioral process.

DET, by contrast, requires a set of biogenetic primitives termed discrete emotions that reflect evolutionary adaptations. These emotions, therefore, are universal across the human species and both reflect and constitute innate structure. DS theories of development also require primitives to the extent that elements compose systems. For DET, however, a strong potential for each component of a discrete emotion system and for its self-organization is hard-wired. Relations among components and their activation are sensitive to local contingencies, and an extremely harsh environment may produce deviant emotion systems. However, the cross-individual and cross-cultural invariance of discrete emotion system products (e.g., anger feeling per se) testify to their origins in evolutionary and biogenetic processes. The complement of this principle bears repetition:

Emotion-cognition relations and emotion-action sequences *do* change over time and vary across individuals and cultures.

DET and DS theories of development differ in conceptualizing a specific emotion per se. For some proponents of DS approaches to development (cf. Fogel, 1993), the discrete emotions are simply the ones that are named, and these appear among many other emotions in a child's life that are inchoate, unnamed, and perhaps less frequent. From this perspective, naming conventions privilege some emotions over others. For DET, the primitives reflect a small and predetermined set of hard-wired emotions. They have dedicated neural substrates and are named across most cultures. The individual varieties of emotion experiences reflect differences in emotion-thought linkages and varying patterns of co-occurring discrete emotions.

Second, in a dynamic system, the elements lose individuality, more or less. Emergence means that the system product is not predictable or reducible to the constituent elements. Element functions are amplified or attenuated in recursive interactions with other elements, but elements also assume qualitatively new and different functions in a system configuration. By contrast, in DET, elements in discrete emotions and emotion patterns do not lose individuality. Even in multiple-emotion patterns the elements, at the level of discrete emotions, retain their qualitatively distinct functions.

Third, dynamic systems theorists refer to behavioral products as representing *relations* among processes rather than as *things* with an ontogenetic trajectory. Thus emotions are processes rather than states. For DET, discrete emotions and perhaps stable emotion patterns reflect relations among constituent processes, but they also have statelike characteristics. As already noted, the phenomenological experience (feeling component of a given emotion) does not vary qualitatively across episodes. Anger feeling does vary, however, in intensity, as do its cognitive accompaniments, across individuals and situations.

Similarly, fourth, emotion feelings do not vary developmentally. This point is important because the causa belli for many systems theorists is to understand developmental change. For DET, however, change in the basic structure and function *within* discrete emotion systems is minimal (cf. Ackerman et al., 1998). Higher-level systems or patterns of emotions emerge and vary, and the predominance of some patterns may vary across contexts and time. Yet the emergence of higher-order complexity and change is not related in any principled way to *qualitative* changes in organismic variables.

There is an area of theoretical overlap in conceptualizing developmental processes in the cognitive-dependent emotions, such as shame and guilt.

These emotion systems emerge after the infancy period and the processes that activate them reflect clear developmental acquisitions. Nevertheless, the products of these emotion systems (shame feelings, guilt feelings) remain constant over the life span. What develop robustly for DET are the linkages between the emotional and cognitive systems or the affective-cognitive structures that emerge and consolidate. But consolidation and stabilization reflect classical principles of contiguity, similarity, repetition, observational learning, and reinforcement, and emergence may not often reflect any coherent developmental logic. The interesting exception here may concern attachment-related processes (cf. Sroufe, 1996).

Our notion of affective-cognitive structures also overlaps with similar constructs in dynamic systems approaches to emotion, in particular with Lewis and Douglas's (1998) concept of emotional interpretations. Both constructs describe the structures that emerge out of self-organizing couplings of elements of the emotions system and the cognitive system. For Lewis, however, the contribution of the cognitive system (as the seat of self-organization) seemingly has more causal weight than the contributions of the emotions system, and he does not treat the concept of emotion patterns that interact with the cognitive system. Both we and Lewis recognize that linking emotions to the cognitive system introduces immense flexibility and variability in emerging structures. We also agree with Lewis on the principle of reciprocal causation between the emotions and cognitive systems. We may differ a bit from Lewis in preferring to think of the emotion systems per se, particularly discrete emotions, as more modular and less malleable and as the motivational roots of personality.

The fifth distinction concerns the construct of skill. For some systems theorists (Thelen and Ulrich, 1991), skill acquisition in a particular context is sometimes a substitute for the conception of development as a goal-directed progression of qualitatively different stages or structures. Skill reflects behavioral structure emerging out of qualitatively different organizations of constituent elements. Sometimes theorists apply the honorific descriptors of ''efficient'' and ''complex'' to these novel structures, but skill per se simply reflects a relation among temporally organized structures assembled by task demands and unique local contingencies. In this sense, skill often reflects automatized attractors. Given a constant environment, behavioral skill is what emerges developmentally.

For DET, skill, as it relates to emotion, is an ambiguous concept. The metaphor of emotional intelligence is consistent with a skill-based perspective on emotional development, and the conception that emotion regulation increases over childhood fits with a skill-acquisition perspective. Both ideas

have a place in DET as reflecting emerging affective-cognitive structures. The problem, however, is that the concept of skill has no referent in describing the functions of the discrete emotion systems and emotion patterns. Though automaticity may change for particular systems, the changes do not reflect skill. The changes are not directional in terms of local contingencies, even in the sense that patterns of emotions are higher-level systems. ''Higher-level'' simply describes the nature of relations among elements.

Conclusion

We are strongly attracted to aspects of dynamic systems theories of development as powerful metaphors for conceptualizing the processes constituting emotions and emotion patterns. The ''systems'' metaphor has always played a key role in differential emotions theory in describing discrete emotions and stable patterns of emotions, but dynamic systems approaches have provided new ways of thinking about what ''system'' means, and about the what, how, and why of development. For us, however, the most provocative and informative aspect of ''fitting'' differential emotions theory and dynamic systems theories of development is that not all the parts fit well. Pouring old wine from a new bottle sometimes invites formulation of a new wine, but it may also inspire another look at the old bottle.

Acknowledgment

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