

that is particularly vulnerable to perturbation from social nuances. Some such individuals may be quite sensitive to subtle nonverbal cues and inadvertent misattunements; these disconnections may lead rapidly to states of shame from which it may be difficult to recover. For other people, past histories of parental intrusion make their semistable cohesion hypervigilant to the intrusion of others' internal experiences into their own. In this manner, they may defensively guard against the perception of others' minds, creating interpersonal disconnection.

In individuals with disorganized attachments, two major forms of dis-association can occur. One is within a state of mind at a given time, in which there is a "strange attractor" state of widely distributed activations. In the second form, cohesive states are dis-associated from one another across time; that is, there is a functional isolation of information transfer across states. Cohesion is achieved only through the restriction in complexity achievable by this particular configuration of self-states.

Complexity theory suggests that self-organization allows a system to adapt to environmental changes through the movement of its states toward increasingly complex configurations. Moving with a balance of flexibility and continuity, the system emerges within the internal and external constraints that define the trajectory of state changes. Internal constraints include the strength and distribution of synaptic connections within neural pathways; external constraints include social experiences and attuned emotional communication between people. By regulating these internal and external constraints, the self-system evolves through an emerging set of self-states that have cohesion and continuity within themselves. The mind as a non-linear system is also quite capable of abrupt shifts in constraints, which lead to the instantiation of distinct, discontinuous self-states. The mind's creation of stable systemic coherence across these self-states is one of the central goals of emotional development and self-regulation.

*The Developing Mind
Daniel J. Siegel*

CHAPTER 7

Self-Regulation

THE CENTRAL ROLE OF EMOTION IN SELF-REGULATION

The self is created within the processes that organize the activity of the mind in its interactions with the world. As we've seen in Chapter 6, such self-organization is a part of the fundamental ways in which complex systems function. At a given moment in time, the array of possible mental activity becomes organized within a mental state that functions to create a cohesive set of goal-directed processes. Across time, we can understand how continuity is created within a given self-state through the various principles of complexity, connectionism, and information processing. Integrating these processes is emotion.

As Luc Ciompi has described, emotions function as "central organizers and integrators" in linking several domains: providing all incoming stimuli with a specific meaning and motivational direction; participating in state-dependent memory processes; connecting mental processes "synchronously" and "diachronically" (within one time and across time); creating more complex interconnections among abstract representational processes that share emotional meaning; and simultaneously attuning the whole organism to the current situational demands on the basis of past experience through neuro-physiologically mediated peripheral effects.¹ Such organizing features intimately link what are traditionally considered the mental, social,

and biological domains. As Alan Sroufe has pointed out, then, emotions are inherently integrative in their function.²

As we further explore the nature of the mind, we will find that understanding the creation of the self at the interface of brain and human relationships focuses our attention on the fundamental ways in which emotion is experienced and regulated. As many researchers have suggested, emotion is both regulated and regulatory. In its manifestations as neurophysiological events, subjective experiences, and interpersonal expressions, emotion interconnects various systems within the mind and between minds. Focusing on emotion regulation allows us to explore how the mind becomes organized and integrated.

In this chapter we'll explore some ways of viewing the regulatory processes that organize the mind. From a developmental perspective, the infant's first challenge is to achieve internal homeostasis via the activity of deep structures of the brainstem, which mediate sleep-wake cycles and other basic bodily functions (such as heart rate, respiration and digestion). Myron Hofer has described how even at this early stage, the parent provides "hidden regulators" that directly facilitate these basic functions in the infant.³ As maturation unfolds, "dyadic regulation" becomes important in enabling the child to modulate more complex states of mind.⁴ Attachment serves as a crucial way in which the self becomes regulated. As the child's evaluative mechanisms become more active, and memory processes enable the child to respond to discrepancies, subjective meaning is created in engaging with the social surround. Intimate attunements permit a resonance of states of mind that are mutually regulating. Misattunements lead to dysregulation, which requires "interactive repair" if the child is to regain equilibrium.⁵ Achieving emotion regulation is dependent upon social interactions. At this early point, according to Sroufe, the child has become an emotional being—not merely a reactive one—in that arousal or tension is created via evaluative appraisals that create subjective meaning in engagements with the environment.⁶ As infancy gives way to the toddler period, dyadic regulation is supplanted by "caregiver-guided self-regulation," in which the adult helps the child begin to regulate states of mind autonomously.⁷ As the child's brain matures into the preschool years, the emergence of increasingly complex layers of self-regulation becomes possible.

As emotion continues throughout life to function in integrative ways, it reveals the continuing process by which our minds carry out intersystem integration: within our own modes of processing, across various modalities, and between our own minds and those of others.

As Antonio Damasio has noted, "Emotion, and the experience of emotion, are the highest-order direct expressions of bioregulation in complex organisms. Leave out emotion and you leave out the prospect of understanding bioregulation comprehensively, especially as it regards the relation between an organism and the most complex aspects of an environment: society and culture."⁸ From our discussion of complexity, we can see that emotion and the development of emotion regulation move the self into more complex states of intra- and intersystem functioning. Emotion regulation that allows the mind a flexible manner in which to emerge in interaction with the environment reflects optimal state regulation. As we've discussed in earlier chapters, the prefrontally mediated capacity for response flexibility may be a central component to such a balanced capacity. Emotion "dysregulation" can be seen as impairments in this capacity to allow flexible and organized responses that are adaptive to the internal and external environment. As we'll discuss, such dysregulation can have its origins in constitutional elements, interactional experience, and the transaction between these two fundamental components of the mind.⁹

DYSFUNCTIONAL PATTERNS OF SELF-REGULATION

The structure of the brain gives it an innate capacity to modulate emotion and to organize its states of activation. Sometimes referred to as "affect regulation," this capacity is crucial for the internal and interpersonal functioning of the individual.¹⁰ Any of a number of psychiatric disturbances can be viewed as disorders of self-regulation.¹¹ Among these are the mood disorders, in which emotional state is massively dysregulated, producing states of depression or mania. Within these states of mind are characteristic dysfunctions in perception, memory, beliefs, and behaviors. These are disorders where the unique feature is a profound instability in mood. Anxiety disorders also reveal the flood of an emotion that evokes a dysfunctional state of mind. Individuals with these difficulties may be excessively sensitive to the environment and may also have autonomous signals of impending disaster, as in panic disorder and obsessive-compulsive disorder. Here, too, there is a marked incapacity to regulate one's state of mind. As individuals with these and other disorders (see below) develop, the instability of their states may become a

characteristic feature, or trait, of their self-regulation. Indeed, in studies of patients with bipolar disorder, the untreated swings between mania and depression can begin to "kindle" the onset of more frequent, intense, and rapid cycling. In this way, the instability can become a repeated, "stable" feature of the individual's self-organizational dysfunction.¹²

In many of these disorders, a combination of pharmacological and psychotherapeutic interventions may be indicated. Even if the origin of the dysfunction is seen as the neural instability of some neuronal circuit in the deep or limbic regions of the brain, the mind of the individual is inextricably created by the brain's activity. As we've seen in Chapter 6, dysfunction of a subcomponent in a system can have profound and unpredictable effects on other subcomponents, as well as on the system as a whole. For this reason, interventions aimed at many layers of the functioning of the brain and the mind may be essential in helping the individual achieve a more balanced and functional form of self-organization. Within the clinical setting, the relationship of therapist and patient becomes the "external constraint" that can help produce changes in the individual's capacity for self-organization.

An example of the developmental origins of impaired self-organization can be seen within those with insecure attachments. With the experience of avoidant attachment, the mind learns to adapt to the barren psychological world by decreasing the awareness of socially generated emotional states. The rigidity of such a constrained pattern is revealed in the ways in which physiological responses continue to express the significance of social interactions, which are cognitively blocked from being processed. In disorganized attachment experiences, the child acquires the ability to respond to stress with a dis-association of processes leading to dissociative states. Whereas some of these states are quite disorganized and incohesive, others have the appearance of functional cohesion. Closer examination of even these dissociated states reveals a marked cognitive blockage restricting the overall processing of information and flow of energy through the mind as a whole. The apparently divergent avoidant and disorganized attachment patterns actually share the characteristic of restriction in the flow of states of mind. This convergence is supported by the finding in the Minnesota Parent-Child Project that during the early years of life, before adolescence, disorganized and avoidantly attached children have the greatest degree of dissociative symptoms.¹³ This finding supports the proposal that impairments to mental well-being may be understood as adapta-

tions that impair the balanced flow of energy and information in the formation of emerging states of mind.

As noted above, many psychiatric disturbances involve affect dysregulation. In addition to mood disorders (such as depression and bipolar illness) and the anxiety disorders (including panic disorder, phobias, obsessive-compulsive disorder, and posttraumatic stress disorder), these include dissociative disorders and certain personality disorders, such as borderline and narcissistic character structures.¹⁴ However, rather than reviewing all of these disorders in detail, let us look at a single case example to gain additional insight into the nature of emotion dysregulation.

"I couldn't help myself. He made me so furious with his mistakes that I told him to go jump in a lake. Not in those friendly words, of course. I was so angry. I wasn't going to let him get away with that kind of stuff again. Maybe for others it's OK, but not with me. Why is everyone in this world so stupid?"

This thirty-five-year-old attorney was fired by her client of ten years after screaming and apparently threatening a colleague at a meeting for missing a deadline in mailing a document she had given to him. This was not the first time her emotions had "taken over": she had lost several boyfriends in the past for her "instability" and was now at risk of being alone again, in addition to having lost her most important client. For this patient, the inability to regulate her emotions was a major problem in both her personal and professional lives.

Interactions with other people long before this episode of screaming at her colleague had historically evoked "sudden outbursts of intense emotion" in this woman. Within our framework for understanding emotional processes, let's examine what this phrase may have meant for her. "Sudden" refers to the notion that something seems to occur without a preparatory period giving some warning or clue that a process is even occurring. At a minimum, we can suggest that she was not consciously aware of the impending external expression of her emotional response. "Intense emotion" is a common term that we can now interpret in the language of the mind. "Intense" probably signifies a strong degree of activation or arousal, which became expressed in this woman's case as the categorical emotion of rage. So we have taken this a bit further, but not much. Is this just the use of new words to describe the familiar notion of an emotional "hijacking" or "outburst," in which rational thinking is suspended and anger or other

emotions cloud perceptions and influence behavior?¹⁵ It is much more than this, as we'll see later in the chapter when we review this attorney's childhood relationship history.

But, you may say, perhaps it was just this woman's "genetic legacy" to have uncontrolled outbursts of anger. Perhaps so. But in any psychiatric conditions that may have a large genetic component, understanding the mechanisms of the mind and the contributions of interactive experiences can help provide interventions that can alter the way the brain functions.¹⁶ Recall that the reduction of human behavior into an "either-or" condition of "genetics versus learning" or "nature versus nurture" is unhelpful and clouds our thinking about the issues, especially when it comes to designing interventions. We will return to this example of the attorney toward the middle of this chapter, to examine ways of understanding how constitutional and experiential factors can lead to certain kinds of emotion dysregulation.

A CONCEPTUAL FRAMEWORK OF EMOTION REGULATION

The remainder of this chapter provides a conceptual framework for understanding some basic components of emotion regulation. These include regulation of intensity, sensitivity, specificity, windows of tolerance, recovery processes, access to consciousness, and external expression. This is not an exhaustive review of emotion regulation in its myriad manifestations, which can be found elsewhere in a number of useful texts.¹⁷ Rather, this is a practical framework that draws on our study of the mind in order to illustrate how individuals achieve a flexible and adaptive capacity for the regulation of emotional processes.

The brain has developed a rich circuitry that helps regulate its states of arousal. The nature of this process of emotion regulation may vary quite a lot from individual to individual and may be influenced both by constitutional features and by adaptations to experience. "Temperament" describes some of the aspects of inborn characteristics, including sensitivity to the environment, intensity of emotional response, baseline global mood, regularity of biological cycles, and attraction to or withdrawal from novel situations. These inborn features of the nervous system, which are the results of both genetic and intrauterine factors, probably have powerful shaping

effects throughout the lifespan. Temperament can evoke particular parenting responses and create its own self-fulfilling reinforcements, which further amplify the inborn trait. The example of a slow-to-warm up or shy child whose mother has little patience for his hesitancy illustrates how the response of others can engrain temperamental features.¹⁸

Attachment studies support the view that the pattern of communication with parents creates a cascade of adaptations that directly shape the development of the child's nervous system. Both longitudinal attachment studies and early intervention research support the idea that what parents do with their children makes a difference in the outcome of the children's development.¹⁹ It is important to realize that both temperament and attachment history contribute to the marked differences we see between individuals in their ability to regulate their emotions.

If emotions influence the flow of states of mind that dominate so many of our mental processes, how do we keep them in some form of balance? The mind's ability to regulate emotional processes is essentially the ability of the brain to modulate the flow of arousal and activation throughout its circuits. Primary emotional processes, categorical emotions, affective expression, and mood can each be regulated by the brain. "Emotion regulation" refers to the general ability of the mind to alter the various components of emotional processing. The self-organization of the mind in many ways is determined by the self-regulation of emotional states. How we experience the world, relate to others, and find meaning in life are dependent upon how we have come to regulate our emotions.

Why should emotions and their regulation be considered so central to the organization of the self? As we've discussed in Chapter 4, emotion reflects the fundamental way in which the mind assigns value to external and internal events and then directs the allocation of attentional resources to further the processing of these representations. In this way, emotion reflects the way the mind directs the flow of information and of energy. The modulation of emotion is the way the mind regulates energy and information processing. With this perspective, emotional regulation can be seen at the center of the self-organization of the mind.

From the wide range of research on emotions, it is possible to propose here at least seven aspects of emotion regulation that can illustrate these ideas.²⁰ These divisions are derived from a synthesis of scientific concepts and clinical observations. Other aspects of regula-

tion could also be proposed, but these seven areas provide a practical framework with which to begin to understand the various ways in which the mind regulates its own functioning.

Intensity

The foundation of emotional processing is the appraisal and arousal system, which can respond with various degrees of intensity. The brain appears to be able to modify the intensity of response by altering the numbers of neurons that fire and the amounts of neurotransmitters released in response to a stimulus. Degrees of arousal have a wide range. If initial appraisal and arousal mechanisms give a minimal activation of the body and brain, then the elaborating appraisal-arousal response will also be minimized. For example, studies have shown that subjects who are asked to meditate or who are given pills to reduce bodily responses and physiological arousal will interpret a stimulus as "not so important," and the primary emotion will not be as intense, as in subjects without such inhibitors of bodily reaction.²¹ The body's state of arousal is mediated by the brain through the autonomic nervous system. As discussed in Chapter 6, the brain in turn monitors the state of the body and incorporates emotional meaning from the somatic markers that serve as representations of the body's change in physiological state.

The general pattern of high or low intensity of an individual's characteristic response may be a product of both constitutional and experiential factors. People with shy temperaments may have an inborn tendency to respond intensely to new situations and to withdraw when confronted with novelty. Geraldine Dawson has found that intensity of emotional response appears to be related to bilateral frontal activation, in contrast to the quality or valence of response, which is asymmetric (involving left activation for approach and right for withdrawal states).²² Other individuals may experience milder degrees of intensity of emotion in response to novelty.

As noted in Chapter 5, Dawson has also found in studies of infants of clinically depressed mothers that the infant's capacity to experience joy and excitement is markedly reduced, especially if the maternal depression lasts beyond the first year.²³ Experience can thus directly shape the general intensity and valence of emotional activation in children. In particular, the sharing of positive emotional states may be missing from the experience of children with depressed parents. The sharing of such states under normal conditions permits an

amplification of these pleasurable emotions, which sends both child and parent "into orbit" with waves of intensely engaged positive affect.²⁴ If such shared amplification of positive emotional states is missing, as in depressed dyads, then the capacity to tolerate (to emotionally regulate in a balanced manner) and to enjoy these intense states may be underdeveloped. Interactive experiences enable the child not only to experience high levels of "tension" or emotionally engaged arousal,²⁵ but to entrain the circuits of the brain to be able to manage such states.²⁶ Feeling comfortable with intense arousal and engagement with others may have its origins in both constitutional and experiential features of the individual.

As we'll see, intensity of arousal can be masked. It is often at the moments in which emotion becomes most intense that we seem to have the greatest need to be understood and the most intense feelings of vulnerability. This sense of exposure may make many individuals, especially those with unsatisfying past experiences with communication, reluctant to reveal openly what they are feeling. At a moment of intensity, a failure to be understood, to be connected with emotionally, can result in a profound feeling of shame.²⁷ The shame generated by missed opportunities for the alignment of states—for the feeling of emotional resonance, of "feeling felt"—can lead to withdrawal. Even with less intense states, not being understood may lead to a sense of isolation. Recognizing this vulnerability and the fact that moments of unintended disconnection are inevitable can allow us to repair such ruptures in alignment. Such interactive repair experiences allow us to learn to tolerate new levels of emotional intensity and the feeling of vulnerability that may accompany them.

Sensitivity

Each of us has a "threshold of response," or minimal amount of stimulation needed in order to activate our appraisal systems. Those with a hairtrigger response mechanism will find life filled with challenging situations by virtue of their brains' firing off messages of "This is important—pay attention!" frequently. Those with "tougher skins" will not respond with arousal and will be less emotionally sensitive to the same stimuli.

Sensitivity, like intensity, may be both constitutional and modified by experience. Both variables may also be dependent on an individual's state of mind at a particular moment in time. We can have times in our lives when our "nerves are raw" and we react quickly to

previously innocuous events. We can also be not as sensitive as we might otherwise be when we are preoccupied by something else or emotionally defending ourselves. Alterations in our threshold of responding may be an important way our brains regulate emotional responses.

How can a mind alter sensitivity? Again, by turning to the foundation of emotions in appraisal, we can make some educated hypotheses. By increasing the amount of stimulation a value center needs to become activated, the brain can directly decrease its sensitivity to the environment. Later on, modifications in the appraisal system can decrease or increase sensitivity. For example, if you have recently seen a violent movie with gunshots and murders, your mind may be sensitized to loud sounds and dark alleys. If, upon returning to your car in a dark parking lot, you hear a sudden loud sound, you may be more likely to become aroused and to appraise such a situation as dangerous. If you had just been to a party with a lot of noise and fireworks, your mind would be less vigilant for signs of danger and would be less sensitive to those same sounds in the dark parking lot. Recent experience primes the mind for a context-specific change in sensitivity.²⁸

Repeated patterns of intense emotional experiences may engrain chronic alterations in the degree of sensitivity. For example, overwhelming terror, especially early in life, may permanently alter the sensitivity of an individual to a particular stimulus related to the trauma. If a cat scratches and bites a young child, the sight of even a distant cat may evoke a strong emotional response of fear in this individual for years into the future. Furthermore, early trauma may be associated with an increase in release of stress hormones in response to daily life experiences.²⁹ Early alteration of the circuits of the brain involved in evaluative processes can deeply influence the appraisal mechanisms that directly influence the nature of emotional experience and emotion regulation.

One way of conceptualizing a therapeutic approach to excessive sensitivity involves the basic stages of emotional processes. Some early experiences that sensitize the arousal system to fire off may never be fully desensitized.³⁰ Patients may remain in a chronically hypersensitized state. However, specific appraisal of the excessively sensitive general arousal stage can be changed. Let us look at an example of this "cognitive override" mechanism.

As a young child, a forty-year-old man had been mauled by a dog; in the incident, he lost part of his left ear and sustained deep

wounds to his arms and chest. Throughout his youth he naturally avoided dogs. As a young father, he dreaded the day when his own children would ask to have a dog as a pet. He came to therapy when that day indeed arrived. What could be done? Every time he saw a dog his heart would pound; he would sweat profusely, clutch his chest, and feel a sense of doom. This panic was once treated with medications, which were effective but excessively sedating for him. The man wanted to get a dog for his children but couldn't live with his fear.

Some might appropriately say that parents should let children know about the limits of what can or can't be done. They might feel in this case that the father's need to have a canine-free house should have been communicated and respected. Another possibility—the one that this man preferred—was to try to "deal" with his fears. The original accident had happened when he was two years old. He had little explicit recall of anything from that period. We know, of course, that this was a normal part of his childhood amnesia; that is, explicit autobiographical encoding was not yet available to him, due to the immaturity of his orbitofrontal regions. And so his primary form of memory for this event was implicit: He exhibited emotional (fear and panic) and behavioral (avoidance) memories of the accident. Fortunately, he knew about the experience from the stories he had been told by his parents and from his own semantic memory. This knowledge was in a noetic form: He knew the facts, but did not have a sense of himself at this point in the past. Seeing his mauled ear in the mirror also reminded him each day that something terrifying had occurred.

This patient's amygdala was probably exquisitely sensitized to the sight of a dog. As we've discussed in Chapter 4, a preconscious feedback loop involving the perceptual system and the amygdala would have allowed for the fight-flight response to be initiated even before he became aware that he had seen a dog. These functional circuits have been evolutionarily helpful to us as human beings: Once we are hurt, our amygdalas will do everything they can to keep us from allowing it to happen again.

Teaching this man about the nature of the fear response and the neural circuits underlying it was relieving for him. Relaxation techniques and guided imagery with exposure to self-generated images of dogs were provided. Nevertheless, he still had an initial startle response to dogs. A "cognitive override" strategy was then tried. That is, this patient learned to acknowledge the relevance of his amygdala's response to the present dog and the past trauma (the ini-

tial arousal mechanism). He then would say to himself, "I know that you are trying to protect me, and that you think this is a dangerous thing" (the specific appraisal stage). What he would say next was what eventually allowed him to buy his children a (small) dog: "I do not need to see this sense of panic as something to fear or get agitated about." He would then imagine his amygdala sighing with relief, having discharged its duties to warn, and the sense of doom would dissipate. After several weeks of performing these internal override discussions, he felt ready to proceed with the purchase of the pet. Six months later, he and his family were doing well with the new addition to their household.

This example illustrates that even if the sensitivity to particular stimuli cannot be changed, a person's response to the initial arousal can be diverted in ways that lead to a more flexible life. This may have been made possible by the development and involvement of his prefrontally mediated response-flexibility process. In this case, this individual's past trauma had led to a rigid pattern in the flow of information processing and energy (the sight of a dog led to massive arousal and the sense of fear). By altering the engrained patterns of both the flow of information and energy, the patient became more flexible in his behavior and he was able to move forward more adaptively in his life. As we shall continue to explore, impediments to mental health may often be seen as blockages in information processing and energy flow. Experiences that allow for these fundamental elements to achieve a more flexible and adaptive flow or "circulation" through the mind can contribute greatly to emotional well-being.

Specificity

Emotion regulation can also determine which parts of the brain are activated by arousal. By determining the specificity of appraisal—the ways in which the value centers are establishing meaning of representations—the brain is able to regulate the flow of energy through the changing states of the system. For example, being awakened by a sound while taking a nap will probably lead your body to enter an aroused state of initial orientation. As your brain begins to process this stimulated state, it can assign meaning to various aspects of the sound. If you are expecting the arrival of your spouse while resting, the context of anticipating your spouse's return will be represented, and you may interpret the sound as a source of excitement. If instead you aren't expecting anyone, the sound may be interpreted as a pos-

sible intruder and a signal of danger, and you may feel fear. The representations activated at any particular moment, including the context of the situation, help shape the specific direction of stimulus appraisal elicited. The specificity of elaborated and differentiated appraisal directly shapes arousal and thus determines the specific type of emotional experience that unfolds.

Through its shaping of arousal, the specificity of appraisal directly influences the differentiation of primary emotions into categorical emotions. Characteristic differences among individuals in their appraisal mechanisms can directly determine the kinds of emotions generated and can influence the general "nature" of their moods and personality. Specificity of appraisal creates not only the meaning we attribute to stimulus events, but the meaning of the self-environment context and the form and meaning of the emerging emotional processes themselves. Specificity is thus a complex, recursive process of evaluation that appraises the meaning of events and the ongoing appraisal-arousal processes. The specificity of appraisal may be influenced by several elements of the evaluation of the stimulus, such as the individual's assessment of its relevance to the achievement of current or future goals, its threat to the capacity of the individual to cope and to maintain the self as the locus of control, and its meaning to global issues regarding the self and the self in relation to others.

As a child develops, the differentiation of primary emotions into categorical ones becomes more and more sophisticated. In this manner, there is a progression from the earliest states of pleasure or discomfort to the basic or categorical emotions, such as fear, anger, disgust, surprise, interest, shame, and joy. Sroufe has described the "precursor emotions" of pleasure, wariness, and frustration/distress as preceding the development of the more discrete emotional states of joy, fear, and anger, respectively.³¹

As the child continues to develop, more complex and "socially derived" emotions, such as nostalgia, jealousy, and pride, become differentiated. Linda Camras has suggested that dynamical systems theory may be useful in examining the development of emotional expression.³² From this perspective, the infant's mind functions to incorporate internal processes with interactional responses from parents in the differentiation of the emotional processes within the interconnected domains of neurophysiology, subjective experience, and expression. The more differentiated, discrete emotions come to function as attractor states that have internally and externally determined

constraints. As described by Carol Malatesta-Magai, such a process is a form of "emotion socialization," which reflects the fundamental way in which affect serves as a social signal and develops in part as a reflection of interpersonal history.³³ Such emotion socialization occurs both within the child-caregiver relationship and in peer-peer interactions.³⁴

The specificity of emotional experience is determined by the specific complex layers of appraisal activated in response to a stimulus. These evaluative processes, mediated by our socially sensitive value centers in the brain, emerge within our individual constitutions and interactional histories. It is for this reason that in the same situation two people often have such qualitatively different reactions. Unique personal meaning is created by the specificity of our emotional responses.

Researchers have named a wide range of emotions in various categories.³⁵ Some of these include interest/excitement, enjoyment/joy, surprise/astonishment, sadness, anger, disgust, contempt, fear, anxiety, shyness, and love. Other types have also been described, such as the "self-conscious emotions" of embarrassment, pride, shame, and guilt, as well as a sense of exhilaration and humor. Individuals may have experienced many or all of these emotions at some point in their lives. They may also have noticed that each time they experienced a given categorical emotion (for example, sadness), it has both unique and universal aspects. As a state of the system is assembled, it has unique features of both inner processes and external contexts.

The differentiation of primary emotional states into categorical emotions is a rapid process illustrating how various layers of the brain are influenced by the unfolding state of mind. In its essence, emotion is a set of processes involving the recruitment of various circuits under the umbrella of one state of mind. Thus the appraisal and arousal processes create a neural net activation profile—a state of mind—whose characteristics in turn directly shape subsequent appraisal and arousal processes. This intricate feedback mechanism helps us to see why patterns of emotional response can be so tenacious in a given individual. The elements of continuity in specificity are self-reinforcing.

Creating change within rigid patterns of specific appraisals requires a fundamental change in the organization of information and energy flow. As we have seen in the example of the man who eventually bought the dog for his children, the alteration in sensitivity to the image of a dog took place at the level of altered specificity

of appraisal: The specific appraisal response to both "dog" and "panic" needed to be revised before a new pattern of emotional reaction could be achieved.

Value circuits determine specific appraisal, creating the basic hedonic tone of "this is good" or "this is bad" and the behavioral set of "approach" or "withdraw." Value circuits also continue to assess the meaning of these initial activations as they are elaborated into more defined emotional states, including the categorical emotions. What determines the nature of the appraisal/value process itself? How does the mind "know" what should be paid attention to, what is good or bad, and how to respond with sadness or anger?

For human beings to have survived, this complex appraisal process had to be organized by at least two components. According to the fundamental principles of evolution, the characteristics of those individuals whose genes shaped the appraisal process in a direction that helped the individuals to survive and pass on their genes are more likely to be present today. This is one explanation, for example, of why some people are frightened of snakes though they may never have seen one before. This may also explain why infants have a "hard-wired," inborn system to appraise attachment experiences as important.

A second evolutionarily crucial influence on the appraisal mechanism is that it had to be able to learn from an individual's experience. Individuals who did not learn, for example, that touching a flame hurts would have been more likely to be repeatedly injured and unable to defend themselves, and therefore less likely to survive and pass on their genes. Those individuals whose brains could alter their evaluative mechanisms would have been more likely to survive. Hence, *the appraisal system is also responsive to experience; it learns. Emotional engagement enhances learning.*

Windows of Tolerance

Each of us has a "window of tolerance" in which various intensities of emotional arousal can be processed without disrupting the functioning of the system. For some people, high degrees of intensity feel comfortable and allow them to think, behave, and feel with balance and effectiveness. For others, certain emotions (such as anger or sadness), or all emotions, may be quite disruptive to functioning if they are active in even mild degrees. The intensity of a specific emotional state may involve arousal and appraisal mechanisms outside of

awareness. As we've seen, these nonconscious activities of appraisal influence how the brain processes information. *One's thinking or behavior can become disrupted if arousal moves beyond the boundaries of the window of tolerance.* For some persons, this window may be quite narrow. For such individuals, emotional processes may only become conscious when their intensity nears the boundaries of the window and is on the verge of disorganizing the functioning of the system. For others, a wide range of emotion may be both tolerable and available to consciousness—from pleasant emotions including joy, excitement, or love, to unpleasant ones such as anger, sadness, or fear.

The width of the window of tolerance within a given individual may vary, depending upon the state of mind at a given time, the particular emotional valence, and the social context in which the emotion is being generated. For example, we may be more able to tolerate stressful situations when surrounded by loved ones with whom we feel secure and understood. Within the boundaries of the window, the mind continues to function well. Outside these boundaries, function becomes impaired.

At its most basic level this can be understood in terms of the activity of the autonomic nervous system's branches, which will be discussed in detail in the next chapter. Outside the window of tolerance, excessive sympathetic branch activity can lead to increased energy-consuming processes, manifested as increases in heart rate and respiration and as a "pounding" sensation in the head. At the other extreme, excessive parasympathetic branch activity leads to increased energy-conserving processes, manifested as decreases in heart rate and respiration and as a sense of "numbness" and "shutting down" within the mind. Other autonomic combinations are possible, with the most common being simultaneous activation of both branches; this creates the internal sensation of an "explosion" in the head and tension in the body, as if one were driving a car with both the brakes and the accelerator on at the same time. Some individuals refer to such a state as "explosive rage."

Under these conditions, the "higher" cognitive functions of abstract thinking and self-reflection are shut down. The circuits linking these cortical processes with the highly discharging limbic centers are functionally blocked, and rational thought becomes impossible. In states of mind beyond the window of tolerance, the prefrontally mediated capacity for response flexibility is temporarily shut down. The "higher mode" of integrative processing has been replaced by a

"lower mode" of reflexive responding. The integrative function of emotion, in which self-regulation permits a flexibly adaptive interaction with the environment, is suspended. We can propose that under such conditions, the dynamical system appears to shift away from the movement toward maximizing complexity by entering into states characterized by either excessive rigidity or randomness. These states are inflexible or chaotic, and as such are not adaptive to the internal or external environment. The mind has entered a suboptimal organizational flow that may reinforce its own maladaptive pattern. This is now a state of emotion dysregulation.

A window of tolerance may be determined both by constitutional features (temperament) and by experiential learning. Present physiological conditions, such as hunger and exhaustion, may also markedly restrict individuals' windows of tolerance and make them more vulnerable to irritability and "emotional outbursts." The example of temperamental differences reveals how windows can be shaped by individuals' constitutional qualities. People with shy temperaments may find emotional intensity of many sorts very uncomfortable, and may seek environments that are familiar to them and that do not evoke such disturbing and disorganizing inner sensations. Within the social context of being with attachment figures with whom they have secure relationships, such individuals may feel safe enough to move toward novel situations. Without such a context, they may withdraw and become socially isolated. For others with more adaptive sensitivities, novelty may be quite pleasurable, evoking a feeling of excitement that is not disruptive to their sense of balance. Familiarity in these bolder individuals may sometimes become quite boring and create an internal sense of restlessness. Children with "easy" temperaments are characterized by such open approaches; on the whole, they make life for their parents less demanding. Those with the more irritable and unpredictable "difficult" temperaments are "moody" and have frequent bursts outside of their windows of tolerance, creating a challenge for many parents. As such children mature, many of them find more sophisticated ways to regulate their emotions, with a subsequent decline in the frequency and intensity with which they break through their windows of tolerance.

Windows of tolerance may also be directly influenced by experiential history. If children have been frightened repeatedly in their early history, fear may become associated with a sense of dread or terror that is disorganizing to their systems. Repeated senses of being out of control—experiencing emotions without a sense of others

helping to calm them down—can lead such persons to be unable to soothe themselves as they develop. This lack of self-soothing can lead directly to a narrow window of tolerance. When such a person breaks through that window, the result is a very disorganizing, “out-of-control” sensation, which in itself creates a further state of distress.

A person’s present state of mind can also narrow or widen the window of tolerance. Being emotionally worn, physically exhausted, or surprised by an interaction can each narrow the window of tolerance. In such cases, an individual may become “emotionally wrought up” or visibly upset by an encounter; under other conditions, the person’s emotions might have merely indicated that something important was occurring.

Let’s return to the example of the attorney offered earlier in this chapter. We cannot take the interaction with her colleague out of the temporal and social context in which it occurred. The document the attorney had given her colleague was addressed to one of her most important clients, a woman executive in her late sixties whom the attorney saw as a mother figure. She had always wanted to please this woman, because she felt (as she later revealed in therapy) that her actual mother had never been supportive of her or able to be pleased with her. The colleague’s mistake (despite being reminded before the attorney left for a vacation, the colleague failed to mail the document on time, jeopardizing their legal case) created a sensation in the attorney that “yet again” she would be unable to please her mother. In this case, displeasing a mother figure gave the attorney an internal image, a cognitive representation, of herself in relationship to an angry mother. She had experienced as a child, and was now experiencing again as an adult, the state of mind that wanting to please but being unseen creates: shame. What was worse, the mother (and the business client’s image, in the attorney’s mind) had frequently expressed anger and hostility toward her, creating a sense of both shame and humiliation.

Some might ask how much of this patient’s recollection was accurate, and, if it was accurate, how we can distinguish genetic from experiential effects. This patient’s memories of these early events were independently supported after the patient entered therapy by the recollections of a cousin who had lived across the street and personally witnessed some of these humiliating interactions. In an even more uncommon type of corroboration, the therapist was able to interview the mother herself, at the request of the daughter.

The mother reflected on these incidents very much as the patient had reported them; she also stated that her own mother had “practiced” such a style of parenting, in order to “harden” her for the “real world.” Her treatment of her own daughter, she said, was intentionally a “watered-down version” of the treatment she herself had received. Such single clinical case examples are not the same as research data, but they do offer us an in-depth example of how early experiences of dysregulated dyadic states can be associated with the development of individual dysfunction later in life. Still, “association” does not mean “causation.” After all, the mother passed on her genes as well as providing a particular parental experience for her daughter. Having an explosive temper—a form of emotion dysregulation—can certainly be an inherited trait. The mixture of two individuals, mother and daughter, each with a constitutional tendency to break through windows of tolerance might help explain some of this patient’s experience. The transgenerational passage of patterns of humiliating parenting could also explain such a finding. In any case, this woman found herself with the reality of dysregulation.

The repeated activation of these configurations of mental representations and a state of mind of shame/humiliation can be seen to have engrained this state as a repeating pattern of neural activation. We could almost say that the activation of this state had become a personality trait. The attorney was prone to entering this state of enraged humiliation at “inappropriate” times. In this manner, she entered an inflexible state that was no longer adaptive and inhibited new behavioral responses in interaction with the social environment. We can view this state as induced by the massive activation of the parasympathetic branch (the sense of not being understood or listened to when the colleague failed to mail the document on time despite a reminder) and the sympathetic branch (the internal state that she was being yelled at by her client and feeling anger toward her colleague) of the attorney’s autonomic nervous system. The brakes and accelerator were being applied simultaneously. The car, her mind, could not be regulated. The cues that set her off were rationally related to the earlier states, but the logic of these reasons was of emotional and historical value only. Her colleague and her client couldn’t care less about the “meaning” of her frightening rages. She was removed from all of the client’s cases immediately after this last incident.

With intensive work during the months following this turning

point in her life, the attorney began to become aware of the sadness and profound disappointment she had experienced as a child within her interactions with her mother. She also began to connect the meaning of her present interactions with others with what she (her value system) had learned through these repeated experiences of her childhood. Fortunately for her, this process apparently has allowed her to widen her window of tolerance for various disappointments she continues to encounter in life, as we all do. Her understanding of these layers of response and learning yielded a more flexible manner of relating to others and to herself as an adult.

Recovery Processes

When the intensity of an aroused state moves beyond the window of tolerance, a flood of emotion may bombard the mind and take over a number of processes, ranging from rational thinking to social behavior. At this point, emotions may flood conscious awareness. Some have called this an emotional "hijacking," "breakdown," or "flooding."³⁶ In such a situation, one's behavior may no longer feel volitional, and thoughts may feel out of control. Images may fill the mind's eye with visual representations symbolic of the emotional sensation. For example, when angry, some people may "see red" or visualize doing harm to the target of their rage. They may lose control of their behavior, performing destructive acts that would not be a part of their behavioral repertoire under "normal" conditions. In this "lower mode" of processing, the state of mind has pushed beyond the window of tolerance.

As we've seen, emotion, meaning, and social interactions are mediated via the same circuitry in the brain. Information in the brain is not handled independently of the biological reality of how the brain is in fact structured. For example, within the convergence zones of one of the central regions of emotional processing, the orbitofrontal cortex, we can see the way in which brain structure shapes mind function. In this neural region, inputs from anatomically distinct areas converge: Neural firing patterns transmitting the "information" from these regions are directly sent to the orbitofrontal cortex. This information includes social cognition, auto-noetic consciousness, sensation, perception, various representations such as words and ideas, somatic markers representing the physiological state of the body, and the output of the autonomic nervous system (which allows for "affect regulation" via the balancing of sympa-

thetic and parasympathetic branch activity).³⁷ As we've discussed earlier, the capacity to respond adaptively to the personal significance of an event, not merely with an automatic reflexive reaction, may require both the capacity for response flexibility as well as its integration with these other prefrontally mediated processes.

In states of excessive arousal, it has been suggested that the "higher" processing of the neocortical circuits is shut down, and that the direction of the energy flow within the brain and especially within the orbitofrontal regions is determined more by input from the "lower" processing centers of the brainstem, sensory circuits, and limbic structures than by input from the cortex. In this way, the beyond-the-window-of-tolerance state of hyperarousal leads, neurologically, to the inhibition of higher perceptions and thoughts in favor of the dominance of more basic somatic and sensory input. In this situation, we don't think; we feel something intensely and act impulsively. What this means is that an individual who enters a state outside the window of tolerance is potentially in a "lower mode" of processing, in which reflexive responses to bodily states and primitive sensory input are more likely to dominate processing.

In the attorney's interaction with her colleague, she went beyond the boundaries of her window and entered a state in which self-reflection, thinking about her emotions, achieving some distance from her reflexive reactions, and considering other options for behavior beyond her immediate impulses were not possible. All of these are thought to be cortical processes that are likely to shut down when a person is emotionally flooded in the state beyond the window. Having this patient learn the boundaries of her window of tolerance—that is, the points at which interactions with others began to generate intense responses in her mind that moved her to the edge of control—was a first step in helping her to try to avoid those "out-of-control" states. Becoming aware of the state of her body (tension in her muscles, tightness in her stomach and throat) and sensing images of anger in her mind were the first stages in her gaining some sense of control over her emotional outbursts. Prevention of the ruptures through the window was the most helpful for her. She also needed to learn techniques for increasing the speed at which she could recover, once she was out of the window.

How does the mind ever recover from this state of suspended cortical processing and thinking about thinking (metacognition)? The recovery process may vary from person to person, again depending on present context, constitution, and personal history. Certain states

may be easier to recover from than others; specific contexts may activate a particular cluster of neural net profiles from which it is especially difficult to recover, whereas others may be more readily repaired. For example, if a person feels betrayed by a close friend who has never been suspected of being disloyal, then recovering from a flood of anger and sadness may be particularly difficult. On the other hand, being let down by an acquaintance of dubious reliability may create anger that is relatively easy to bring back into the window of tolerance.

Recovery means decreasing the disorganizing effects of a particular episode of emotional arousal. Recovery may be a primary physiological process in which appraisal mechanisms bring the degree of activation to tolerable levels. This modulation may involve a dampening in the intensity of arousal, as well as a restriction in the distribution of neuronal groups activated within the state of mind at that time. Recovery may also involve the reactivation of the more complex and abstract reasoning that the cortex mediates. This will then allow for the metacognitive processes of self-reflection and impulse control. The capacity to reflect on mental states and to integrate this knowledge about the mind of others and of the self may be important in enabling this aspect of emotion regulation. These reinstated cortical processes in part may help by altering the characteristics of the elaborated emotion and permitting an individual to begin to tolerate levels of arousal that previously would have been flooding. For example, the person engulfed in rage at a close friend may find that activating old memories of the friend and engendering a feeling of loss and sadness may allow the characteristics and intensity of this emotional experience to be transformed. For some, sadness is more easily tolerated than rage.

Some individuals have extreme difficulty recovering from emotional flooding of any sort. For these people, life may become a series of efforts to avoid situations that evoke strong emotional reactions. These avoidance maneuvers are defensive, in that they are attempts to keep the individuals' systems in balance. For those whose windows are quite narrow for certain emotions, such avoidance behaviors can shape the structure of their personalities and their ways of dealing with others and the world. If recovery processes are unavailable, then such individuals become prisoners of their own emotional instability.

Emotions are central in the self-regulation of the mind. It is inevitable that at times emotional arousal will be too much for any of us to

tolerate. At these moments, the flood of emotions without an effective recovery process will result in prolonged states of disorganization that are ineffective and potentially harmful to ourselves or to others. Recovery allows us to move back within the boundaries of our windows of tolerance and to "push the envelope" but not to break it. In essence, recovery allows the self-organizational processes of the mind to return the flow of states toward a balance that maximizes complexity, moving the system between the extremes of rigidity on the one side and excessive randomness on the other. The system becomes more adaptive by tuning itself to both internal and external variables in a more flexible manner, thus enhancing complexity, which allows the mind to achieve stability.

How can recovery occur? Looking toward the two fundamental elements of the mind—energy and information—can help us to answer this question. Let's return to the example of the attorney. In her interaction with her colleague at the meeting, she remained in a state of hyperarousal, agitation, and rage, in which her cortical processing was surely suspended. The internal representations of the colleague's deadline error were probably linked, as we've discussed earlier, to the attorney's sense of shame and humiliation from interactions with her mother. "Linked" means that the error created within her a humiliated state of mind, with excessive arousal of both branches of the autonomic nervous system. This familiar state quickly flooded her beyond her window of tolerance. Her higher reflective processes were suspended. She began yelling at the top of her lungs, feeling misunderstood, demeaned, and enraged. Any attempts the colleague might have made to calm her down, she stated in retrospect, were interpreted as his being condescending (like her mother) and further irritated her. For hours after she had yelled at him she remained in a seething, agitated state.

Recovery from that episode was long in coming. As time wore on, she seemed to calm down, but was easily agitated by thoughts of the experience and of the eventual call from her client. As therapy progressed, the therapist and patient began to examine what had occurred in terms of these ideas about windows of tolerance, emotions, memory, and states of mind. She was very motivated at this point to understand how her own mind was "betraying" her. She was eager to change this pattern of emotional outbursts.

Within the sessions, she would again enter these hyperaroused, beyond-the-window states. Now entered the crucial elements of change. Within these states in the therapeutic session, her experience

of being "out of control" was joined by the reflective and supportive dialogue with her therapist. She was able to listen in her agitation, but remained hyperaroused. However, she now had two objects for her attention—her internal state and the external dialogue. As time went on, she was able to begin to reflect on the nature of her own mental processes. She could picture her circuits with an excessive flooding of activity; she could notice her tense muscles contributing to the feedback to her mind that she was furious; and she could begin to see how the deadline error meant something to her and her past, beyond what the colleague and the mistake in reality were about.

This woman learned to enhance her recovery processes by learning to use the energy flow and information processing of her mind. Therapy allowed her to experience emotionally flooded states, and *within that state of mind*, she was then able to apply her newly acquired abilities. She could use relaxation and imagery to "lower the energy of her circuits" and the tension in her body. Her metacognitive cortical capacities were strengthened and made more accessible *during her rages* in ways that were not possible before. Such capacities allowed her to use previously inhibited pathways during this state of mind to alter the way she processed information. What had been a blockage in information processing and an inhibition in the flow of energy now became more adaptive states of mind. Her capacity for emotion regulation, and thus for self-regulation, became more flexible and more effective. She could say to herself, "This interaction is more about my feelings of shame than about my colleague," and focus her experience in a different way. The overall result, fortunately, was that in addition to entering these states less often, she learned that she was able to recover from them much more rapidly. The effect was to give her a deeper sense of stability and clarity than she had ever had before. This was just the beginning for this woman. Her next step, of course, was to work on getting new clients and establishing meaningful relationships with others in her life.

Access to Consciousness

As our appraisal mechanisms operate and as our primary emotions are differentiated into categorical ones, our minds are influenced by our value systems in every aspect of their functioning. These influences occur without the necessity of conscious awareness. The idea

presented in this book is that emotion is a central set of processes directly related to meaning, social communication, attentional focus and perceptual processing. Emotion is not just some "primitive" remnant of an earlier reptilian evolutionary past. *Emotion directs the flow of activation (energy) and establishes the meaning of representations (information processing) for the individual.* It is not a single, isolated group of processes; it has a direct impact on the entire mind. By defining emotion in this way, we can begin to make sense of the wide range of interpretations of research findings on emotion, thinking, and social processes. Discussing the relationship of emotion to consciousness provides a useful opportunity to delineate our ideas about emotion further.

Huge amounts of evidence support the view that the "conscious self" is in fact a very small portion of the mind's activity.³⁸ Perception, abstract cognition, emotional processes, memory, and social interaction all appear to proceed to a great extent without the involvement of consciousness. Most of the mind is nonconscious. These "out-of-awareness" processes do not appear to be in opposition to consciousness or to anything else; they create the foundation for the mind in social interactions, internal processing, and even conscious awareness itself. Nonconscious processing influences our behaviors, feelings, and thoughts. Nonconscious processes impinge on our conscious minds: we experience sudden intrusions of elaborated thought processes (as in "Aha!" experiences) or emotional reactions (as in crying before we are aware that we are experiencing a sense of sadness). So we can say that for the most part, the self is not divided by some line between a conscious and a nonconscious self. Rather, the self is created by nonconscious processes, as well as by the selective associations of these processes into something we call "consciousness." To put it another way, we are much, much more than our conscious processes.

But then what do the "associations" of certain processes, such as perceptions or thoughts, with the phenomenon of consciousness do? What does it mean to have consciousness? Why do we even have consciousness at all? One answer to these questions, among many possibilities, is that *when processes become linked within consciousness, they can be more strategically and intentionally manipulated, and the outcome of their processing can be adaptively altered.* Consciousness may allow us to become free from reflexive processing and introduce some aspect of "choice" into our behavior. For example, by making a worry about who sits where at a wedding into a

conscious concern rather than a nonconscious fret, a soon-to-be-married man can raise the issue with his fiancée, and then they can examine the options together; they can add new information and consider alternatives to decisions, which then can result in the selection of what may prove to be a more satisfactory seating arrangement. In this manner, a process made conscious can be directly shared across individuals, and the outcome can be strategically altered. The strategic manipulation, the introduction of choice, and the sharing of information are made possible by consciousness. If the groom is unable to be conscious of the meaning of his sensations of discomfort or thoughts about the wedding, it is likely that he will not bring up the issue for examination. What is a neuroscientific explanation for how this occurs?

Consciousness is important for focal attention and working memory, which allow information to be processed into long-term, explicit memory storage. As noted throughout this book, working memory is considered the "chalkboard of the mind"; it allows us the ability to reflect on several (seven, plus or minus two) items simultaneously. Such reflection allows us to manipulate these representations, to process them (for example, to note similarities and differences, create generalizations, and recognize patterns), and to create new associations among them. Working memory allows self-reflection and creates cognitive "choice." In other words, it introduces the possibility of personal intention and strategic, deliberate behaviors that are independent of automatic reflexes.

At the most fundamental level, we have discussed that consciousness involves the selective linkage or binding of representations, which then can be intentionally manipulated within working memory. The idea of intention is itself a philosophical puzzle. What we can say is that with consciousness, new information can be introduced or new manipulations can be attempted within the mind for a strategic purpose that is determined by the individual. Consciousness itself is not necessary for information processing, but it is necessary at times to achieve new outcomes in such processing.

From this vantage point, we can say that emotional processing—the initial orientation, appraisal, arousal, and differentiation mechanisms—usually occurs without consciousness. An individual's consciousness of these processes allows for the qualitative sensation of emotion, experienced as a sense of energy, meaning, and categorical emotion. Any and all of these sensations can be called a "feeling," which explains why people of many different ages respond with a

range of reactions to the common query of "How are you feeling?" "I feel . . . up . . . down . . . excited . . . that this means the end of our relationship . . . like I want to run and hide . . . that he didn't understand my intentions . . . that I am bad . . . sad . . . angry . . . happy." "Feelings" can therefore involve energy, meaning, behavioral impulses, or the discrete categories of emotion. Why do emotional processes enter consciousness? What information processing does this permit?

The ability to involve conscious processing with something as fundamental as the creation of meaning, social relatedness and perceptual processing certainly does give the individual an increase in the flexibility of response to the environment. Having a consciousness of emotions is especially important in the social environment. Without it, we are likely not to be aware of our own or others' intentions and motives. Awareness of emotional processes has value for our survival as a social species: We can know our own minds as well as those of others, and can negotiate the complex interpersonal world with increased skill and effectiveness at meeting our needs.

Recall that consciousness may involve an integration of distributed neuronal activities that achieves a certain degree of complexity.⁴⁰ Effective processing within consciousness can thus be seen as the furthering of such an integrative process. Consciousness is more than the mere activation of representations in working memory that have become linked via the thalamocortical system and the lateral prefrontal cortex. Active, executive functions that direct the integrated flow of energy and information—possibly mediated also by nearby regions such as the orbitofrontal cortex and anterior cingulate—play an important role in the coordination of mental processes and response.⁴⁰ For example, Nobre and colleagues suggest that recent findings regarding the orbitofrontal cortex indicate that its activity may be important in "inhibiting prepared motor programs" and in "the tasks of motor selection and preparation requiring withholding of responses. The orbitofrontal cortex participates both in the redirection of the response based upon a violation in stimulus contingencies and in possible changes of emotional state. . . . Activity in the orbitofrontal region is recruited as stimulus contingencies change, interacting dynamically with the basic neural-cognitive system that directs attention. The anatomical connections of the lateral orbitofrontal cortex support this ability."⁴¹ Earlier we have called such a capacity "response flexibility" and have suggested that such a process may be an important element in self-regulation

and in the behavioral and attentional flexibility seen in the contingent, collaborative communication and coherent adult narratives revealed in secure attachments.

What role does consciousness itself play in the regulation of emotion? *Consciousness can influence the outcome of emotional processing.* Conscious awareness allows for self-reflection, which can enable the mobilization of strategic thoughts and behaviors and can therefore enhance the flexible achievement of goals. This can be seen as the achievement of new levels of integration. For example, if a person realizes that she is feeling sad about a friend who has left town, she can then write or call that person and reestablish contact. If, instead, her sadness remains nonconscious, she may never reach out to her friend in this way. Given the fundamental role of the appraisal system in distinguishing what is good and should be approached from what is bad and should be avoided, emotions being accessible to parts of cognition that can consciously mobilize behavior can be crucial in having emotion be effective in certain adaptive ways as a value system. Consciousness allows emotion to play a more adaptive role in the individual's behavior. But how does it help regulate emotion?

Let's return to the example of the attorney in psychotherapy to illustrate how consciousness can permit two fundamental elements of emotion regulation: the modulation of the flow of activation or energy through the brain, and the adaptive modification of information processing. After her "explosion" with her colleague and her dismissal from the case, the attorney's motivation to understand her social difficulties reached a peak. Though she had had a number of brief encounters with therapists in the past, this was the first time she felt driven to examine what role she was playing in these difficulties. Earlier, she had focused on how troubled the world and other people were. For the first time, she now became consciously aware of the possibility that the source of her difficulties was within her own mind.

Such a change in attitude was itself quite an accomplishment; in this woman's case, it was brought about by "hitting bottom" with her job. This new openness was a window of opportunity for therapy to provide her with some new tools. In the therapy sessions, therapist and patient began a dialogue in which they examined the patient's memories of experiences in both the recent and distant past. The patient was also coached to reflect in the present on her own internal processes—in other words, to begin the development of her

metacognitive abilities. The therapist strongly encouraged this self-reflection, knowing that it would be an essential tool for the patient to learn in order to regulate her emotions. Metacognition gives the developing minds of children (and adults) the ability to perform a number of unique processes: thinking about thinking itself; forming a representation of one's own mind; becoming aware of sensations, images, and beliefs about the self; and reflecting on the nature of emotion and perception.⁴²

In formal terms, the mind develops the metacognitive capacity for the "appearance–reality distinction," which allows an individual to comprehend that what something looks like may be different from what it actually is in the world.⁴³ The notions that one's perceptions and ideas can change over time, and can be distinct from the equally valid ones of other people, are called "representational change" and "diversity," respectively. Metacognition also includes the awareness that emotion influences thought and perception, and that one may be able to experience two seemingly conflictual emotions about the same person or experience. Each of these areas became vital for this patient to develop a more adaptive capacity for emotion regulation.

These metacognitive abilities often, but not necessarily, involve consciousness. In this patient's case, her lack of metacognition required that it become a part of the focus of the therapeutic dialogue; its not being an innate ability at this point in her development also necessitated that she make it a conscious part of her processing of intense emotions. With time, these new capacities, which had to be initiated intentionally and with mental effort, might become more automatic for her and might not require as much exertion of conscious effort.

Before therapy, this patient's orientation, appraisal–arousal, and differentiation processes were often out of her conscious awareness. At some point, her rage became expressed externally as her screaming. Internally, she might first become aware of her emotional state through a burning sensation in her head and an intense focus of her attention on the "evil" of the person with whom she was interacting. Her consciousness was linked to the elements of emotional processing only when they burst through her window of tolerance in the form of uncontrolled fury and perceptual distortions filled with suspicion. In this state, she literally viewed others as "out to get her." Some might say that she was projecting her anger onto others. Another view might be that she was entering a state of shame and humiliation in which she was implicitly recalling an angry and

betraying mother. Whatever the explanation, her conscious awareness began at a time when self-reflection was impossible in such a state of rage. Recall that in states of excessive arousal, higher cognitive functions, including metacognition, are shut down. The key to this woman's development was to bring such "lower mode" states into a more balanced modulation. Conscious awareness of emotional processes is always a beginning; in this case, metacognitive reflection on these processes was essential to enhance response flexibility and self-regulation.

Therapy includes various aspects of an attachment relationship, as well as the co-construction of stories, bearing witness, teaching, and role modeling for patients. Each of these was essential in taking the next step with this frightened individual. Giving her a conceptual framework for how her emotions worked and influenced her experience of herself and interactions with others was vital in allowing her not to feel "accused" of being defective. The shame state involves a sense that something is wrong with the individual, and this emotion is often at the root of why patients have not developed the ability to reflect on their own contribution to their troubles. They may have an inner belief that they are defective, and they seek to hide from revealing this "truth" to others.

As therapy permitted the patient to tell the story of her life, the therapist could bear witness to the pain and vulnerability of her having been a child in a hostile family world. Making the link of these emotional experiences to her present encounters, both with people in her daily life and with the therapist himself, allowed the patient to experience firsthand these emotional processes at work. She became sensitive to the subtle sensations of primary emotions long before they were elaborated into the categorical states that so often burst through her window of tolerance. These primary sensations allowed her to become aware of what was arousing to her ("This interaction now has some meaning for me—watch out!"). They also permitted her to reflect on how the specific meaning of an interaction had the dual layers of her appraisal of its significance in the moment ("What is happening now with this person?") and its parallel to historical meanings for her ("How does this relate to my emotional issues from the past?"). The important step for her was to associate primary emotions with consciousness.

At first she continued to have outbursts, but these were less intense and less frequent, and it seemed easier to recover from them. Her feeling of success at actually stopping such an outburst was

exhilarating. This allowed her to consciously alter her bodily response by reducing the somatic marker feedback that was automatically reinforcing the cascading cycle of appraisal and arousal. This clearly allowed her to alter the flow of activation (energy) through her mind.

Simultaneously, she began a metacognitive analysis of the meaning of these interactions and emotional experiences. She could recognize that something "significant" was occurring, and was then able to connect (that is, to note similarities and to work with generalizations within working memory) the recurring themes of being ignored or misunderstood with her prior history of shaming and humiliating interactions with her mother. She was then able to examine the meaning of a representation (for example, the interaction with her colleague was associated with shame) and compare it to those from the past (her interactions with her mother had been humiliating and shameful). Such a nonconscious linkage in the past had created an explosion. Now, with conscious reflection, the same comparison permitted the outcome to be quite different: She altered the appraisal process to highlight a different aspect of the meaning of these representations. Previously, her mind would have nonconsciously noted the similarity in the interaction and created a state of humiliation and outburst. This was an automatic component of the Hebbian synaptic memory process, in which past states were reactivated by similar retrieval cues. Now, consciously, she was able to add the dimension of metacognition. This allowed her to state to herself, "I am becoming agitated because of the similarity of this interaction to my earlier ones, filled with feelings of shame. I am not a slave to the past, and I do not have to react in a similar way." Instead of the nonconscious, reflexive response, consciousness permitted response flexibility and a more adaptive reaction. By acquiring the ability to reflect on the relationships among past, present, and future, this patient was developing her capacity for auto-noetic consciousness. She could choose not to become explosive. She could decide that what was best for her was to alter her initial impulses and try to achieve her professional goals in a more productive manner.

Appraisal processes, operating even without consciousness, recruit new neuronal groups into their active state of mind. The addition of consciousness to such a recruitment effort permits further mobilization of a new set of processes: Consciousness allows for the manipulation of representations in new combinations within working memory, the chalkboard of the mind. Consciousness involving

the linguistic system and autooiesis allows for reflections on the past and future, moving us beyond the lived moment.⁴⁴ We are also able to be motivated by our awareness of emotions, which then facilitates more strategically focused achievements that are not likely without the involvement of consciousness.

External Expression

From the beginning of life, emotion constitutes both the process and the content of communication between infant and caregiver. Simply put, a baby's inner state is perceived by parents, who in turn feel in a parallel manner themselves. The baby perceives the parents' contingent response, and the affect is mutually attuned. Later, in addition, parents use words to talk about feelings and direct a shared attention to the infant's state of mind. The parents may state directly that the baby is feeling sad or happy or scared, giving the infant the interactive verbal experience of being able both to identify and to share an emotional experience. This earliest form of communication in a setting of safety and comfort provides the child with a sense that her emotional life can be shared and be a source of soothing from others.

By the second year of life, the infant has learned the adaptive behavior of not showing how she might be feeling. The social context in which an intense emotion is experienced may motivate the child to "hide" her inner experience. For example, if the toddler wants something but has learned that she will be yelled at if she shows an interest in that object, it will be best if she keeps a "poker face" and does not show an affect that reveals her true emotion. For us adults, complex social situations repeatedly teach us the essential ability to mask our inner states from the criticism and harsh reactions from others. Culture and family environments play a central role in a child's experiential acquisition of these often unspoken laws of emotional expression, called "display rules."⁴⁵

Studies of children and adults of various cultures demonstrate that people may show emotions quite differently if they are with unfamiliar people or if they are by themselves. For example, one study showed that in the Japanese culture, facial expression showing emotional response to a stimulating film was quite evident if a subject believed that he was alone in the room. With the experimenter present, facial expression was quite flat.⁴⁶ If display rules tell people

not to show emotion, does this affect how conscious they may become of their own emotional response? This may in fact be the case: We use our own facial responses to become aware of how we are feeling. This fits in with the general view that the brain has a representation of the body's state, including states of arousal, muscle tension, and facial expression, which it uses as information to register "how it feels."⁴⁷

*The self is capable of at least two contextual states: a private, inner, core self and a public, external, adaptive self.*⁴⁸ Some authors have used the parallel notions of a "true" and a "false" self. This terminology, however, suggests that it is somehow false to adapt to social requirements; instead, it may be more useful to accept that different contexts evoke different states in each of us. Repeated patterns of social interactions can make a specific state, such as the masking of internal emotions from the outer world, an important adaptation. There is nothing "false" about a mechanism of survival. However, if the brain often relies on the expression of emotion as a signpost of what the individual truly feels, then this masking process certainly can create a challenge to knowing one's "true" response.

The regulation of emotional expression may assist the mind in modulating its states of arousal by social and intrapsychic mechanisms. Socially, masking internal states can permit the individual to avoid an experience of interpersonal resonance, in which the contingent response of the receiver can alter the initial state of the sender. Masking inner states can also enable an individual to avoid being misunderstood, in which case the painful state of shame would be induced. Within the individual, regulating affect can dampen the positive feedback loop in which an internal state is expressed externally as facial expressions and bodily responses, which then are perceived by the mind and heighten the initial emotional state. In both the individual and social feedback processes, regulating external expression of an internal state can help to keep the state of arousal from breaking through the window of tolerance.

A very difficult situation arises when an aspect of this form of emotional modulation, the inflexible and "nonexpressive" regulation of affect, is so engrained that it becomes a rigidly and repeatedly evoked state, or trait, of the individual. If there are no contexts available in a growing child's life when the inner, private self can be fully engaged in interactions with others, then the adaptive, external, public self may perpetually mask internal states even from the individual.

This condition may be experienced by the person as a sense of not knowing who she is. There may be a feeling that life is meaningless. In emotional terms, this person's access to awareness of her own emotions has been repeatedly blocked.

The danger of chronically blocking general affective expression is that it may also repeatedly inhibit the access of emotions to an individual's consciousness. The mechanism to block expression is unknown, but perhaps involves a temporary shutting down of the circuits that control affective expression. As we've seen, these appear to be primarily located in the right hemisphere, especially in the orbitofrontal cortex and the amygdala. Individuals with right-hemisphere lesions, for example, may have a reduced ability to perceive others' emotions, as well as to express and gain conscious access to their own. Furthermore, imaging studies of depressed individuals (who show reduced facial expression) have revealed a functional blockage in the activation of right-hemisphere facial perception centers.⁴⁹ The implication here is that the expression and perception of facial affect may be neurologically linked processes.

People vary widely in their ability to express affect. One way we can begin to make sense of these variations is to conceptualize non-verbal signals as the external expressions of internal states of mind. Primary emotions are expressed as the vitality affects described as the profiles of activation, including "crescendo" (increasing energy) and "decrescendo" (decreasing energy) states. A person reveals such vitality states in facial expression, tone of voice, activity of the limbs, gestures, and the timing and fluidity of these signals in interactions with another person. These signals may enter one's own awareness, and may also directly influence the adjustment of one's own state to that of the other person. Becoming aware of both the external signals from another person and those being given off by oneself can be crucial. Reflection on internal sensations may be an essential aid in knowing how another person may be feeling.

"Feeling felt" may be an essential ingredient in attachment relationships. Having the sense that someone else feels one's feelings and is able to respond contingently to one's communication may be vital to close relationships of all sorts throughout the lifespan. Such attachments foster the interactive sharing of states, which facilitates the amplification of positive, enjoyable emotions and the diminution of negative, uncomfortable emotions. The attuned communication within attachment relationships allows such interactive amplification

and diminution to occur. The outcome is that each member of the pair may "feel felt" by the other. For the developing child, the secure attachment relationship provides the amplification that heightens pleasurable states and allows the child to engage in the self-regulation needed to diminish unpleasurable ones.

The challenge of communicating internal states may be a bit less demanding when it comes to the expression of categorical emotions. These more elaborated states of activation, with their cross-culturally similar patterns of expression that are probably embedded within the physiological response patterns of the brain, seem to involve a different form of communication. The studies cited above suggest that some aspects of categorical affect are mediated by social display rules. People sometimes mask certain intense feelings in the presence of strangers; in other situations, people only reveal certain responses (such as smiling or laughing) in the presence of others. These findings, combined with the developmental acquisition of masking categorical affects, support the social communication aspect of this form of emotion. The sharing of these states has a more "distant" quality and can involve more of the classic sense of empathy as a state of understanding another's experience rather than feeling another's feelings. We can feel sad when other persons feel sad, and we can rejoice in their excitement and joy. In this way, categorical affects can certainly be shared as well. But categorical emotions allow us to become more actively verbal within the communication with others. That is, we can use words with roughly shared definitions to encapsulate the shared experience: "It must have been so sad to have that happen," or "It is great to see you feel so excited about that event." In this way, the expression of a categorical emotion permits more linguistic distance from a shared moment in a relationship than the "feeling felt" of a primary emotional state alone.

Of course, categorical expressions are usually accompanied by all the undefinable nonverbal signals of vitality affects that are reflections of the ongoing primary emotional processes. But the point here is that the perception of a classic categorical affect, such as anger, sadness or fear, often overshadows the less classifiable and often more "subtle" aspects of vitality affects. The "risk" of a predominantly categorical emotional communication is that one may begin to use only one's intellect in classifying what this particular emotional experience means, rather than attending to the unique meaning of that moment, both for the other person and for the relationship itself.

REFLECTIONS: EMOTION REGULATION AND THE MIND

The capacity to regulate the appraisal and arousal processes of the mind is fundamental to self-organization; therefore, emotion regulation is at the core of the self. The acquisition of self-regulation emerges from dyadic relationships early in life. Attachment studies suggest that the type of interpersonal communication that facilitates autonomous self-regulation begins with healthy dependence. Such relationships involve sensitivity to the child's signals, contingent communication, and reflective dialogue that permits the child to develop coherence and mentalizing capacities. Achieving self-organization occurs within emotionally attuned interpersonal experiences. At the emotional core of attachment relationships are the amplification of shared positive states and the reduction of negative affective states. As these dyadic states are experienced, the child comes to tolerate wider bands of emotional intensity and shared affective communication.

A proposed model of emotion regulation includes seven elements: intensity, sensitivity, specificity, windows of tolerance, recovery processes, access to consciousness, and external expression. As we've seen, early attachment experiences and constitutional variables such as temperament help form these emotion regulation processes. "Epigenetic" factors—especially the social experiences that shape genetic expression and the experience-dependent maturation of the brain—directly influence how neuronal connections are established. In early childhood, such epigenetic attachment experiences create the neuronal pathways responsible for emotional modulation. Continuing emotional development within adult relationships can utilize the same attachment elements in helping to develop new paths to self-organization.

Lack of mental well-being may often be a result of emotion dysregulation. This may be experienced as abrupt ruptures of emotion through the window of tolerance, such as episodes of rage or sadness, from which it is difficult to recover. In these ruptured states, the mind loses its capacity for rational thinking, response flexibility, and self-reflection. Waves of intense arousal and sensations of "out-of-control" emotion such as anger or terror may flood the mind. In these states, the individual is both internally and interpersonally unable to function. Helping such an individual requires the development of a more effective self-organizational process. Metacognitive processes and mental-

izing reflective functions may be important in the development of an integrative mode of processing, which is essential to achieve a more flexible and coherent experience.

If constitutional features, traumatic experiences, or severely sub-optimal attachments have produced maladaptive emotion regulation, then individuals may be restricted in their ability to achieve emotional resilience and behavioral flexibility. In some situations, a form of "cortical override" mechanism may be useful. If there has been excessive parcellation (pruning) of corticolimbic structures, then the brain's ability to modulate states of arousal may be quite compromised. Learning to use neocortical reasoning abilities to observe and then intervene in reflexive initial dysregulatory responses is often a helpful approach. What does this mean? When people move beyond their windows of tolerance, they lose the capacity to think rationally. This initial response may be difficult to alter if it is engrained within deep circuits, such as those encoded early in life in the amygdala. However, the neocortex can override these responses and bring the deeper structures into a more tolerable level of arousal. This can be accomplished by any number of "self-talk" strategies in which imagery, internal dialogue and evocative memory (for example, evoking the soothing image of an attachment figure) can be activated. Over time and with continued practice, the frequency and intensity of breakthroughs into the "lower mode" of reflexive states beyond the window of tolerance can be significantly decreased, and the speed of recovery can be greatly enhanced.

Why is self-regulation seen as fundamentally emotion regulation? Emotion, as a series of integrating processes in the mind, links all layers of functioning. In fact, the study of emotion itself is essentially the study of emotion regulation. Though emotion can be defined as a subjective experience involving neurobiological, experiential, and behavioral components, it is "in fact" the essence of mind. "Emotional communication" is also the fundamental manner in which one mind connects with another. Early in life, the patterns of interpersonal communication we have with attachment figures directly influence the growth of the brain structures that mediate self-regulation.