Emotional Complexity

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Imagine someone who is 'emotionally complex,' and a number of characteristics might come to mind: the ability to see the good and the bad in all things; the ability to describe feelings with detail and precision; the ability to specifically and reliably anticipate which feelings will arise in a given situation; or the tendency to remember experiencing many emotions at once. You might also imagine someone who tends to characterize himself or herself as an emotionally complex person. It appears that there are myriad ways in which a person can be considered 'emotionally complex.' In fact, the concept of emotional complexity is similarly varied in the psychological literature. In this chapter, we review this literature with a focus on three main formulations of emotional complexity as (1) dialecticism and precision in people's self-reports of emotion experiences, (2) explicit, propositional knowledge about emotion in situations, and (3) people's self-characterizations of their degree of complexity.

Before we begin our review of the emotional complexity literature, it seems apropos

to clearly define just *what* we think people are being complex about. There are two general approaches to defining the nature of emotion. A "natural kinds" perspective (e.g., Ekman, 1972; Izard, 1994; Tomkins, 1962; Panksepp; 2000; Roseman; 1984) views a select set of emotions (e.g., anger, sadness, fear, anger, disgust, and happiness) as biologically given and fixed categories (for a review of the natural kinds perspective, see Barrett, 2006a). In this perspective, complexity in self-reports of online experiences of emotion would occur when more than one emotion circuit fires at a given point in time, or would be caused by variations in the accuracy with which people translate experience into words. In this sense, emotion categories are perceptual categories that are either hard coded into the brain at birth or that are learned by inducing statistical regularities in the environment. According to this perspective, people would gain complexity in propositional knowledge of emotion when they learned to associate the consequences of the firing of a given emotion circuit with certain environmental

conditions. Finally, complexity in self-characterizations of experience would exist because of differences in people's ability to characterize their experiences as complex. In this sense, complexity in self-characterizations of experience would exist because some people merely overlay complexity onto what is really a fixed and stable system.

The second approach to the nature of emotion takes a "psychological constructionist" perspective (e.g., Barrett, 2006b; Barrett, Lindquist, Bliss-Moreau, Duncan, et al, 2007; Russell, 2003; Mandler; 1975; Schacter & Singer, 1962). In this view, complexity is not a conceptual overlay; it is intrinsic to the neurobiological and psychological systems that constitute emotional experience. From this point of view, a discrete emotional event emerges in consciousness (i.e., a person 'has an emotion') when an instance of a more basic core affective state is automatically and implicitly categorized as having emotional meaning. *Core affect* is an on-going, ever-changing psychologically primitive state that has both valenced, and to some extent, arousal-based properties (see Barrett, 2004; Russell, 2003; Russell & Barrett, 1999). The events that people call (in English) anger, sadness, fear, and so on, result when core affect is categorized using *the conceptual system for emotion.* This term refers to what people know about emotion and how that knowledge is represented in emotion categories (see Barrett, 2006b). Categorizing an instance of core affect proceeds efficiently and automatically to produce a state that is at once affective and conceptual, where internal sensory information from the body and external sensory information of the world are bound together in a moment in time. A person experiences an emotion like anger, for example, when a state of unpleasant affect is categorized as having been caused by an event that blocked a person's goals. Categorizing core affect bounds it as a discrete experience: it allows core affective experience to pop out in consciousness and gives it meaning. Categorization transforms core affect into an intensional state, allowing a person to make inferences about what caused the affective change, what to do next, and to communicate that state to others in an effective and efficient manner. From this perspective, emotional complexity is the direct result of the conceptual system for emotion.

In the context of this review, we will explore how various forms of emotional complexity result from the form and function of the conceptual system for emotion. The idea of a transaction between emotional and conceptual complexity is not new. Lane and colleagues have proposed a cognitive-developmental model of emotional awareness (e.g., Lane & Garfield, 2005; Lane & Pollermann, 2001) that argues for conceptual development as the core determinant

of emotional complexity. The view that we propose in this chapter is distinct from the cognitive-developmental model on several points. First, we propose that emotional complexity is grounded in a highly-flexible, context-dependent conceptual system of situated representations of emotion (see Niedenthal, this volume), rather than a system comprised of schemata or fixed prototypic or script-like concepts. Second, we emphasize the possibility that conceptual complexity has a hand in psychologically constructing each episode that we call "emotional" during the online categorization of affective (pleasant or unpleasant) events (cf., Barrett, 2006b). Finally, our perspective assumes that complexity in the conceptual system derives not only from *which* categories of emotion populate a person's conceptual system (i.e., whether or not a person possesses categories like *sad, happy, fearful,* etc.,) but also from idiographic variations in the *content* of category knowledge (e.g., what exactly a person knows about happiness or sadness), in the *representational format* of category knowledge (i.e., how that category knowledge is constituted in memory and during online use of category information), and the resources to *use* category knowledge to construct the experience of emotion (i.e., whether people can readily access and manipulate what they know during online experience). In this chapter, we argue that greater complexity in the structure, content, and representational format of the conceptual system, and deftness in wielding such knowledge, contribute to more complex psychological events that we call "emotion." The conceptual system for emotion is a unifying factor in producing emotional complexity in its various forms.

Complexity in Self-Reported Experiences of Emotion

The best way to assess the properties of experience (such as its complexity) is to ask people how they feel and to examine the content of what they answer. While self-report methods have obvious drawbacks for assessing the processes that might produce emotional complexity, they can tell scientists a good deal about the contents of what people feel (cf. Barrett, 2004; Barrett, Mesquita, Ochsner & Gross, 2007; Conner, Barrett, Lebo, Bliss-Moreau & Kashub, 2003). Emotional complexity refers to two types of contents in emotion self-reports: dialecticism and the granularity in the experience of emotion. Implicit in both is the idea that self-reports are verbal behaviors that can be analyzed in a way that unearths the structure of emotion experience.

Dialecticism in Self-Reported Experience of Emotion

As a form of emotional complexity, dialecticism refers to the experience of pleasant and unpleasant states in a coincidental or temporally related fashion (Bagozzi, et al, 1999). The term 'dialecticism' is derived from Confucian philosophy (see, Peng & Nisbett, 1999), and was first used in the context of cross-cultural research (Bagozzi, et al, 1999). In the context of this review, 'dialecticism' refers to all studies assessing the relation in reported experiences of positive and negative emotions.

Cross-cultural Variation in Dialectic Experience of Emotion

There appears to be a general scientific consensus that individuals from Eastern cultures such as China, Korea or Japan are more likely to have dialectical experiences of emotion when compared to those from Western cultures such as the United States or Europe (Bagozzi, et al., 1999; Kitayama, Markus & Kurokawa, 2000; Scollon, Oishi, Diener, & Biswas-Diener, 2005; Shimmack, Oishi & Diener, 2002). There is also some evidence for a Yiddish form of dialecticism (see Peng & Nisbett, 1999), but most research focuses on the East-West dichotomy. The psychological dimensions typically used to describe the difference between Eastern and

Western cultures (e.g., Individualism-Collectivism) fail to account for the cross-cultural variance in the dialectic experience of emotions, however (cf., Shimmack, et al, 2002). Instead, differences in dialecticism are thought to derive from emotion regulation strategies that are promoted by the philosophical traditions within each culture. Eastern dialecticism has been linked to a philosophical tradition that promotes balance and the acceptance of contradiction (Peng & Nisbett, 1999, although see Lee, 2000), where opposites are conceptualized as being intrinsically related to one another: *good* has some *bad* in it, such that something can be both *good* and *bad* at the same time. This orientation leads people to enlist in strategies that promote more affectively balanced lives. In contrast, Western experience is grounded in Aristotelian philosophy that favors an 'either-or' type of reasoning where opposites are biplolar: *good* is conceptualized as the antithesis of *bad*, such that something can never be both at the same time. This orientation leads people to enlist strategies that promote maximally pleasant (at the expense of unpleasant) experience (Heine, Lehman, Markus & Kitayama, 1999). The philosophical differences that characterize the East-Wide divide translate into different conceptions of what constitutes 'ideal affect' (the affective states that people deem most valuable and desire to feel most; Tsai, Knutson & Fung, 2006). What may lie at the heart of the cross-

cultural differences in the dialectic experience of emotion is a difference in the value that cultures place on the experience of unpleasant emotion.

The claims for broad cross-cultural variation in dialecticism may hide individual variability in dialectic experience within each cultural tradition, however. Dialecticism is sometimes operationally defined as a negative correlation between reported pleasant and unpleasant emotions (e.g., Bagozzi et al., 1999), but it has also been defined as a zero correlation (e.g., Diener & Emmons, 1985) or any decrease in the magnitude of negative correlation between the two (Shimmack, et al., 2002; Carstensen, Pasupathi, Mayr & Nesselroade, 2000).[1] In cross-sectional studies, the presence of a near zero correlation between reports of pleasant and unpleasant experience indicates that there is no systematic co-variation between them within a group of people. While some respondents report feeling both more pleasant and unpleasant emotion when compared to each respective group mean, other individuals report greater pleasant emotion with an absence of negative emotion (i.e., pleasant scores fall above the group mean for pleasure but unpleasant scores fall below the mean for displeasure), or vice versa. In reality, then, correlations near zero mask individual differences in the dialectic experience of emotion

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[1] The *absence* of dialecticism has also been defined as a zero correlation (e.g., Scollon et. al., 2005).

that appear to be present in both Eastern and Western contexts, although perhaps at different base rates.

Individual Variation in Dialectic Experience of Emotion

Several lines of research point to individual differences in the dialectic experience of emotion. As people age, their experience becomes more dialectic. In an experience sampling study of American participants ranging in age from 18-94, younger participants experienced pleasant and unpleasant emotions as inversely related, but this correlation diminished with age (Carstensen, et al., 2000). Greater cognitively complexity promotes dialectic thought (i.e., the ability to conceptualize contradiction), thereby producing more dialectic experience. Individuals greater in cognitive complexity did not demonstrate a systematic relationship between pleasant and unpleasant experiences, as compared to individuals low in complexity whose pleasant and unpleasant experiences were inversely related (Davis, Zautra, & Smith, 2004; Reich, Zautra, & Potter, 2001). Women demonstrate exaggerated versions of the dialecticism patterns associated with their culture (e.g., Bagozzi, et al., 1999; Shimmack, et al., 2002). American women had less dialectic experience (i.e., larger negative correlations between experience of pleasant and unpleasant emotions) but Chinese women had

more dialectic experience (i.e., larger positive correlations between experiences of pleasant and unpleasant emotion) than their respective male counterparts (Bagozzi, et al., 1999). These findings stand in contrast to the stereotype that women are the more emotionally complex sex (for a discussion see Barrett, Robin, Pietromonaco, & Eyssell, 1998), and call into question the generalizability of findings that Western women have more complex emotional awareness when compared to Western men (Barrett, Lane, Sechrest & Schwartz, 2000).

Sources of Knowledge Sampled

The strongest evidence of dialecticism comes from responses that are more likely to be infused with culturally-embedded beliefs, such as judging how a hypothetical scenario might feel (e.g., Leu, Mesquita, Ellsworth, Yong, Huijian, Buchtel et al, in prep), recalling prior experiences (e.g., Kitayama, Markus, & Kurokawa, 2000; Reich, Zautra, & Potter, 2001; Oishi, 2002; Ong & Bergeman, 2004; Carstensen, et al., 2000), or summarizing experiences across a period of time to produce a response (e.g., Larsen, McGraw & Cacioppo, 2001; Larsen, McGraw, Mellers & Cacioppo, 2004; for a discussion, see Barrett, 1997; Robinson & Clore, 2002; Ross, 1989). Momentary experience of emotion ("How happy are you right now?") are less belief-based and correspondingly fail to find evidence of dialecticism (e.g., Vansteelandt, Van Mechelen &

Nezlek, 2005), even in cultures typically characterized as more prone to dialectic experiences of emotion (e.g., Chinese; Scollon et al., 2005).

Granularity in Self-Reported Experience of Emotion

A second form of complexity in self-reports of emotion experience is the ability to verbally characterize such experiences with precision, referred to as *emotional granularity* (Barrett, 1998, 2004; Barrett, Gross, Christensen, & Benvenuto, 2001; Feldman, 1995; Tugade, Barrett & Gross, under review).[2] Individuals who are emotionally granular use emotion adjectives (such as "sad," "contentment," "angry," "afraid," "joyful," and so on) to represent discrete and qualitatively different experiences. Those lower in granularity use these same words in a less precise way to represent broad, global affective states, such as *pleasantness /unpleasantness,* or *arousal / quiescence*.

Emotional granularity is determined by assessing the relatedness in emotion experiences as they are represented through people's endorsement of emotion adjectives during the

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[2] Emotional granularity is not defined in terms of validity because it is currently not possible to objectively verify that a certain emotional event is present or absent (i.e., there is no empirically justifiable accuracy criterion that is independent of an observer; Barrett, 2006b). It might be possible to examine whether observers' perception of emotion agrees with a person's ratings of their own experience, but estimates of self-other agreement address a different question.

self-report process. Typically, participants are given a set of emotion-related adjectives (happy, anxious, annoyed, etc.) and rate, on a Likert scale, how closely each adjective described their emotional state at a given measurement moment; this is done across a series of measurement instances (e.g., in an experience-sampling paradigm). The relatedness between ratings is then calculated using P-correlations (e.g., Barrett, 1998; Barrett et al., 2001; Feldman, 1995) or intra-class correlations (Tugade, Barrett & Gross, under review). A strong positive correlation between two such ratings is evidence for low granularity, meaning that an individual uses emotion words (e.g., "angry" and "sad") in a non-specific fashion to represent what those two feeling states have in common (e.g., displeasure). A weak (or zero) correlation, or a strong negative correlation, indicates high granularity, meaning that an individual uses two emotion words to represent two qualitatively different states (e.g., "angry" is a different feeling than "sad"). (A correlation of zero between ratings of "angry" and "sad" indicates high granularity because it reflects the fact that a person differentially uses the words across measurement occasions; in some instances, "angry" and "sad" are rated above a person's own mean (indicating that both intense anger and sadness are being felt), whereas in other instances, "angry" is rated higher and "sad" rated lower, or

vice versa (indicating that one is being felt in the absence of the other).

Individuals from the US vary tremendously in their degree of emotional granularity, even when controlling for verbal ability. Estimates from one study (Barrett, 1998) put the granularity for unpleasant experiences between .16 and .89 (M=.52, SD=.24). The granularity for pleasant experiences ranged between .51 to .96 (M= 0.77, SD= 0.28). People who represent their negative states in a granular way also typically report their positive states in a granular way (Barrett, 1998).

Processes Underlying Emotional Granularity

The conceptual system for emotion. When people report on their experiences, they must represent and communicate those experiences using words. Differences in the structure of the conceptual system for emotion may be one source of variation in how people describe their experiences of emotion, leading to variation in emotional granularity. For example, the words that correspond to basic-level categories may influence how people use emotion words to represent experience during the self-report process. Categories for emotion can be thought of as hierarchically organized, from the most general level (*positive* and *negative*) to the most specific (e.g., *frustration, aggravation, irritation,* etc. for the category of *anger*). Basic-level categories represent the level of conceptualization that

people prefer when parsing a domain (Murphy, 2002; Rosch et al., 1976), and words that correspond to basic-level categories are used most frequently by parents when naming objects and events for their children (Brown, 1958). Most researchers assume that the categories corresponding to the words "anger," "sadness," and "fear," etc. are basic-level, and cross-sectional research bears this out (e.g., Alonso-Arbiol, Shaver, Fraley, Oronoz, Unzurrunzaga, Urizar, 2006; Fehr & Russell, 1984; Shaver, Schwartz, Kirson & O'Connor, 1987; Shaver, Murdaya & Fraley, 2001). It is possible, however, that there is significant and important individual differences in the categories that function as the basic level that have gone unnoticed. We propose that individuals lower in granularity use nomothetically superordinate category knowledge as the modal means of categorizing their experiences (e.g., they categorize as *unpleasant* those feelings that might normatively be categorized as *sadness, anger,* or *fear,* and *pleasant* those feelings that would normatively be categorized as *joy, happiness,* or *interest*). Categorizing an affective state gives it meaning, such that a person can communicate it to others, make inferences about it, and make predictions about how to act (cf. Barrett, 2006b). If a person uses superordinate categories of emotion (e.g., *pleasant* and *unpleasant*) as the modal means of categorization, then that person will not only

communicate affective experience in a broad manner, but he or she might also experience those states as broad and undifferentiated. Alternately, individuals higher in granularity might be experts in emotion and use subordinate categories as basic (e.g., they may use *frustration*, *annoyance* and *rage* as basic, rather than *anger*). These individuals would report and experience affect as discrete and nuanced emotional events, much in the same way that experts in x-rays (Christensen, Murry, Holland, Reynolds, et al, 1981), chicken sexers (Biederman & Shiffrar, 1987), and wine (Solomon, 1990; 1997), can perceive important differences that novices cannot (for a similar point, see Lane, 2000 p.348).

Although studies have yet to explicitly examine the relation between conceptual basicness and emotional granularity, some findings suggest the plausibility of such a link. Two year-old children typically use the word "sad" to refer anything unpleasant (such as faces depicting *anger*, *sadness*, and *fear*) and "happy" to refer to anything pleasant (see Russell & Widen, this volume); that is, their basic-level of categorization is *pleasant-unpleasant*. This pattern of response is very similar to how low granularity adults use emotion adjectives to communicate only the most global or general affective states (Barrett, 1998, 2004; Feldman, 1995). As children's conceptual system becomes more differentiated, they learn to reliability distinguish

between exemplars of other emotion categories (e.g., *anger*, *fear*, and *sadness*). Their ability to correctly identify faces depicting these emotions mirrors adults with high granularity who use emotion words to precisely represent their experience. We would expect, then, that a child's experience of emotion becomes more granular as his or her conceptual system becomes more differentiated. Even more tempting are the implications for emotional complexity in adulthood. Complexity in the content of a person's conceptual system for emotion might intrinsically shape complexity of experiences emotion in much the same way that conceptual complexity shapes children's perception of emotion across early stages of development.

In addition to variation in structure, the content that constitutes the conceptual system for emotion may be linked to emotional granularity. Typically, emotion concepts (e.g., the concept for *anger*) have been conceived of as a single, stable representations of information that are organized classically (e.g., Johnson-Laird & Oatley, 1989; Ortony, Clore, & Foss, 1987), as prototypes (Russell, 1991), as schemata (Lane & Pollermnn, 2001), or as theories (Clore & Ortony, 1991) that can be retrieved from long-term memory when needed. More recently, emotion concepts have been understood as flexible, constructions deriving from a more generative system of heterogeneous and varied situated

conceptualizations (see, Niedenthal, this volume). From the vantage point of this more recent view, emotion concepts are examples what Edelman (1989) has termed the 'remembered present,' where neural representations of an emotion exemplar combines information from the current situation with that which is stored from previous experience. The result contributes to the representational structure that is utilized during later online categorizations of percepts from that domain.

To date, no studies have examined idiographic variability in the richness of conceptual content. Studies assessing the conceptual system for emotion primarily ask individuals to list words for emotion categories (e.g., Fehr & Russell, 1984; Study 1), to rate the similarity between words (e.g., Alonso-Arbiol et al, 2006, Study 2; Barrett, 2004; Shaver et al., 1987, Study 1) or to rate the prototypicality of emotion words (e.g., Alonso-Arbiol et al, 2006, Study 1; Fehr & Russell, 1984, Study 3; Shaver et al., 1987 Study 1). Emotion words are not synonymous with emotion concepts, however, so that tests of how people use and think about emotion words may not sufficiently map the variability and detail in what people know about emotion. Words can be processed using shallow, quick, associative methods that fail to activate deeper representations of category information (Barsalou, Santos, Simmons &Wilson, in press).

Even studies that have participants write narratives for episodes of *anger, sadness,* and *fear*, and code those narratives for their prototypical features (Shaver et al., 1987, Study 2), may not be suitably sensitive to capture individual differences, because people can construct a prototype of a category even if conceptual knowledge is not stored that way.

There is some evidence to suggest that socialization contributes to variability in the conceptual system for emotion. People may have a richer conceptual base for emotion available to them if they are exposed to a wider range of emotion categories, a more varied emotion vocabulary, and learn to represent their experiences with greater detail and complexity. Children learn about emotion categories through formal, rule-based instruction, where parents make explicit links between affective feelings, a situational context, and emotion words (e.g., when a child throws a toy at Jimmy, a parent might say "You're feeling *angry* right now because Jimmy grabbed your toy without asking"). Parents also reminisce about emotional memories in a way that helps children learn about a particular emotion category, discussing the feelings that were involved during the experience of that emotion, the interpersonal consequences of expressing that emotion, or by discussing coping strategies relevant to that emotion (e.g., Fivush, Berlin, Sales, Mennuti-Washburn & Cassidy, 2003;

Miller & Sperry, 1988). Indeed, children whose parents speak to them about emotion know more about emotion (e.g., Harris, 2006a, b; Harris, de Rosnay & Pons, 2005; de Rosnay, Pons, Harris & Morell, 2004).

Children may also acquire emotion concepts via inductive, associative learning, such as when an emotion word is used (but not explicitly paired with) features of an emotional episode (e.g., a child hearing a parent refer to feeling depressed when slumped at the table with a defeated expression discussing a recent job loss). The role of associative learning in the acquisition of emotion category knowledge remains to be empirically tested, however.

Cognitive resources. Differences in granularity may not only stem from what people know about emotion, but also from how well they use what they know. For example, a person's working memory capacity (WMC) most likely shapes his or her ability to attend to affective states, and to access and efficiently wield conceptual knowledge during emotion representation. WMC capacity is the ability to control attention for the purposes of processing information in contexts where there are competing demands (Barrett, Tugade, & Engle, 2004). Working memory is required during the self-report process, where respondents must hold an experience in mind as they describe that feeling using emotion adjectives presented to them in a serial format.

With effortful, controlled processing, people can reject adjectives that are not characteristic of the current state, so that correlations between emotion adjectives will be substantially lower, resulting in high emotional granularity. WMC may also impact emotional experience itself because people higher in WMC will be able to hold more information about the current affective state in mind as emotion category content (i.e., contextual information, arousal content, linguistic representations) is retrieved to aid in online categorization that feeling. This would result in not only the report of more discrete emotional experiences, but also in the experience of more discrete emotional states.

Summary

In this section, we discussed how emotional complexity is observed in verbal representations of experience. In both studies of dialecticism and emotional granularity, evidence of emotional complexity is derived from the structure of people's self-reports of emotion experience; self-reports are treated as verbal behaviors, and the degree of complexity in the structure of those behaviors is examined. We suggested that conceptual knowledge about emotion seems to play a role in both forms of complexity, but not merely because self-reports require language. Rather, there is good reason to hypothesize that conceptual knowledge about emotion plays an intrinsic role in the complexity

of emotions as they are experienced. Individual differences in the content of the conceptual system for emotion and in executive function, as well as how these differences shape experience, have yet to be explored, and therefore constitute a new frontier of research in emotional complexity. In the next section, we examine what is known about complexity in a particular form of conceptual knowledge: propositional knowledge for emotion. We then explore the experiential ramifications of deficits in this type of knowledge to shed further light on the potential mechanisms underlying emotional complexity.

Complexity in Propositional Knowledge of Emotion

The Levels of Emotional Awareness Scale

To date, the study of complexity in conceptual knowledge of emotion has been assessed with measures that ask individuals to make explicit, propositional statements about emotion experience (e.g., "If I didn't win a contest, then I would feel disappointed"). The Levels of Emotional Awareness Scale (LEAS; Lane, Quinlan, Schwartz, Walker & Zeinlin, 1990) is the most frequently used measure and is based on the assumption that emotion experience occurs when feelings of 'emotional arousal' are conceptualized using knowledge about emotion. Individual differences in emotional complexity, as

measured by the LEAS, reflect variations in the degree of differentiation and integration of a person's "emotional schemata" (cf. Lane & Pollerman, 2001; Lane & Schwartz, 1987; Lane, et al., 1990). According to writings by Lane and colleagues, development of emotional schemata is facilitated both by language and by individuals' ability to encode and represent past experiences of emotional arousal. Individuals who focus on proprioceptive information during emotional arousal will be more likely to encode and later represent emotion knowledge in visceral or action-oriented terms. Individuals who abstract relational meaning from feelings of emotional arousal (such as how different feelings relate, how they are coordinated, etc) will be more likely to encode and later represent emotion knowledge in a nuanced and differentiated fashion.

The LEAS measures the complexity of propositional knowledge of emotion by asking individuals to describe the types of emotional experiences that would occur during hypothetical emotion-eliciting situations (e.g., "You and your friend are competing for a prize and your friend wins. How would you feel? How would your friend feel?"). Responses are coded for the extent to which they make reference to bodily sensations, specific behavioral responses or action tendencies, or discrete emotion words, each of which is taken as evidence of increasing emotional complexity (see, Lane, et al, 1990).

LEAS scoring criteria can be used on any emotion representation, be it a narrative describing a current experience or a prior, remembered experience (e.g., Bliss-Moreau, Barrett, Connor & McCarthy, 2006). In such cases, the scoring represents that a tendency to represent experience as emotional (rather than somatic or affective) and to characterize that experience using multiple emotion concepts (rather than reflecting anything about the detail and situated nature of the conceptual content).

Complexity in propositional knowledge for emotion predicts more normative identification of emotion cues in others and the surrounding context. People who score higher on the LEAS are better able to identify emotional content in other people's facial behaviors and in the environment using the Perception of Affect Test (PAT; Rau, 1993) (Lane, Sechrest, Reidel, Shapiro, Kazniak, 2000; Lane, Sechrest, Reidel, Weldon, Kasniak, Schwartz, 1996). Higher LEAS scores are also associate with greater right cerebral hemisphere dominance during perception of emotional face stimuli (Lane, Kivley, Du Bois, Shamasundara, & Schwartz, 1995), a phenomenon that is thought to index heightened sensitivity to external emotion cues (see, Lane et al., 1995).

Sex Differences in Propositional Knowledge of Emotion

There are robust and consistent sex differences in complexity of propositional knowledge for emotion. Women from Western contexts routinely out-perform men on the LEAS (e.g., Conway, 2000; Bliss-Moreau, et al, 2006), even when factors such as verbal intelligence, language of origin, or social economic status are controlled (Barrett, Lane, Sechrest & Schwartz, 2000). These sex differences are present in children, where girls out perform boys on the children's version of the LEAS (LEAS-C; Bajar, Ciarrochi, Lane & Deane, 2005). At face value, these findings suggest that males and females routinely in their use of emotion knowledge, but it may not reflect differences in emotional aptitude. Sex differences in LEAS performance disappear when items on the LEAS are made particularly self-relevant (Bliss-Moreau, et al. 2006), suggesting that men and women may possess the same range of knowledge, but use it differently under the testing circumstances imposed by the standard LEAS administration (i.e., controlled lab situations with few contextual cues and social cues). Under such circumstances, responses to hypothetical scenarios (as in the LEAS) very likely draw on culturally infused gendered beliefs about emotion. Consistent with this idea is the finding that both male and female respondents who describe themselves as more masculine perform more poorly on the LEAS than do those who are lower in masculinity (Conway, 2000).

Cultural stereotypes about emotion will have both distal and proximal effects on LEAS responses. The distal effects of stereotypes begin in childhood, where parents transmit stereotypes about sex roles to children via implicit means (talking about emotion differently to boys and girls) or explicit means (teaching boys and girls to behave in different ways during emotional situations). For example, when speaking to their daughters, European American, middle class mothers elaborate and evaluate emotional memories more, and are more likely to discuss the interpersonal contexts of those memories, compared to when they are speaking to their sons (Fivush, et al, 2003). Proximally, stereotypes may impact LEAS performance because they affect the motivation to respond in a complex manner, or because they act as a lens through which participants retrieve conceptual knowledge about emotion.

Developmental Differences in Propositional Knowledge of Emotion

Individual differences in propositional knowledge for emotion have been recently demonstrated in children (using the LEAS-C; Bajar, Ciarrochi, Lane & Deane, 2005). Consistent with some adult samples (e.g., Lane et al., 1990), performance on the LEAS-C was associated with increased verbal skill and vocabulary. Although linguistic and cognitive capacity might have been driving LEAS

performance, the evidence is also consistent with the idea that children with greater language skills also had better understanding of emotion (e.g., de Rosnay & Harris, 2002; Pons & Harris, 2005; Pons, Lawson, Harris & de Rosnay, 2003; Widen & Russell, this volume). LEAS performance increases with age (Badjar et al., 2005), suggesting that propositional knowledge about emotion increases in complexity as people learn about emotion.

Alexithymia: An Absence of Conceptual Knowledge of Emotion

Deficits in propositional knowledge of emotion ground an emotional disturbance known as "alexithymia." The term 'alexithymia,' (literally meaning 'absence of words for emotion') was first coined by Sifneos (1973) to describe patients who appeared to lack conceptual knowledge of emotion, resulting in an impaired ability to symbolically represent their affective feelings as emotional. Alexithymic individuals' apparent lack of conceptual knowledge results in difficulties expressing emotion, imagining, socializing, and increases the likelihood that emotion will be experienced as somatic symptoms (Haviland & Reise, 1996; Rieffe, Oosterveld, Meerum & Terwogt, 2006; see Lane, Ahern, Schwartz & Kazniak, 1997 for a discussion of the alexithymia construct). As might be expected, individuals high in alexithymia consistently perform poorly on the LEAS (e.g., Lane, et al.,

1996) and measures of emotional intelligence (e.g., Lumley, Gustavson, Partridge, & Labouvie-Vief, 2005; Parker, Taylor & Bagby, 2001). Alexithymia occurs most frequently in older individuals (although see Rieffe, et al, 2006), men, individuals of lower SES, in those with fewer years of education (Lane, Sechrest & Riedel, 1998), and is seen in patients with various psychological and somatic disorders.

It is widely believed that alexithymia results when individuals fail to develop the cognitive resources needed to consciously represent emotional states (Berenbaum & James, 1994; Frawley & Smith, 2001; Lane & Schwartz, 1987; Taylor, 2000; Taylor, Bagby & Parker, 1997). This rudimentary conceptual system for emotion results in a form of 'affective blindsight' where individuals experience subjective bodily sensations or "background feelings" but fail to experience them as emotional (Lane, et al, 1997; Lane & Garfield, 2005) (akin to classic blindsight patients who have behavioral awareness of visual objects in the absence of the conscious experience of seeing those objects (e.g., de Gelder, Vroomen, Pourtois, & Weiskrantz, 1999).

Deficits in Emotion Experience Associated with Alexithymia

Alexithymics report less intense experience of emotion (e.g., Luminet, et al, 2004; Mantani, Okomoto, Shirao, et al, 2005; Stone & Nielson, 2001) and use fewer emotion words to

describe their emotional states (e.g., Luminet, et al, 2004; Roedema & Simons, 2001) than do their non-alexithymic counterparts. Alexithymic individuals also demonstrate decreased capacity for coping with emotion (Parker, Taylor, & Bagby, 1998), supporting the idea that alexithymic individuals lack the complex conceptual system that contributes to successful regulatory strategies.

Even as the experience of emotion is disrupted, the experience of core affect (meaning psychologically primitive states of pleasure and displeasure) is not. Alexithymic and non-alexithymic individuals make similar ratings when they report pleasure and displeasure in response to stimuli (Aftanas, Varlamov, Reva, & Pavlov, 2003; Berthoz, Artiges, Van de Moortele, et al, 2002; McDonald & Prkachin, 1990). Alexithymics have difficultly describing their affective states as discrete instances of emotion but report experiencing many somatic symptoms (e.g., Joergen Grabe, Spitzer, Juergen Freyberger, 2004)**,** consistent with reporting a basic experience of feeling "good" or "bad." Some studies find that alexithymic individuals actually experience more intense negative affect (e.g., Friedlander, Lumley, Farchione, & Doyal, 1997) and enlist more behaviors designed to reduce the experience of negative affect (e.g., Troisi, Belsanti, Bucci, Mosco, Sinti, & Verucci, 2000) than do their non-alexithymic counterparts,

suggesting alexithymic individuals do in fact have preserved experience of core affect.

Alexithymic individuals also have preserved (and sometimes greater) physiological arousal to evocative stimuli when compared to those without alexithymia. For example, individuals with and without alexithymia did not differ in skin conductance rate or heart rate while watching an unpleasant, highly arousing video (Stone & Nielson, 2001). Although they had intact physiological reactions to the movie, alexithymic participants reported less intense feelings disgust, concern, depression, surprise, fear, etc. than non-alexithymic participants (Stone & Nielson, 2001). In some studies, individuals with alexithymia actually experience greater physiological arousal in reaction to emotionally evocative stimuli (Byrne & Ditto, 2005; Infrasca, 1997; Luminet, et al, 2004; Martínez-Sánchez, Ortiz-Soria & Ato-García, 2001; Wehmer, Brejnak, Lumley, & Stettner, 1995).

Taken together, these findings suggest that alexithymics *feel* core affect (i.e., defined as psychologically primitive pleasant and unpleasant states; Barrett, 2006a; Russell, 2003), perhaps as somatic symptoms, but fail to translate this into a mental representation of emotion (as per Barrett, 2006b; Barrett, et al, 2007). Existing neuroscientific evidence is consistent with the idea that alexithymic individuals suffer from a deficit in the ability to experience their affective

states as emotional. Studies find that, during emotional experience, individuals with alexithymia show less activation in several areas within medial prefrontal cortex (MPFC) (e.g., Berthoz, Artiges, Van de Moortele, et al, 2002) and within several regions of anterior cingulate cortex (ACC), as compared to individuals without alexithymia (Berthoz, et al, 2002; Lane, et al, 1998). These areas seem to play an important function in representing core affective states as experiences of emotion (see Barrett et al., 2007; Wager et al., this volume).

While the majority of studies find deficits in alexithymics' tendency to report discrete experiences of emotion, those that do not are particularly illuminating. Studies that use more complex cues to induce emotion, such as video clips or imagery, tend to find evidence of emotion experience deficits in Alexithymics (e.g., Luminet, et al, 2004; Mantani, et al, 2005; Stone & Nielson, 2001; although see, Aftanas & Varlamov, 2004), whereas studies that use less complex cues, such as pictures (e.g., IAPS) do not (e.g., Aftanas, et al, 2003; McDonald & Prkachin, 1990). Sufficiently simple cues may facilitate alexithymic individuals' ability to access a rudimentary cache of emotion knowledge, and to make 'normal' reports about emotion experience.

Deficits in Emotion Expression Associated with Alexithymia

People who suffer from alexithymia not only have deficits in the experience of emotion, but they also exhibit low levels of spontaneous expressive behavior combined with a surplus of somatic symptoms. Alexithymic individuals are typically rated as less expressive during social interactions (e.g., Luminet, et al, 2004) and humorless during clinical interviews (Lumley et al, 2005) as compared to their non-alexithymic counterparts. Individuals with alexithymia produced significantly less intense and more ambiguous spontaneous emotional facial behaviors when viewing unpleasant stimuli, as compared to those without alexithymia, although both groups were equally capable of posing emotional expressions when prompted (McDonald & Prkachin, 1990). This decrease in emotional expressivity occurs along side greater somatic manifestations of emotion. Alexithymics report greater bodily concerns and somatic complaints (e.g., Nakao, Barksy, Kumano, & Kuboki, 2002; Taylor, Parker, Bagby & Acklin, 1992; for a meta-analytic review, see de Gucht & Heiser, 2003), more tension headaches (e.g., Yücel, Kora, Özyalçín, Alçalar, et al., 2002), and demonstrate higher levels of hypertension (e.g., Todarello, Taylor, Parker, & Fanelli, 1995) and cortisol reactivity during stress (e.g., Lindholm, Lehtinen, Hyyppa, & Puukka, 1990). With an impoverished conceptual system for emotion, alexithymic individuals may be more likely to

experience free-floating affect as somatic. This would explain why the link between alexithymia and somatic complaints disappears when factors such as trait anxiety, depression, or experience of negative affect are controlled (de Gucht, Fischler & Heiser, 2004; Lundh & Simonnson-Sarnecki, 2001).

Deficits in Emotion Perception Associated with Alexithymia

Individual suffering from alexithymia not only have difficulty perceiving their own affective states as emotion, but they have difficulties perceiving emotion depicted in other people's faces (e.g., Lane et al., 1995; 1996; 2000; Parker, Taylor & Bagby, 1993; Vermuelen, Luminet & Corneille, 2006). This effect extends to processing emotional content in other stimuli, such as sentences about emotion, pictures depicting emotional situations (Lane, et al., 1996; 2000), and words that are emotional in content (Luminet, Vermeulen, Demaret, Taylor, & Bagby, 2006; Suslow & Junghanns, 2002). Neuroscientific evidence supports the idea that alexithymic individuals have difficulty conceptualizing external cues such as faces and words as emotional. Alexithymic as compared to non-alexithymic individuals exhibited decreases in brain activity in a number of brain regions such as right inferior frontal gyrus (BA 44/45), orbitofrontal cortex (BA 11), middle frontal gyrus (BA 9), anterior cingulate cortex (BA 24) and

cerebellum while viewing emotional facial behaviors (Kano, Fukado, Gyoba, Kamachi, et al, 2003). Meta-analyses of the imaging literature suggest that these regions are consistently implicated tasks involving the perception and categorization of emotion (see Wager et al., this volume).

Self-Characterizations of Complexity

Thus far, we have examined emotional complexity as displayed in self-report behaviors (where individuals verbally represent their experiences of emotion) and in propositional conceptual knowledge of emotion. In both domains, complexity is assessed using performance measures, because scientists abstract information about a person's emotional complexity from patterns of responses or the ability to perform emotionally complex operations. The third and final way of conceptualizing emotional complexity is as self-characterization, where respondents are asked describe their own degree of emotional complexity.

A number of existing scales tap an individual's beliefs about his or her own emotional complexity. Scales typically ask individuals to characterize how aware they are of their own affective states (e.g., Mood Awareness Scale, MAS; Swinkles & Giuliano, 1995), as well as the degree to which they attend to, can distinguish between, and are capable of repairing

those states (e.g., Trait Meta Mood Scale, TMMS; Mayer & Stevens, 1994). Perhaps the best example of a self-characterization measure of complexity is the Range and Differentiation of Emotional Experience Scale (RDEES; Kang & Shaver, 2005), which assesses the degree to which people believe that they experience a broad range of emotional states with subtle distinctions between them. Recently, self-characterization scales of emotional complexity have been developed for use in child samples (e.g., Emotional Awareness Questionnaire; Rieffe, et al, in press; Alexithymia Scale for children; Rieffe, et al, 2006). The various self-characterization measures sometimes correlate strongly with one another (e.g., Gohm & Clore, 2000) but often do not (e.g., Kang & Shaver, 2005).

More importantly, studies comparing self-characterizations and performance measures of emotional complexity reveal a disconnect between the two. For example, the RDEES is only moderately correlated with the LEAS ($r=.30$) and Toronto Alexithymia Scale (rs range from .36 to .38 across three studies; Kang & Shaver, 2005). The RDEES also failed to correlate with indices of emotional granularity computed over a month's time period (Barrett, unpublished data). It would be tempting to assume that people's beliefs about themselves do not match their behavior, were it not for the fact that the performance measures themselves often fail to correlate. Granularity is

essentially unrelated to performance on the LEAS (Barrett, unpublished data). Taken together, these findings suggest that emotional complexity may not be a single, homogenous construct, but rather a heterogeneous construct that consists of many different aspects of complexity.

The link between greater conceptual complexity and complexity in people's self-characterizations of emotion experience is at present speculative, but we suggest that there is good reason to assume such a link exists. When people complete self-characterization scales of emotional complexity, they are typically asked to rate the typical frequency, intensity, or differentiation with which they experience discrete emotions.   To describe themselves using such questionnaires, respondents must remember, summarize, and integrate their past experiences into a consistent set of responses to the questionnaire items. Recalling information is a reconstructive process, however. Those people who have a greater store of emotion knowledge to draw from may find it easier to construct a response during the self-report process. In essence, these people would exhibit greater fluency of emotion knowledge during the self-characterization process, resulting in a higher degree of self-characterized complexity.

Outstanding Issues

Measurement and Conceptualization of Emotional Complexity

Emotional complexity is a broad and varied construct. In this review, we have seen that emotional complexity has been conceptualized as dialecticism or emotional granularity in the experience of emotion, the ability to use multiple emotion adjectives in propositional responses to emotion-evoking scenarios, and as self-characterizations of complexity. If these different forms of complexity tapped a common construct, we would expect them to be strongly correlated, such that one type of complexity could stand in for another. Yet, this type of coherence does not describe the state of the literature. One possibility is that the various forms of complexity fail to cohere as a single construct because the measures that have been used to assess them are flawed.

A second, perhaps more likely, possibility is that the measures are *causal indicators* of emotional complexity, so that complexity is a construct that emerges from its measured parts. In causal indicator models, a latent construct (in this case, emotional complexity) is a linear combination of its essentially uncorrelated causes (or measures) (Bollen & Lennox, 1991). The validity of the emergent construct cannot be judged on the basis of covariation amongst its indicators, but is instead determined by its ability to predict an externally measured criterion, such as well-being, interpersonal adaptability, emotion regulation, pro-social behavior, or perhaps another

person's perception of the target person's emotional complexity in a given instant.

A third possibility is that various conceptualizations of complexity are causally related under certain (but perhaps not all) conditions. We have suggested that richness and detail in the conceptual system for emotion may serve a common function in the various forms of emotional complexity. This perspective calls for a more detailed, idiographically sensitive mapping of the conceptual system for emotion. Studies assessing the nature of the conceptual system for emotion would determine which emotion categories people know and use, what the content of those categories are, and how that content is represented.

Variability in Emotional Complexity

A more comprehensive examination of sex and developmental differences in the various facets of emotion complexity is warranted. Clear sex differences exist in LEAS performance (Barrett et al., 2000) and in self characterizations of complexity (Gohm & Clore, 2000 for a review), but there are no consistent sex differences in emotional granularity. To gain an understanding of sex differences in complexity, future research must flesh out when and why sex differences appear. Mothers make more frequent references to emotion when discussing emotional memories with their daughters as compared to their sons (Adams, Kuebli, Boyle & Fivush, 1995)

and also discuss the interpersonal content and connotations of negative emotional memories more with daughters (Fivush, et al, 2003). This socialization process should have implications for the richness of children's conceptual systems for emotion. There are also developmental changes in emotional complexity (indicated by age differences in LEAS performance, differences in self-reported complexity in children, and suggested by an increased facility with emotion perception in early childhood). Little is known however, about how these differences might extend to the experience of emotion. Children's ability to precisely identify other people's emotional behavior mirrors the stages of conceptual development (see Widen & Russell, this volume), and as we noted previously, its possible those with a more well-defined conceptual system may more precisely represent their own experiences of emotion. At the other end of the lifespan, developmental differences also exist. Dialecticism increases in old age, and more recent work demonstrates age differences in the organization of positive and negative information in memory, indicating that older adults organize and represent emotional memories in a more dialectic fashion than younger adults (Ready, Robinson, & Weinberger, in press). There may also be age-related increases in granularity, although this hypothesis has not been explicitly tested. Carstensen and colleagues (2000) found

that older adults used emotion words in a more differentiated manner to represent online experience, whereas younger adults used emotion words in a less differentiated manner.

Finally, person factors such as working memory capacity might influence emotional complexity because greater WMC facilitates the creation of a complex conceptual system for emotion and allows for more efficient use of that system. WMC influences the construction of mental representations that support new learning (Cantor & Engle, 1993) and shapes how individuals use already existing information to support the encoding of new knowledge (Daily, Lovett, & Reder, 2001; Hambrick & Engle, 2002; but for evidence of additive effects, see Rukavina & Daneman, 1996). Thus, all other factors being equal, individuals higher in WMC might have more complex or idiographic detail in their conceptual systems for emotion merely because they are better at learning and storing category content. During online experience, WMC might affect how individuals wield conceptual knowledge because it facilitates easier, more efficient access to conceptual knowledge of emotion (see, Barrett, Tugade, & Engle, 2004), allowing individuals to make more specific, situation ally-tuned categorizations of their affective experiences as they occur.

Conclusion

Regardless of how emotional complexity is conceptualized, one thing is clear: emotional complexity is advantageous. Greater dialecticism, for example, is associated with greater resilience and lower stress in Western contexts (Davis, Zautra & Smith, 2004; Ong & Bergeman, 2004), particularly in older individuals (Carstensen, et al, 2000; Charles, 2005). Greater granularity confers more frequent and flexible emotion regulation (Barrett, et al., 2001; Tugade, Fredrickson & Barrett, 2004; Tugade, Barrett & Gross, under review). Complexity in propositional knowledge of emotion is also loosely associated with greater psychological well-being, as indicated by the fact that complexity in propositional knowledge of emotion increases following psychodynamic treatment in a patient population (Subic-Wrana, Bruder, Walther, Lane & Köehle, 2005). Children who are better at identifying and verbalizing their emotions experience less worry and depression than those children who have difficulty distinguishing or communicating their emotions (e.g., Rieffe, et al, in press). Finally, self-characterized complexity is related to greater interpersonal adaptability (e.g., Kang & Shaver, 2005). It would appear that greater emotional complexity confers greater capacity to navigate and cope with the emotional world.

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