# CHAPTER 8

# Emotions and Emotion Regulation

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Emotional responding and dysregulation underlie or exacerbate most problems that are the focus of clinical intervention. In this chapter, we define what an emotion is, how it arises, how it becomes dysregulated, and the implications these understandings present for clinical practice.

The definitions of *emotion* vary. For some, emotions are constructions, culturally defined meanings ascribed to antecedent stimuli and imposed upon neurophysiological-based affective responses. From this perspective, simple valence and arousal dimensions characterize these affective responses, and when combined with a social-driven attributional process, they give rise to the perception of distinct emotions (Barrett, 2012). For others, emotions are discrete action tendencies representing naturally selected adaptations in mammals. These action tendencies provide a basic framework for fast responding to species-specific, historically recurring antecedents in order to promote individual evolutionary success (Keltner & Haidt, 1999; Tooby & Cosmides, 1990). Still others strike a balance between these perspectives and view emotions as distinct states, as in the basic evolutionary view, but appraisal processes elicited by specific species-typical situations mediate their emergence (Hofmann, 2016; Scherer, 2009).

## The Nature of Emotions

With respect to antecedent conditions, there is a general consensus across perspectives that emotions are responses to self-relevant stimuli (Frijda, 1986; Hofmann, 2016; Scherer, 1984). How a stimulus is recognized as being self-relevant in any given context appears to be driven by two distinct, but not incompatible, processes: top-down processing and bottom-up processing (e.g., Mohanty & Sussman, 2013; Pessoa, Oliveira, & Pereira, 2013). While both processes are accepted as a part of

emotional responding, different theoretical perspectives of emotion debate the primacy of each process to the experience and regulation of emotion.

Bottom-up processing does not require higher-level cognitive processing or attribution. A pure evolutionary, bottom-up view would suggest that emotions are hardwired responses to common fitness-related stimuli in our evolutionary past (Tooby & Cosmides, 1990). Proponents of this view define "emotions" as the output that results from the interaction of a biologically based core emotional system and a control system that modulates core emotional responses to match the relevant contingencies in specific contexts in order to maximize the adaptiveness of the response (Campos, Frankel, & Camras, 2004; Cole, Martin, & Dennis, 2004; Levenson, 1999). From this perspective, emotions are recursive, synchronized responses that can recruit a broad array of resources. The elements recruited that make up an emotional response include the engagement of perceptual and attentional systems; the activation of associational memory and attributional sets; physiological, hormonal, and neural activation; and overt and covert behavioral responses, including overt expression and goal-relevant responding. The degree of recruitment of any of these constituent elements for any given emotional response is contingent on multiple factors related to the nature of the antecedent stimulus. This includes factors such as degree of self-relevance, in terms of facilitation or impedance of approach or avoidance goals in any given situation, and social display rules for responding (Izard, 2010).

An evolutionary view of emotion suggests that antecedent conditions are largely stereotyped and reflect evolutionarily recurrent situations/stimuli, such as threat to physical integrity or loss of resource-rich objects or statuses that would reduce individual fitness (Ekman & Friesen, 1982; Tooby & Cosmides, 1990). In this view, specific emotions evolved as adaptations to generalized antecedents defined by specific, distributed patterns of neural activation, physiological arousal, and behavioral display (Panksepp & Biven, 2012). Activation of these response tendencies, while largely biologically determined, is open to significant modification via learning and conditioning (e.g., Levenson, 1999). As stimuli are perceived, whether biologically driven or shaped by conditioning, associational neuronal activation gives rise to the patterned response associated with emotional reactions to specific classes of stimuli. Thus, evolutionary-based theories suggest an important part of the emotion-elicitation process is that there is a one-to-one correspondence between some classes of stimuli and some responses, whether this coupling is hardwired or modified by conditioning.

While there may be general similarities in antecedent stimuli and emotional responses as described by evolutionary theory, it is important to keep in mind that variability exists across cultures (e.g., Elfenbein & Ambady, 2002; Mesquita & Frijda, 1992). Experimental evidence of cultural variation in emotion situations

and responses is evident even within the United States. In a series of studies, researchers found that members of the Southern US honor culture were more likely to show facial displays of anger and experience increased testosterone when they were insulted compared with those not from an honor culture (Cohen, Nisbett, Bowdle, & Schwarz, 1996). To understand this variability, we can define "culture" as a set of expectations for how to think, feel, and behave in a given context. In other words, it is a culturally defined set of rules defining the self-relevance of many situations and stimuli in a social environment given one's role in that culture. These expectations originally developed in response to different socioecological demands that different groups faced in their history and the meaning ascribed to them, highlighting the role for higher-order processing in the elicitation and subsequent elicitation of partially stereotyped emotion responses.

The top-down process for emotion generation is schema driven, in which learned appraisals and associations color the way people perceive and hence respond to conditions. They are in part learned during acculturation, and they are in part a product of an individual's unique learning history. In Scherer's Component Process Model of emotions (2009), people undergo a series of either unconscious or conscious appraisal steps to evaluate stimuli, including (1) relevance, such as the novelty of an event, relevance to goals, and intrinsic pleasantness; (2) implications, such as outcome probability, discrepancy from expectations, conduciveness to goals, and urgency to react; (3) coping potential; and (4) normative significance, such as compatibility with internal and external standards. Other appraisal theorists have discussed similar ideas (e.g., Ortony & Turner, 1990; Smith & Lazarus, 1993).

Some emotions, especially those described as "self-conscious" or "moral" emotions, such as pride, shame, and guilt, require some social evaluative process to engender them (Haidt, 2001; Tracy & Robins, 2004). These social evaluation processes involve the consideration of social status and hierarchy, the moral probity of one's behavior, and attributions about the mental states of others, among other processes. For example, pride can involve attributions that one has done something that increases social status, is socially valued, and evokes envy in others. Shame can involve attributions that one has decreased social status, is socially undesirable, and evokes disgust in others.

Those from an evolutionary perspective would say that these *hypercognitized* emotions are adjuncts or modifications of a basic evolutionary-derived subset of emotions (Levy, 1982). However, an alternative position states that it might be reasonable, given that all emotions can be linked to some specific attributional set, to conclude that all emotions are hypercognitized constructions of a basic core affective system that responds in terms of valence (positive/negative or approach/avoidance) and intensity or level of arousal. In this constructivist view,

what differentiates emotions is the experience of different attributional sets and expressive behaviors and the associated differences in action readiness. The experience of the recruited elements of an emotional reaction is defined by cultural scripts associated with the antecedent conditions, and it is modified by individual learning histories (Mesquita & Boiger, 2014).

Support for this view comes from two main sources: emotion granularity research and research seeking to identify the biological underpinning of emotional reactions. Research on emotional granularity suggests that while emotional categories are common conceptualizations of how emotions exist, many people do not report differences between their emotions in their day-to-day emotional experience but instead report in "nongranular" terms related to the constructs underlying core affect (valence and arousal; e.g., Barrett, 2012). The general lack of consistent findings delineating a patterned response in physiological measures of emotional arousal unique to each emotional state, and the lack of consistent findings identifying dedicated neurophysiology or activation unique to each emotional state, support this observation (see Cameron, Lindquist, & Gray, 2015; but see Panksepp & Biven, 2012).

## *Elements of Emotional Responding*

One way to delineate an emotion from its antecedents and consequences is to consider it a state of the organism that creates a context that increases the likelihood of subsequent action. Most emotion theorists, regardless of theoretical orientation, would agree that emotions involve multidimensional, semicoupled response channels, including physiological, expressive, cognitive, and motivational changes (Levenson, 2014). However, many debate the extent to which it is necessary to define the coherence and specificity of these response channels (e.g., Gross & Barrett, 2011; Lench, Flores, & Bench, 2011).

**Physiological changes.** Emotion researchers have examined autonomic nervous system (ANS) and central nervous system (CNS) activation and deactivation as an indicator of emotion specificity. This line of thinking makes sense if neural circuits were adapted by natural selection to solve different adaptive problems (Tooby & Cosmides, 1990). In a meta-analysis, Cacioppo, Berntson, Larsen, Poehlmann, and Ito (2000) found that a number of claims regarding ANS discrimination among emotions hold up. For instance, anger, fear, and sadness were associated with greater heart rate activity than disgust, anger was associated with higher diastolic blood pressure than fear, and disgust was associated with greater increases in skin conductance than happiness. A recent meta-analysis of the neural correlates of emotional processing found some support for differentiation

(Vytal & Hamann, 2010). However, this meta-analysis also found that many neural structures overlap with different emotions.

Research examining not just neural structures but neural pathways has pinpointed a number of unique systems dedicated to processing specific types of emotional information. For instance, research has demonstrated that the behavioral activation system is related to the detection of reward (Coan & Allen, 2003), while Panksepp's PANIC system is related to the detection of loss, which is proposed to be neuroanatomically distinct from the substrates involved in PLAY (Panksepp & Biven, 2012). Researchers have investigated other emotional systems (e.g., Panksepp, 2007; see Barrett, 2012, for criticisms of neural specificity) as well as auxiliary systems, such as the neuroendocrine system, which is related to a general stress response (Buijs & van Eden, 2000). One caveat to all of this research, however, is that emotions unfold over time, and, as a result, it is likely that components of ANS activity vary with respect to time (Lang & Bradley, 2010). This suggests that to truly distinguish ANS patterning for different emotions, research must look at multiple components across time.

**Expressive changes.** In his 1872 book *The Expression of the Emotions in Man and Animals*, Darwin highlighted the commonalities of expressions across mammalian species. Today, functional theories of emotion hypothesize that expressions of emotion are adaptations to social environments. Although expressions initially evolved to promote individual survival (e.g., disgust and fear affect nasal inhalation volume and visual field size; Susskind et al., 2008), they also promote the survival of other members of the group because of the communicative benefit of recognizing expressions in others, thus improving the overall fitness of the group. From the functional perspective, facial expressions are ethologically defined as social signals, meaning they are behaviors that come under selection pressures because of the effect they have on the behavior or states of others, which are in turn subject to selection pressures (Mehu & Scherer, 2012). In other words, recognizing facial expressions was an evolutionary adaptation that promoted group fitness, thus placing expressions, recognition ability, and responses in the realm of natural selection. They were selected for because they facilitated interindividual communication and coordination both within and between species. Facial expressions of emotion have been shown to shape the responses of others by evoking corresponding emotional responses, thus reinforcing or discouraging behavioral expression in others (Keltner & Haidt, 1999).

However, it is abundantly evident in certain social conditions that facial expressions do not necessarily correspond to a felt emotion (e.g., power/status differentials; Hall, Coats, & LeBeau, 2005). In addition, the rate of correspondence goes up when a person is in the presence of others, leading to the hypothesis that

facial expressions are learned, culturally defined behaviors for communicating social intent (e.g., Barrett, 2012). Research on whether facial expressions are universal across cultures is mixed, but on balance it suggests that people from different cultures around the world display and recognize similar facial expressions (Ekman et al., 1987; see Russell, 1995, for critique). What is clear from this research is that cultural variations and nuances in prototypical expressions exist (Marsh, Elfenbein, & Ambady, 2003), suggesting that different facial expressions of emotion more or less comprise both evolutionary-adapted signals *and* learned cultural sets (Barrett, 2012; Mehu & Scherer, 2012; Scherer, Mortillaro, & Mehu, 2013).

Interestingly, research examining facial feedback suggests that facial expressions associated with certain emotions can initiate and modulate emotion and ANS arousal (see McIntosh, 1996, for a review of this work) even when the contraction of muscles related to a specific facial expression is inadvertent (e.g., Soussignan, 2002). Work on embodiment suggests a similar feedback process. *Embodiment* is the idea that emotional concepts are meaningful because they are grounded in sensorimotor and interoceptive activities that can represent the content of emotional information and knowledge (Niedenthal, 2007). For instance, Strack, Martin, and Stepper (1988) found that participants who were made to smile while watching a cartoon were more likely to report that the cartoon was funny. Research has also shown that the suppression and enhancement of facial expressions hampers and facilitates the processing of emotional information, respectively (Neal & Chartrand, 2011).

**Changes in attention, memory, and appraisals.** Emotion has been shown to affect all stages of attention, including orientation toward, engagement with, shifting away from, and maintaining disengagement from a stimulus (Vuilleumier & Huang, 2009). Depending on the emotion in an emotional situation—that is, a situation of self-relevance—individuals can narrow their focus on central aspects of the situation or broaden it in a global way. In the case of negativity bias, research has shown that threat-related information is more readily attended to compared with other information (Koster, Crombez, Verschuere, & De Houwer, 2004). Attentional changes also occur when one is experiencing positive emotions. Using the global-local visual processing paradigm, Fredrickson and Branigan (2005) found that when participants are led to feel a positive emotion, they tend to focus on global features, whereas when led to feel a negative emotion, they tend to focus on local features.

Emotions can also influence the content of cognition by directing attention and by affecting memory. Bower's network theory of affect (1981) suggests that distributed, associational information processing, starting at the processing of perceptual information, facilitates the recall of affectively similar information, which explains phenomena such as mood-state-dependent recall (e.g., when you

are sad, you're only able to recall ever being sad) and mood-congruent learning (recall is maximized when there is affective congruency between a learner's mood state and the type of material being presented). These factors lead to thought congruity (thoughts and associations congruent with mood state) that is heightened by the intensity of emotional arousal, with increases in intensity leading to greater activation of associational networks, which affect how information is processed. For example, Forgas and George's (2001) affect infusion model (AIM) is a dual-process model designed to explain how affective states influence cognition, such as judgments and decision making. In this model, situational demands, in terms of effort required and degree of openness of information-search processes, result in four information-processing approaches. These include top-down, reflective processing, such as (1) direct access processing (low effort, low openness) and (2) motivated processing (high effort, low openness); and bottom-up associational processing, such as (3) heuristic processing (low effort, high openness) and (4) substantive processing (high effort, high openness). In all cases, when a person uses open, more constructive information-search processes, emotion is more likely to affect cognition processing. When effort is low and sources of information are open and constructive, individuals use an affect-as-information heuristic in which their emotional state is a source of information about a situation, regardless of whether the situation elicited the emotion (Clore & Storbeck, 2006). This is consequential, as once emotion-related associations are activated, there is a tendency for people to appraise subsequent, temporally related and/or affectively related events similarly, regardless of the functionality of the appraisal (e.g., Lerner & Keltner, 2001; Small, Lerner, & Fischhoff, 2006). This could be problematic when anxiety from one source leads to attributions of high risk and uncontrollability across situations, independent of the risk inherent in a particular context. In situations demanding complex, effortful, constructive thinking (substantive processing), researchers have seen affect-priming effects on cognition, as the constructive process is more likely to incorporate information primed by associational memory recall.

## *Do Emotions Have Functions?*

An essential hypothesis of the evolutionary–basic emotion perspective is that emotions are states derived from conditions of evolutionary and cultural significance that have persisted across time, and thus they have important functions. The potential intrapersonal and interpersonal functions of emotions span different levels of analysis: dyadic, group, cultural, and individual (Hofmann, 2014; Keltner & Haidt, 1999). At the dyadic level, emotion informs others as to one's inner states, motivational tendencies, and intentions; evokes emotions in others;

and promotes social coordination by eliciting or deterring behavior in others. At the group level, the function of emotions has been thought to define in-group membership, roles, and status, thus facilitating the resolution of group conflict. Emotions at the cultural level are thought to promote acculturation, moral guidance, and social identity formation. At the individual level, emotions facilitate situated information processing and motivational changes (Scherer, 2005). This can be seen on the physiological level, where physiological changes in neuroendocrine and CNS activity create a biological context that supports some overt response. For example, early work by Levenson, Ekman, and Friesen (1990) demonstrated that when anger is elicited, blood flow shifts toward appendages. Information processing and motivational changes can also be seen in individuals when changes in cognition related to an emotion reorient the individual's attention to salient features of a situation. These action tendencies act as modal action patterns, in which the likelihood of a species-typical behavioral response pattern increases. For example, when an individual experiences fear, the action of fighting, fleeing, or freezing increases in probability. This concept is similar to the behavioral notion of an establishing operation. However, given that emotions are evolutionary-derived responses that a person's history of reinforcement can shape, it would be misleading to consider emotions as merely establishing operations without specifying any biological affordance.

However, even the question of whether emotions have any emergent properties other than the sum of the activated elements in any behavioral response to a stimulus is open for debate (Gross & Barrett, 2011). If the experience of emotion is the epiphenomenon of the conceptual act of imposing meaning to physiological responses to core affect, then the question regarding the function of emotions is mainly this: Does behavior that a social group recognizes as emotion have a symbolic function within the group (Barrett, 2011)? Thus, "functionalist" accounts of emotion comprise a loose range of perspectives that differentially emphasize the primacy of naturally selected adaptations to symbolic functions. In all cases, functionalist accounts of emotion are the flip sides of the ontological perspectives outlined above.

## Defining Emotion Regulation

All theorists would agree that current environmental conditions are more important to adaptive responding than ancestral conditions. Levenson's control theory of emotions (1999) takes this into consideration. Levenson postulates that there are two emotion systems: (1) a core system that is a hardwired emotion-response system that processes prototypical inputs and outputs stereotyped emotional

responses, and (2) a control system that modulates or regulates these stereotyped responses through feedback loops affected by learning and immediate social context to maximize the adaptiveness of emotional responding. In Levenson's definition, the distinction between emotion generation and emotion regulation (ER) are blurred—the regulatory feedback processes of the control system are a critical component in emotion generation, linking the emotional response to the environmental context and maximizing the functional adaptiveness of the response. Moreover, the ongoing interactions between the core and regulatory processes that tune the behavioral manifestations of a person's interaction with his environment are transactional in nature, affecting both the ongoing experience and expression of an emotion, and also the nature of the situation itself.

Cognitive reappraisal affects the intensity and duration of a response by modifying the cognitions framing the situation and thus the experience. Scherer's Component Process model (2009; see above) and other cognitive theories of emotion outline aspects of attributions that might be changed. Similarly, response modulation affects the intensity and duration of an emotion by influencing the degree to which any elements of an emotional response (i.e., perceptual and attentional processes, attribution, memory, physiological, hormonal, neural activation, and behavioral responses) are activated. Gross (1998) proposes hat this response modulation could include trying to suppress thoughts and expressions related to the emotion, trying to relax, engaging in exercise, or using substances. Others have since proposed other forms of response modulation, including engaging in acceptance or mindfulness exercises (Hayes et al., 2004), deliberate attentional shift/redeployment (e.g., Huffziger & Kuehner, 2009), and positive reminiscence (e.g., Quoidbach, Berry, Hansenne, & Mikolajczak, 2010), among others. ER as a form of appraisal or cognitive process is consistent with the constructionist view that emotions are personal and have social meaning that informs the nature of emotional experience (Gross & Barrett, 2011).

From all perspectives, the cognitive processing of emotional stimuli may be conscious or nonconscious. Automatic, associational processing, which leads to nonconscious response modulation, can (1) engender nonconscious affect mimicry and embodiment, affecting an emotional state; (2) be influenced by automatic face perception and social judgment; (3) prime regulatory goals that are associated with enacting various response-focused and antecedent-focused ER strategies; and (4) activate implicit attitudes, preferences, and goals, which can affect the associated valence and reinforcement properties of environmental stimuli. All of these results have implications for how attentional, perceptual, and working memory resource allocation discriminate between emotional stimuli in any given context (Bargh, Schwader, Hailey, Dyer, & Boothby, 2012). At its extreme, automatic processing can result in selective attention being paid to stimuli related to

prepotent depressogenic and anxiety-related schemas; biased attributions; congruent memories being overaccessible; and emotion dysregulation contributing to the development and maintenance of psychopathology (Hofmann, Sawyer, Fang, & Asnaani, 2012; Teachman, Joormann, Steinman, & Gotlib, 2012).

Emotion regulation can go beyond control system processes. Individuals can proactively modify if and how they interact with antecedent stimuli. Gross (1998) outlines the following antecedent-focused ER strategies (see also chapter 16): (1) situation selection (approaching or avoiding certain emotionally evocative stimuli), (2) situation modification (preemptive steps to change the environment), (3) attentional deployment (deliberately attending to certain or different aspects of a situation), and/or (4) cognitive change (preventively exploring new meanings ascribed to stimuli/situations). However, it should be noted that if the antecedent stimuli eliciting an emotion can be identified, one will find that emotional reactions are almost always tightly linked, preprogrammed, or culturally scripted responses that naturally follow antecedents. Emotions are functionally maladaptive when regulatory feedback insufficiently "tunes" the intensity of the response to the context in which the antecedent stimulus occurs, or when the emotion is in response to a nonrelevant antecedent in a given context, thus obviating the potential for preadapted fast-track responding. This suggests that in order to promote the functional adaption of responding in individuals, a therapist should encourage them to (1) discriminate between co-occurring antecedent stimuli; and/or (2) enhance the efficacy of control processes or the range of control processes they employ, or (3) better match the control processes to the response or situation (see Bonanno and Burton, 2013). Indeed, a growing body of research supports the idea that well-being is, in large part, influenced by the extent to which individuals engage in flexible, context-sensitive emotional responding and regulation (Kashdan & Rottenberg, 2010).

## Application for Clinical Science and Conclusions

Breakdowns in antecedent discrimination and/or the efficacy of control processes trigger or exacerbate most of the problems conceptualized as mental health difficulties, and they are the main targets of intervention for most psychotherapies. These breakdowns may be attributable, in part, to the effect of emotional arousal on selective attention to stimuli, to preattentive processing, to poor attentional control, and to interpretive bias for ambiguous stimuli that results in decontextualized emotional responding.

However, decontextualized emotional arousal and regulation may have its genesis in a number of different problems beyond those of poor in-the-moment

antecedent discrimination and the breakdown of feedback in automatic control processes. In depression, cognitive vulnerabilities and latent depressogenic schemas from early adverse life events impair information acquisition, memory retrieval, and information processing, creating a reciprocal relationship in which bias toward negative stimuli—and subsequent negative emotional experience—reaffirms negative schemas (Disner, Beevers, Haigh, & Beck, 2011). These schematic biases that are engendered in attributional patterns of dichotomous thinking, negative filtering, and hopelessness are also associated with attentional bias toward negative self-referential information—not necessarily threat—and away from positive information in the environment (Peckham, McHugh, & Otto, 2010). Difficulty orienting away from negative information and the expedited neural processing of emotionally negative information both influence attentional bias; both also influence the encoding and retrieval of negatively valenced memory, further heightening depressed mood and the bottom-up activation of depressogenic schemas (Beevers, 2005; Disner et al., 2011; Joormann & Gotlib, 2010). The open-sourced, associative heuristic or reflexive processing delineated by Forgas and George's (2001) AIM model, outlined above, reflects this bottom-up processing. This bottom-up process becomes problematic, because individuals are not in contact with sources of information or stimuli that violate depressive expectancies and stimulate reflective, motivated processing to correct biases, thus maintaining a positive feedback loop for depressive symptoms (see Beevers, 2005). The closed nature of this process is demonstrated by a general insensitivity to emotion context, in which individuals demonstrate decreased emotional reactivity to positive and negative stimuli over time (Bylsma, Morris, & Rottenberg, 2008; see also Van de Leemput et al., 2014), resulting in noncontextual, inflexible emotional processing and regulation characterized by avoidance, suppression, and rumination (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Conceptualizing mental illness in terms of decontextualized emotional responding, and focusing on the elements of emotion and control processes that may be contributing to the dysfunction, has the potential to improve our understanding of psychopathology and how to treat it. However, the dominant, categorical approaches to understanding mental illness, which look at unique indicators of potential taxon and less at the common processes that drive these emotional disruptions, have hampered this concept's translation into clinical practice. Currently, there is a move to examine the elements of emotion and ER that contribute to the psychic dysregulation called "mental illness" as products of common processes in the emotion systems (e.g., Barlow, Allen, & Choate, 2004; Hayes et al., 2004; Kring & Sloan, 2010; Watkins, 2008). This chapter represents a brief introduction to the vast amount of basic research literature on emotion and the burgeoning translational literature.

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