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EMOTIONAL BEHAVIOR AND PSYCHOPATHOLOGY: A SURVEY OF METHODS AND CONCEPTS

JUNE GRUBER AND DACHER KELTNER

Here we encounter remarkable possibilities: facial expressions of sadness (i.e., "grief muscles") lasting for extended periods of times, perhaps even months; weeping for no reason; expressive behavior revealing depressed states of mind and the predilection to suicide.

—Darwin (1872/1997, p. 184)

Charles Darwin (1872/1997) advocated that the unregulated emotions of the mentally ill provided rich examples of the universal expressions that he sought and so successfully described. Darwin's accounts of expressive behavior drew attention to the potential importance of emotional expression in psychopathology. In the opening quote to this chapter, Darwin described what appear to be individuals suffering from depression, exhibiting sadness and grief that exceeded the typical duration of these emotions and seemed often to occur without obvious cause. Darwin also noted individuals whose absence of expressive behavior was equally revealing of the underlying mental condition: "Many idiots are morose, passionate, restless, in a painful state of mind, or utterly stolid, and these never laugh" (p. 196). In these cases, the relative absence of expression—blushing or laughing—is just as dysfunctional, and a sign of the individual's inability to participate in typical social encounters. At the heart of these observations is the idea that a person's functioning in life, and clues to his or her state of mind and character might be revealed in specific patterns of expressive behavior. Does emotional behavior provide

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a window onto psychopathology? What evidence is there for this provocative idea?

Empirical science has only recently begun to catch up with Darwin's prescient observations (e.g., Keltner & Kring, 1998). The purpose of this chapter is to provide an overview of the emergent methodologies used to study emotional behavior and of the empirical insights these methods have yielded. In the first half of the chapter, we focus on methods relevant to four channels of behavioral communication. Specifically, we review methods for analyzing facial expressions of emotion and the vocal and acoustic properties of speech during the expression of emotional states. Next, we consider narrative approaches, a behaviorally rich source of idiographic emotional information. We end by reviewing recent advances in research on touch and tactile behaviors intended to convey emotions to others.

Following this review, we turn to three themes for considering the empirical relationship between psychopathology and emotional behavior. The first theme is that certain psychopathologies involve an excess of emotional behaviors. The second, seemingly opposite, theme is that psychopathologies often involve noteworthy absences of emotional behavior. Our final theme is that psychopathologies involve disjunctions between emotional behavior and other emotional response components that are normally well coordinated.

FOUR METHODOLOGIES CENTRAL TO THE STUDY OF EMOTIONAL BEHAVIOR

Emotions are multifaceted phenomena, involving multiple response systems that each can be measured in a variety of ways (see, e.g., chap. 1, on self-report methods, and chap. 3, on the psychophysiology of emotions, this volume). The study of emotional behavior is complex compared with other channels, such as self-report, in part because of the seemingly limitless ways to parse the behavioral stream. This chapter discusses four methodologies that researchers have identified as particularly meaningful to measure behavioral activity. Thus, in this chapter, we focus specifically on facial expression, vocal cues, touch, and narrative behavior—all of which are response systems central to emotional communication. We focus on these four aspects because the empirical literature has shown that they are a richer source of emotional information compared with other behavioral responses (e.g., postural behavior; Keltner, Ekman, Gonzaga, & Beer, 2003). Furthermore, deficits in emotional communication have been theorized as integral to the social difficulties and dysfunction at the heart of numerous psychopathologies (Keltner & Kring, 1998). Emotional behavior is important to study in the context of psychopathology because the use of naturalistic measures allows researchers to assess emotions online and unobtrusively within the stream of

spontaneous interactions (this is often not possible with, e.g., self-report measures). Furthermore, the methods we detail in this chapter to measure emotional behavior in the face, voice, touch, and narrative all provide data that robustly discriminate among discrete emotions (e.g., anger vs. disgust; compassion vs. love). To the extent that a line of inquiry seeks to document fairly specific relations between a clinical disorder and a distinct emotion (e.g., fear in anxiety disorders), the measures we detail here will be the most sensitive. Finally, the measures of emotional behavior that we discuss can be exported to other cultures or ethnic groups without significant translation difficulties, thus allowing for cross-cultural and cross-ethnic comparisons.

Facial Behavior and the Expression of Emotion

Facial expressions are rightly considered a grammar of the elementary social interactions of human social life and, by implication, psychopathology (Eibl-Eibesfeldt, 1989). Facial expressions are central to parent–child attachment dynamics and to how parents communicate to offspring about objects in the environment. They are part of how adolescents negotiate positions within social hierarchies. Facial expressions are central to the often unspoken flirtations between potential romantic partners. The face includes 43 sets of facial muscles; these muscles can combine into thousands of facial configurations. Of the many possible muscular configurations, only a limited set communicate emotion (e.g., Ekman, 1993). Some configurations, such as smiles or deferential displays of embarrassment, occur relatively frequently during social interaction and appear to be especially critical for adaptation.

Several characteristics have been identified that differentiate emotional expressions from other nonverbal behavior, such as gestures or emblems (e.g., Frank & Ekman, 1993). First, facial expressions of emotion (and vocal expressions as well) tend to be fairly brief, typically lasting between 1 and 10 seconds (Bachorowski, Smoski, & Owren, 2001). For example, a smile accompanying enjoyment will typically start and stop within a span of 5 seconds; nonemotional smiles of politeness, in contrast, can be exceptionally brief or quite long in duration. Second, facial expressions of emotion often involve involuntary muscle actions that most people cannot intentionally produce or suppress (Dimberg, Thunberg, & Grunedal, 2002). Facial expressions of anger, for example, most typically involve the action of the muscle that tightens around the mouth, which most people cannot produce voluntarily. In fact, the neuroanatomical pathways for generating involuntary emotional expressions can be distinguished from those of voluntary facial actions, such as the furrowed brow or lip press (Rinn, 1984).

Here we concentrate on two approaches oriented toward identifying discrete occurrences of emotion in the face. We should first, however, mention a widely used technique, electromyography (EMG), to record the activation of certain muscle movements, most notably the *corrugator* (brow

tighten) and *zygomatic major* (lip corner pull). EMG has the advantage of sensitively recording movements of these muscles, even those that are not visible to the human eye (and thus not codeable in the two systems we describe subsequently). However, EMG is less useful for measurement of emotional behavior because it does not provide differentiated measurement of negative (e.g., the corrugator is involved in numerous negative emotions, such as anger, fear, and sadness) and positive emotions.

One widely used approach that is well suited for studying specific emotional expressions is the Emotion Facial Action Coding System (EMFACS). EMFACS is a restricted application of the Facial Action Coding System (FACS), developed by Ekman and Friesen (1978) to code all visible facial muscle movements. Specifically, EMFACS codes emotion-relevant facial muscle movements derived from a previous theory using a rigorous, anatomically based approach (e.g., Ekman, 1992; Ekman, Friesen, & Hager, 2002; Ekman & Rosenberg, 1997). Learning FACS requires 80 to 100 hours. To achieve acceptable interrater reliability between two coders, a ratio can be used on overlapping data coded whereby the number of action units is multiplied by 2 and then divided by the total number of action units scored (e.g., Keltner & Bonanno, 1997). This agreement ratio can then be calculated for each event code by one or both of the coders. The elegance of EMFACS lies in its ability to translate coded facial muscle movements into a variety of discrete negative and positive emotional expressions, including anger, compassion, desire, disgust, pain, sadness, shame, embarrassment, enjoyment (i.e., Duchenne smiles), and amusement (e.g., Keltner & Bonanno, 1997). With the addition of specific postural and gestural movements, one can also identify displays of pride and love.

Another important system for coding discrete emotional expressions in the face is the Emotional Expressive Behavior (EEB) coding system (Gross & Levenson, 1993). Whereas EMFACS and other FACS-based systems code specific units of observable muscle action, EEB is more global and codes a broader range of behaviors. EEB includes rated intensities on a 0 (*slight*) to 3 (*strong*) scale for Disgust, Confusion, Fear, Sadness, Happiness and Amusement, Interest, Surprise, and Sleepiness. These intensity scales are applied to a predefined epoch of behavior (15–30 seconds is probably optimal). EEB also includes other behavioral codes such as yawns, face touching, and degree of body movement.

Comparing these two approaches, the strength of EMFACS is its precision: It allows researchers to identify the frame-by-frame unfolding of the specific muscle actions involved in emotion. This allows psychopathology researchers to identify specific millisecond occurrences of emotion as well as small but potentially important variations in emotional expression. For example, in EMFACS, more than 60 variations of anger have been documented, and one may speculate that some of these expressions systematically covary with specific emotional disorders. By contrast, in EEB, observers rate the

overall emotional pleasantness, intensity, and attentiveness–engagement at the end of a designated trial. The strength of EEB, with its use of global codes, is its ease and economy of use relative to EMFACS. EEB is also easier to learn and takes less time to code data.

Communication of Emotion With the Voice

The richness of the voice as a source of information about emotional behavior was not widely appreciated until recently. Unlike facial expression, the voice can communicate emotion when communicator and recipient are not looking at one another, even over great physical distances. Researchers who study vocal communication of emotion rely on more than 20 properties of speech to make inferences regarding the occurrence of emotion (for a catalog of acoustic markers, see Bachorowski, 1999; Scherer, 1986). These markers include speech rate and fluency, including number of syllables per second; syllable duration; and number and duration of pauses. To study the extent to which people can communicate emotions with the voice, researchers have asked people to express different emotions in the voice while reading nonsense syllables or relatively neutral text passages (e.g., Banse & Scherer, 1996; Klasmeyer & Sendlmeier, 1997). These vocal expressions are then presented to listeners, who select from a series of options to identify the term that best matches the emotion conveyed. In a review, Juslin and Laukka (2001) concluded that hearers can judge five emotions in the voice—anger, fear, happiness, sadness, and tenderness—with accuracy rates that approach 70%, comparable to the accuracy rates observed in facial judgment studies. Within these and other reviews, researchers have detailed the specific vocal markers of distinct emotions, which are intuitive categories and fairly easy to translate to empirical use.

One additional advantage of studying the voice is that it is fairly easy to establish the extent to which vocalizations of one person are contingent on the vocalizations of another. This aspect of studying vocalization derives from the continuous nature of many vocal cues (e.g., pitch) and allows researchers to investigate the social contingencies of emotion-related vocalizations. Bachorowski and colleagues have mapped acoustic characteristics of different laughs, for example, and their functions (e.g., Bachorowski et al., 2001). There are cackles; hisses; breathy pants; snorts and grunts; and voiced or songlike laughs, which include vowel-like sounds and pitch modulation. Smoski and Bachorowski (2003) have found that friends are likely to engage in antiphonal laughter, in which the two individuals overlap in their bouts of laughter. Social contingent laughter, then, is often a behavioral cue of relational closeness, and inversely, the absence of such laughter may afford a clue into disrupted relational bonds characteristic of some clinical disorders. Claims about the social disconnectedness of different disorders (e.g., autism, depression) could readily be assessed with these techniques.

Narratives and Communication of Emotion

People most frequently communicate emotion with words. The study of *emotion-related narratives*, which we define as stories people tell in spontaneous speech about their emotional experiences, offers several distinct advantages within the study of emotion-related communication. A first advantage of these narratives is that they allow researchers to move beyond general categories of emotional communication (e.g., "anger," "compassion") to the study of more nuanced, idiographic emotion that emerges out of an individual's particular life circumstances. For example, measures of facial expression provide indexes of an individual's anger, disgust, or shame; narrative techniques provide additional data about the history in which the emotion is embedded; the social context of the emotion; the individual's interpretation of the causes, origins, and associations of the emotion; and his or her evaluation of the emotion.

A second advantage of narrative techniques is closely related to the first: Narrative techniques allow researchers to identify spontaneous appraisals within a stream of emotional behavior. A central assumption in the field of affective science is that emotions are the products of meaning making and construal processes, which affective scientists most typically refer to with the rubric *appraisal* (e.g., Smith & Lazarus, 1993). Narrative techniques allow researchers to identify emotion-related appraisals, such as "injustice," "uncertainty," "loss," or "connection" within steams of emotional behavior (e.g., Bonanno & Keltner, 2004).

A third advantage to the use of narrative techniques, unlike the other channels of emotional communication that we have considered thus far, is that they provide a window into the study of the metarepresentational processes, or the representation of experience from other than the first-person perspectives in different linguistic forms, such as fictional simulation, story, metaphor, or poetic image, that accompany so many emotional experiences. The study of emotion narratives, in more pragmatic terms, focuses on the storytelling of an emotional event, such as a loss or turning point in life, with a specific emphasis on how semantic elements are temporally sequenced, how these propositions and elements are evaluated by the narrator, and which specific words are used.

A select review of different theoretically relevant categories reveals the rich psychological data latent in emotion-related narratives. These include references to core appraisal themes definitive of different emotions (e.g., Bonanno & Keltner, 2004; Capps & Bonanno, 2000), metaphor analysis (Kovesces, 2000; Lakoff & Johnson, 1980), language dysfluencies and disturbances (e.g., Docherty, Rhinewine, Nienow, & Cohen, 2001; Tannen, 1993), and computerized analysis of word usage within a narrative (e.g., Pennebaker, Francis, & Booth, 2001). In this brief review, we highlight emotion-relevant

findings, which attest to the likely fruits of studying how people describe their emotional experiences.

First, appraisal themes within the stream of narrative behavior are important in predicting psychological outcomes, such as increased long-term adjustment. For example, in one study, Capps and Bonanno (2000) identified self-construals of agentic action—so central to human emotion—within bereaved individuals' narratives of their experience of loss. Markers of their experience of agency included explicit references to feeling out of control, passive grammatical constructions, and verbs of necessity (*have to, need to*). It is remarkable that individuals who expressed diminished agentive roles in the language they used to describe their profound loss, beyond the effect of negative thoughts and feelings, suffered more persistent grief symptoms 2 years following the loss. This is one of the few studies in the field to link a spontaneous appraisal of agency—central to the experience of emotions like sadness, anger, guilt, and shame (e.g., Smith & Ellsworth, 1985)—to a significant life outcome.

Second, metaphors for emotions serve to structure experience of emotions within alternative, nonliteral representations (Lakoff & Johnson, 1980). For example, metaphors for anger (e.g., "blew his fuse" and "boiling with anger") may actually reflect the physiological phenomenon (i.e., increased body temperature) that one associates with anger. Metaphors may be labels of subjective emotional experience guided by patterns of autonomic activation. Further evidence by Fainsilber and Ortony (1987) suggests that metaphors may also be a marker of intensity of experience whereby frequency of metaphor use increases with the intensity of the emotion described. Thus, metaphor use may both capture and increase understanding of the intensity and possible physiological sensations of emotion in everyday language in a way that minimizes demand characteristics.

Third, Pennebaker et al. (2001) have developed ways to explore differences in word usage within narratives using a computer-based text analysis program called Linguistic Inquiry and Word Count (LIWC). LIWC has been used to track language use within classical literature, press conferences, everyday conversations, and personal narratives. Within more than 70 linguistic dimensions, LIWC can code both positive and negative emotion-relevant word usage. It also enables researchers to create their own theory-driven word categories. Pennebaker, Kiecolt-Glaser, and Glaser (1988) demonstrated that individuals who constructed a coherent narrative of a negative life event, incorporating aspects of negative emotion and increased cognitive processing, showed enhanced immune functioning and reported fewer medical visits. Thus, carefully attending to the specific words people use when constructing meaningful events may yield novel insights about the processes that promote physical and mental health.

Communication of Emotion Through Touch

Touch is the most developed sensory modality at birth, contributing to cognitive and socioemotional development throughout infancy and childhood (e.g., Field, 2001; Hertenstein, 2002; Stack, 2001) and likely has an abiding importance throughout the life course. In this section, we describe several emotion-based functions that touch provides, stressing the importance of touch in emotional behavior and the cultivation of social relationships.

A first is that certain types of touches can soothe. For example, in one study, infants held by their mothers during a painful medical procedure cried 82% less and had decreased heart rate during the procedure compared with those who were not held by their mothers (Gray, Watt, & Blass, 2000). A second function of touch is to signal safety. Theorists have observed that a primary need of infants is to know whether the environment is safe. For example, Anisfeld, Casper, Nozyce, and Cunningham (1990) discovered that infants who were carried next to their parents' bodies were more likely to be judged later as securely attached than infants carried less close to parents. A third function of touch is that it reinforces reciprocity. That is, the act of touching produces compliance, sharing, and cooperation (e.g., Willis & Hamm, 1980). A fourth function of touch is to provide pleasure. The simple touch of the arm with a soft velvety cloth activates the region of the prefrontal cortex that is involved in the processing of rewards such as pleasurable tastes and smells (Berridge, 2003). Finally, people can communicate emotions with touch. In fact, Hertenstein and Keltner (2005) recently found that people can communicate several emotions with touch, including anger, disgust, fear, sadness, love, compassion, and gratitude.

Although still in its infancy, the empirical study of touch has identified several measurable properties of tactile communication. The first is the social semantics of the tactile act. Tactile acts can be coded in terms of whether they are hits, squeezes, pinches, strokes, shakes, or rubs. A second is the temporal dynamics of the tactile act; that is, the duration and rapidity of onset and offset of the touch. Finally, there is the location on the recipient's body where the touch occurs.

William James (1890/1981) acknowledged the centrality of touch to the health of bonds between individuals. Few data, if any, exist with respect to how touch is involved in psychological disorder. The same could be said of the manner in which individuals interpret touch, that is, how they derive emotional meaning from others' tactile communication. These are two open areas of inquiry that we believe will yield significant results concerning the origins, manifestation, and maintenance of specific psychopathologies. Touch may be a good place to discern behaviorally the social dysfunction common to many disorders, perhaps through decreased soothing behaviors between caregivers with depression and their offspring, fewer touching behaviors as

evidence of social withdrawal in depression or perhaps social anxiety, or the absence of touching as an index of marital and family discord in bipolar disorder (Miklowitz & Goldstein, 1997).

Taken together, the study of facial expression, vocalization, narrative emotional behavior, and touch provide the tools to identify distinct emotions as they occur in the flow of social interaction. Each method has its advantages and disadvantages, as we have tried to highlight in our brief review. These methods are especially useful to the study of emotion (and psychological disorders). We now consider three insights regarding the relation between emotion and psychopathology that the use of these methods has generated.

THEMES IN STUDYING EMOTIONAL BEHAVIOR: EXTREMES, ABSENCES, AND DISJUNCTIONS

Theme 1: Look for Extremes

Extremes in emotional behavior can be indexed in several ways. They may be evident in the intensity of the behavior, such as an anger display that involves maximal contractions of the emotion-relevant facial actions. Extremes can be evident in the duration of the behavior or its frequency across some epoch of time. Within a social functional approach to emotion, which has guided much of this chapter, emotional extremes are likely to be highly dysfunctional within relationships, and specific types of emotional extremes (e.g., extreme sadness vs. extreme anger) may be markers of different psychopathologies.

Externalization and Extreme Anger Displays

Anger may be the most destructive emotion. It is associated with harmful intent and action toward others (Berkowitz, 1989), problems within interpersonal relationships, and risky perceptions and behaviors (e.g., Lerner & Keltner, 2001). One relevant study investigated facial expressions young boys displayed during an interactive IQ test that were coded using FACS. Specifically, measures of the extremity of facial expression were derived for each emotion by finding the product of the mean intensity of emotion-relevant muscle action and the frequency of emotional display. The IQ test produced frequent embarrassment, anger, and fear as the boys made intellectual mistakes in front of an authority figure. Consistent with the hypothesis that extremes of anger relate to antisocial behavior, the externalizers displayed the most anger (Keltner, Moffitt, & Stouthamer-Loeber, 1995). Furthermore, these boys displayed the least embarrassment compared with control participants and those who internalized their emotions. This latter finding is important given the claim that individuals who are less inclined toward

self-conscious emotions (i.e., embarrassment, shame, or guilt), which motivate the adherence to social norms, are more prone to antisocial behavior.

We contend that these findings reveal important guidelines for studying relations between emotional extremes and psychopathology. One does not need to sample extensive amounts of behavior; Keltner et al. (1995) found behavioral markers of antisocial tendencies using only 2 minutes of IQ test behavior. The context for the behavior also matters. Anger in response to an authority figure is a telling and maladaptive response for young boys. Dysfunctional emotion, therefore, is especially problematic in terms of social implications vis-à-vis the specifics of the social context.

Extreme Socially Inappropriate Behaviors in Orbitofrontal Patients

In similarly motivated research, Beer, Heerey, Keltner, Scabini, and Knight (2003) have looked at the self-conscious emotion of individuals with damage to the orbitofrontal region of the frontal lobes. The orbitofrontal region of the frontal lobes, which rests behind the eye orbits (i.e., Brodmann's areas 11, 12, 14, 47), is involved in the regulation of social behavior. Patients with orbitofrontal damage have been observed to greet strangers by kissing them on the cheek and hugging them (e.g., Rolls, Hornak, Wade, & McGrath, 1994), engage in inappropriate joking (Stuss & Benson, 1984), and inappropriately disclose personal information to a stranger (Beer, 2002).

In one study that examined inappropriately extreme emotion, patients with orbitofrontal damage and age-matched control participants were asked to tease a stranger. More specifically, participants were given two initials (e.g., "H.F.") and asked to generate a nickname for the stranger in the study and tease that person on the basis of the nickname. Patients' nonverbal displays of embarrassment and pride were coded based on a modified version of EMFACS. This demonstrated how EMFACS reveals important clues to emotion behavior. Specifically, patients, unlike control participants, exhibited inappropriate self-conscious emotion: They displayed increased pride and reduced embarrassment, even given the fact that they teased in overly forward and even sexually suggestive ways. Extremes of emotion—in this case, pride—reveal specific psychological deficits. Here again, there are normative expectations, as in the IQ test, for emotion: Teasing a stranger is a certain source of embarrassment for most. Not so for these patients.

Theme 2: Look for Notable Absences

As William James (1890/1981) and Charles Darwin (1872/1997) long ago observed, relative absence of emotion can also be unsettling and ultimately dysfunctional. We saw this to be the case with externalizing boys and with the patients with orbitofrontal damage, who showed a relative absence of embarrassment behavior in contexts in which the emotion was normative. The absence of emotional expression is also revealing of depression.

Depression and the Absence of Emotional Responding

Although most studies of depression and emotional disturbance have concentrated on emotional experience, mounting evidence suggests that people with major depression exhibit limited emotional behavior in response to a variety of stimuli (Rottenberg, 2005). For example, compared with nondepressed control participants, people with depression have been found to exhibit fewer facial expressions, especially in positive emotion contexts (e.g., Berenbaum & Oltmanns, 1992; Gotlib & Robinson, 1982; Pogue-Geile & Harrow, 1984). These notable absences in emotional facial behaviors resonate with findings on vocal affect and communication of emotion in depression. Caregivers with depression, for example, have been found to exhibit relatively flat vocal affect, with minimal emotional intonation (Bettes, 1988). Given the importance of pronounced vocal stimulation as a source of stimulation and learning for infants, these deficits are likely to have lasting implications for subsequent development. The study of narrative behavior has also yielded important insights into the absence of emotional responses in patients with depression; Bucci and Freedman (1981) found that individuals with depression exhibited greater speech dysfluencies when discussing positive emotional topics. Other theories posit a negative self-referentiality in the narrative behavior of people with depression (e.g., Rude, Gortner, & Pennebaker, 2004), with increased usage of negatively valenced and self-referential word usages, pointing to a provocative thesis that depression represents a notable absence of positive emotion representation in vocal affect and speech content. Thus, evidence from multiple behavioral response systems (facial behavior, vocal properties of speech, and narrative) converges on the theme of notable absence in depression.

Absence of Self-Conscious Emotions in Autism

One of the central social disturbances associated with autism is difficulties with theory of mind (e.g., Capps & Sigman, 1996). Theory of mind involves an appreciation of social norms and the awareness of others' evaluations. One might therefore expect deficits in theory of mind to relate to deficits in self-conscious emotions requiring these skills, such as embarrassment and shame, and recognizing self-conscious facial behavior in others. Here we highlight how the narrative and facial behavior approaches yield information about the absence of self-conscious emotions in children with autism. Few studies have specifically investigated embarrassment and shame among children with this condition. When asked to provide narratives of these emotions, children with autism have difficulty, providing general, factual knowledge rather than accounts of personal experiences (Capps, Yrimiya, & Sigman, 1992). Capps et al. (1992) concluded that self-conscious emotions are problematic for children with autism because of their decreased ability to engage in social referencing and perspective taking.

The recognition of self-conscious emotion involves the understanding of violations of social norms and negative social evaluations, both important aspects of theory of mind. When asked to judge emotions depicted in photos of human facial expressions, children with autism were impaired in the recognition of self-conscious emotional expressions specifically, because they performed comparably to control participants on the identification of non-self-conscious emotions such as anger or fear (Heerey, Keltner, & Capps, 2003). Children with autism tended to confuse embarrassment with "happy," whereas they tended to describe shame as "sleepy." Thus, absences of self-conscious emotions were most fruitfully understood using multiple avenues of behavioral data, including narratives to understand the lack of self-conscious emotional experience and facial behaviors to see a failure even to perceive these emotional states in others.

Theme 3: Disjunction and Malfunction

Within the study of emotion, it is assumed that the many response systems (e.g., communication, physiology, expressive behavior) are modestly interrelated. Empirical reviews of studies of university students have typically found that the report of emotional experience and the expression of emotion in the face correlate at about $r = .3$ (e.g., Matsumoto, 1987). This correlation makes sense within a functional analysis of display: Displays of emotion are more evocative of responses in others and thereby regulate interactions in adaptive ways when the expressions covary with experience. A nonverbal display of romantic love or of anger, for example, is likely to have much greater potency when accompanied by the experience of the specific emotion.

Historically, diminished emotional expressiveness, or flat affect, has been considered a prominent emotional feature of schizophrenia (e.g., Bleuler, 1911/1950; Kraepelin, 1919/1971). Modern experimental investigations using emotionally evocative stimuli have found that patients with schizophrenia are less facially expressive than nonpatients in response to emotional films (e.g., Berenbaum & Oltmanns, 1992; Kring & Neale, 1996), cartoons (Dworkin, Clark, Amador, & Gorman, 1996), and during social interactions (Krause, Steimer, Sänger-Alt, & Wagner, 1989). If one were to discuss emotions in schizophrenia simply in terms of behavior, we would conclude that patients with schizophrenia are simply less facially expressive across a variety of emotion elicitors and consider this as an example of a "notable absence."

In the case of schizophrenia, a richer story unfolds when experiential data are included with behavioral measures. Specifically, research suggests that patients with schizophrenia exhibit significantly fewer positive and negative facial expressions in response to emotionally evocative pictures and film clips compared with healthy controls, yet these patients report having levels of emotion in response to emotional stimuli that are similar to or greater

than those of nonpsychiatric control participants. Schizophrenia thus involves an unusual disjunction between experiential and behavioral response systems (e.g., Berenbaum & Oltmanns, 1992; Kring & Neale, 1996).

These findings raise intriguing questions about other kinds of disjunctions that might be observed in psychopathology. One might examine disjunctions between emotional display and other channels, such as physiological response. This kind of inquiry applied to depression or bipolar disorder (Gruber, Johnson, Oveis, & Keltner, 2006) would help ascertain whether their disjunctions reflect some general incoherence in emotional response.

CONCLUSIONS AND FUTURE DIRECTIONS

Pioneers in the field of psychology were drawn to the question of how emotions are involved in psychopathology. They pursued this line of inquiry for a very good reason: The study of emotion and psychopathology offers the promise of several conceptual gains in the two fields (e.g., Keltner & Kring, 1998). For affective scientists, study of the relations between emotions and psychopathology still remains one of the clearest routes to understanding the function of a particular emotion. For example, in this review, we have discussed findings showing that the relative absence of embarrassment is associated with a chronic tendency to engage in antisocial behavior, as is evident in externalizing disorders and in patients with orbitofrontal damage. Hence, by studying dysfunction, we learn about function (Oatley & Jenkins, 1992).

For clinical scientists, the kind of research we have detailed here offers similar promise for understanding the social expression and underpinnings of various disorders. More generally, individual differences in emotional behavior, present early in life, may help to explain the life course of the individual, problems the person systematically encounters, and the person's relational difficulties (e.g., Malatesta, 1990). This framework, which treats emotional behavior as one mediator between person and environment, could readily be extended to the study of specific psychopathologies.

The four methodologies of measuring emotional communication that we have detailed—facial expression, vocalization, narrative, and touch—are likely to be central to the manner in which psychopathologies shape the environment and the life course. In the case of schizophrenia, defined by decreased outward displays of emotion, interventions that help patients to match their internal feelings with their outward displays may therefore have positive effects on interpersonal adjustment. To the extent that there prove to be fairly specific expressive markers of a particular disorder—say, reduced embarrassment with autism (e.g., Heerey et al., 2003)—researchers might be better able to identity individuals prone to the disorder earlier in development using markers of emotional behavior (e.g., Kagan, Reznick, & Gibbons, 1989). Studies of emotional expression and psychological disorder, still

in a nascent stage, could help refine the classification, understanding, and treatment of individuals with various disorders.

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