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Chapter 10

The Social Brain

*Our brains and bodies are designed to function in aggregates, not in isolation.*

—John Cacioppo

Using evolution as an organizing principle, we begin with the assumption that our highly social brains have been shaped by natural selection because banding together in groups enhances survival. The more tightly interwoven we are as a group, the more eyes, ears, hands, and brains we have available to us. We know that the expansion of the cortex in primates corresponds to increasingly large social groups and the development of language, problem-solving, and abstract abilities. Our larger and more complex brains not only allow for a greater variety of responses to challenging situations and across diverse environments, but also process the vast amount of social information needed to support communication and group coordination.

Increasingly sophisticated social groups allowed for task specialization such as hunting, gathering, and prolonged and dedicated caretaking. Caretaking specialization, in turn, allowed for longer postnatal development and brains built not by genetic preprogramming but by lived experience. So, while many animals need to be immediately prepared upon birth to take on the challenges of survival, human infants have the luxury of years of total dependency as they learn the complexities of the
group. With the expanding size of primate groups, the grooming, grunts, and hand gestures adequate in small groups were gradually shaped into spoken language. As social groups grew even larger, more cortical geography was needed to process increasingly complicated social information. This coevolution of relationships, language, and brain allowed for the development of higher levels of symbolic and abstract functioning. In other words, early caretaking and intimate relationships are a fundamental building block in the evolution of the human brain.

Despite the fact that our brains are social organs, Western science studies each individual as a single, isolated organism rather than one embedded within the human community. This way of thinking leads us in the West to search for technical and abstract answers to human problems instead of looking at day-to-day human interactions. Take, for example, how physicians responded to the high mortality rate among children in orphanages during the last century. Assuming that microorganisms were to blame, they separated children from one another and ordered their handling to be kept to a minimum to reduce the risk of contamination. Despite these mandates, the children continued to die at alarming rates, leading staff to fill out admissions forms and death certificates during intake for the sake of efficiency. It was not until children were held and played with by consistent caretakers and allowed to interact with one another that their survival rate improved (Blum, 2002).

The notion of the brain as a social organ emerged in neuroscience during the 1970s as animal researchers slowly began to appreciate that neuroanatomy, neurochemistry, and social relationships are inextricably interwoven. The notion that primates possess neural networks specifically dedicated to social cognition was initially proposed by Kling and Stecklis (1976), who found that damage to certain brain structures in primates resulted in aberrations of social behavior and a decline in group status. Since then, scientists have been exploring the varied neural terrain activated during social interactions. Subsequent research in the expanding field of neuroscience has uncovered multiple sensory, motor, cognitive, and emotional processing streams that contribute to interpersonal intelligence (Karmiloff-Smith et al., 1995).

Many of these findings have led to the growing realization that the lessons learned during a century of dynamic psychotherapy may have important neuroscientific implications. The most basic is that we are born into relationships and come to our individual identity while resting
upon social connectivity. Another is that social interactions affect everything from our biology to our intellectual abilities. Neuroscience researchers are slowly coming to the realization that the scope of their scientific observation needs to expand to include relationships.

Neuroscientists already possess the perfect model for understanding interdependency—the individual neuron. We know that neither the individual neuron nor the single human being exist in nature. Without mutually stimulating interactions, people and neurons wither and die. In neurons, this process is called apoptosis, while in humans, it is called anaclitic depression. From birth until death, each of us needs others who seek us out, show interest in discovering who we are, and help us to feel cared for and safe. Relationships are our natural habitat, while the isolated brain is an abstract concept. Thus, understanding the brain requires knowledge of the person embedded within a community of others. Therapists, teachers, and parents intuitively grasp this profound reality just as laboratory scientists often do not. We are now in a position to help research scientists know where to look as they explore how the brain grows, learns, and changes throughout life.

The Social Synapse

*Life is the continuous adjustment of internal relations to external relations.*
—Herbert Spencer

As we discussed earlier, individual neurons are separated by small gaps called synapses. These synapses are inhabited by a variety of chemical substances engaged in complex interactions that result in neural transmission. This activity stimulates neurons to survive and modify themselves and each other. Over vast expanses of evolutionary time, synaptic transmission has grown increasingly intricate to meet the needs of a more complex brain. A parallel process has also been occurring in the evolution of the social synapse.

The social synapse is the space between us. It is also the medium through which we are linked together into larger organisms such as families, tribes, and societies. When we smile, wave, and say hello, these behaviors are sent through the space between us via sights, sounds, odors, and words. These electrical and mechanical messages received by our senses are converted into electrochemical impulses within our
brains. These signals stimulate new behaviors, which, in turn, transmit messages back across the social synapse. From the moment we are born, our very survival depends upon connecting to those around us through touch, smell, sights, and sounds. If we are able to connect with nurturant others whose brains are primed to accept us as an extension of themselves, then we can bond, attach, and survive.

The band of communication across the social synapse is extremely broad and includes unconscious messages sent via posture, facial expression, eye gaze, pupil dilation, and even blushing. As we grow increasingly interdependent, our inner experience becomes more visible through these and other means of communication, in order to enhance the strength of our attachments (Cozolino, 2006). Contact with others across the social synapse stimulates neural activation, which influences the internal environment of our neurons. This activation in turn triggers the growth of new neurons as well as the transcription of protein, which builds neurons as they expand, connect, and organize into functional networks. A basic assumption is that loving connections and secure attachments build healthy and resilient brains, while neglectful and insecure attachments can result in brains vulnerable to stress, dysregulation, and illness.

Early bonding experiences not only strengthen the networks of the social brain, they also promote the building of the brain as a whole by stimulating metabolic arousal. Physical and emotional interactions between mother and child result in a cascade of biochemical processes, enhancing the growth and connectivity of neural networks throughout the brain (Schore, 1994). Face-to-face interactions activate the child’s sympathetic nervous system and increase oxygen consumption and energy metabolism. Higher levels of activation correlate with increased production and availability of norepinephrine, endorphins, and dopamine, enhancing the child’s pleasure during positive connections (Schore, 1997a). The vital importance of these early interactions to the building of the entire brain may help to explain the death of institutionalized children deprived of interaction and love (Spitz, 1946).

You may remember from an earlier chapter that a sensitive period is a window of time when exuberant growth and connectivity occur in specific neural networks. The onset and conclusion of these periods are genetically and environmentally triggered, and correspond with the rapid development of skills and abilities organized by each network.
Thus, early experiences have a disproportionately powerful role in sculpting the networks of attachment and affect regulation due to the strength of learning during these sensitive periods (Ainsworth, Blehar, Waters, & Wall, 1978). Just as positive experiences equip us with feelings of self-assurance and optimism, suboptimal bonding experiences become stored within implicit memory, carried into adulthood, and become woven into our adult relationships. Nowhere are these organizing principles more evident than in psychotherapy.

Attunement and Reciprocity

*Mirror neurons show how strong and deeply rooted is the bond that ties us to others.*

—G. Rizzolatti and C. Sinigaglia

Attunement and reciprocity are aspects of the attachment process that reflect mutual awareness, turn taking, and emotional resonance. Mother–infant emotional attunement during the first year is predictive of the toddler's self-control at 2 years, even when temperament, IQ, and maternal style are controlled for (Feldman, Greenbaum, & Yirimiyä, 1999). A mother's ability to resonate with her infant's internal states and translate her feelings into words will eventually lead to the child's ability to associate feelings with words. As the child grows, the pairing of feelings with words enhances the integration of vertical and horizontal networks dedicated to language and emotions. Early emotional regulation, established via mother–infant synchrony, contributes to the organization and integration of neural networks and the eventual development of self-regulation in the child.

Stage-appropriate attunement maximizes the possibility of neural growth, network coherence, and secure attachment. The combined sense of safety, freedom from anxiety, and excitement generated via attunement provides the affective background for the experience of vitality and spontaneous expression. For the newborn, attunement may be communicated via stroking and cuddling; for a 4-year-old, it means helping him or her learn to share with a sibling. A 16-year-old, on the other hand, may need assistance with creating and staying focused on goals for the future, while a 30-year-old will benefit from financial advice and some free babysitting. This safe emotional background created by proper
attunement, reciprocity, and loving kindness parallels an optimal educational and psychotherapeutic relationship.

The building of the social brain during the first 2 years is driven by the attunement between the right hemispheres of the parent and the child (Schore, 2000). It is through this connection across the social synapse that the unconscious of the mother is transferred to the unconscious of the child. The right-hemisphere-biased circuits of the social brain come online at birth and appear to have their sensitive periods during the first 2 years of life (Chiron et al., 1997). The mother seems to regress to a state of preoccupation with her infant in the last months of pregnancy, and continues in this state for a number of months after giving birth (Winnicott, 1963). This maternal preoccupation involves an increased sensitivity to the visceral and emotional experience of the child in order to attune to his or her primitive means of communication. The mother’s purposeful regression allows her to lend her capacity to translate bodily states into words and actions that are soothing to the infant.

Jump-starting Attachment

A mother understands what a child does not say.

—Jewish proverb

Even before birth, mothers and children engage in complex and reciprocal interactions. Communication occurs through sound, movement, and touch, while their shared biochemical environment informs the child about his or her mother’s state of mind and body. Prior to the formation of cortically organized social neural networks, we possess a number of primitive reflexive behaviors that jump-start and stimulate the development of the more sophisticated forms of attachment behavior to come. These reflexes reach across the social synapse and allow us to become quickly integrated with our parents. The process of transmitting the communication style of the mother, family, and culture begins immediately at birth.

Within the first hours after birth, newborns open their mouths and stick out their tongues in imitation of adults, and after 36 hours they are able to discriminate among happy, sad, and surprised facial expressions (Field, Woodson, Greenberg, & Cohen, 1982). Seeing happy faces causes newborns to widen their lips, while sad faces elicit pouting, and
surprised expressions result in wide-open mouth movement. Infants look primarily at the mouth for happy and sad faces, whereas they alternate between the eyes and mouth in response to expressions of surprise, suggesting they are capable of selecting different visual targets based on the types of information presented to them (Field et al., 1982).

Over 20 involuntary reflexes have been identified in the newborn. Some—like the rooting and sucking reflexes—help the infant obtain nurturance, while the palmar grasp (automatic hand grasp) and the Moro reflex (reaching out of the arms) help the child hold onto the caretaker. These early reflexes, controlled by the brainstem, are gradually inhibited by the cortex and replaced by conscious, flexible, voluntary behavior. Reflexes such as these increase the newborn’s chances of survival by enhancing his or her physical and emotional connection to mother and father. The old image of the infant as a passive recipient of stimulation has been replaced with a view of the infant as a competent participant in the social environment.

One of my clients told me of his first interaction with his son: “A few seconds after he was born, the nurse handed him to me and told me to put him in a small bed under a heat lamp. I dutifully crossed the delivery room and gently placed him under the lamp. The light was very bright and he squinted hard, making his face look like a bunch of wrinkles. I put my hand over his face to shield his eyes and he instinctively reached up and took my thumb in his left hand and my pinky in his right and pulled my hand onto his cheek. He was now about 90 seconds old and had become my son. I felt the glow of pride about how clever he was, while simultaneously feeling a surge of protectiveness. This was obviously a very intelligent child with a bright future.” In this way, reflexes provide the dual function of creating physical connection and ensuring the emotional investment of the adults upon whom the infant relies.

Although specific words are meaningless, the tone and prosody of the parents’ voices hold center stage. Even strangers will instinctively raise the pitch of their voice when talking with babies to match their hearing abilities. A mother reflexively holds her baby against her body after birth, maximizing skin contact and helping the infant’s hypothalamus establish a set point for temperature regulation. The infant and mother gaze into each other’s eyes, linking their hearts and brains, while nursing establishes the lifelong relationship between nutritional and emotional nurturance (food equals love).
The warm and happy feelings associated with holding, touching, and nursing, the pain of separation and the joy of reunion, are all stimulated through a variety of primitive neurochemicals that support bonding and attachment. Through this biochemical cascade, mother–child interactions stimulate the secretion of oxytocin, prolactin, endorphins, and dopamine, resulting in warm, positive, and rewarding feelings. These biochemical processes, in turn, stimulate neural activation and the structural maturation of the brain while shaping attachment circuitry (Fisher, 2004; Panksepp, 1998).

The secretion of endogenous endorphins results in feelings of well-being and elation. It actually does feel better when a loved one kisses your boo-boo because endorphins are also natural analgesics. These opiates are strongly reinforcing and serve to shape our preferences from early in life (Kehoe & Blass, 1989). Research with primates suggests that the activation of the opioid systems of mother and child propels and regulates the attachment process. When parent–child primate pairs engage in touching and grooming behavior, endorphin levels increase in both (Keverne, Martens, & Tuite, 1989). During separation, the administration of nonnerving morphine has the same soothing effect on the infant as does the reappearance of the mother. When naltrexone (a drug that blocks the effects of endogenous opioids) was administered to infant primates, rodents, and dogs, proximity seeking increased (Kalin et al., 1995; Knowles, Conner, & Panksepp, 1989; Panksepp, Nelson, & Siviy, 1994).

Reflexively orienting the head to the sound of the mother’s voice increases the possibility of eye contact while the instinct to seek circles and complex figures directs the baby’s attention toward the mother’s eyes and face. Prolonged mutual gazing stimulates metabolic activity and neural growth, while reflexive smiling evokes positive feelings and expressions in caretakers, further stimulating the infant’s brain.

Close examination of the bidirectional protoconversation between a mother and her baby demonstrates that infants have far more influence on their mothers than previously thought (Bateson, 1979). A baby does not simply react to its mother, but instead learns how to affect her feelings and behaviors. Both mother and infant adjust to each other’s gestures, behaviors, and sounds in a sort of lyrical song and dance (Trevathan, 1993). It is through this language of intersubjectivity that children learn from their mothers about the fundamental safety or dangerousness of the world. Protoconversation over the first year of life
serves as the interpersonal and emotional scaffolding into which semantic language and narratives will gradually emerge. The growth spurt of the right hemisphere provides the neural substrate for the development of the emotional components of language.

The Importance of Eyes

_There is a road from the eye to heart that does not go through the intellect._

—G. K. Chesterton

The eyes are a primary point of orientation for infants. They play a significant role in bonding and social communication. Throughout the animal kingdom, eyes play a crucial role in determining the safety or danger posed by others. Gaze aversion (visual cutoff) is an important social behavior that indicates dominance hierarchy in both primates and humans. Direct eye gaze is a threat signal in primates (De Waal, 1989), and the recognition that we are being looked at results in increased heart rate and amygdala activation (Nichols & Champness, 1971; Wada, 1961). What must it be like for primates trapped in zoos who have hundreds of human primates filing by and staring at them each day? Robert De Niro’s “Are you lookin’ at me?” monologue in _Taxi Driver_ is a dramatic example of the relationship between eye gaze, threat, and dominance.

Learning the language of eyes provides us with valuable information about our environment and what might be on the minds of others. We reflexively look up when we see other people doing so; in these situations, the eyes serve as a source of social communication about possible threats in our environment. Elaborate neural circuits have evolved to monitor the direction of eye gaze of potentially dangerous others in order to anticipate their next move. On the other end of the spectrum, the connection among the eyes, the visual system, and emotion can be easily witnessed in the delight a child takes in a game of peek-a-boo. Thanks to the neurochemistry of bonding, the smiles and laughter elicited from a child during peek-a-boo are just as addicting for adults. There is a surge of good feelings in both children and caretakers with each reappearance of the eyes. Similarly, consider the way two people in love can stare endlessly into each other’s eyes, constantly recharging feelings of happiness.
During infancy, mutual gaze between caretaker and child is a primary mechanism for promoting brain growth and organization. In their exploration of the environment, toddlers regularly check back to see the expression on their parent’s face. If the parent looks calm, the child will feel confident to explore further. A frightened look from the parent may result in the child seeking proximity and decreasing exploration. This use of the eyes and facial expressions to encourage or inhibit toddler activities is referred to as social referencing (Gunnar & Stone, 1984).

In therapy, the way a patient experiences your gaze (as caring or threatening) is an aspect of transference that may provide important cues to early bonding experiences. An identical expression will, for some patients, lead to a request that the therapist not stare at them, while it will make others feel attended to and cared for. Although some patients prefer to lie down and look away from the therapist, others want to keep an eye on you. These reactions reflect the eyes’ ability to elicit emotions from the patient’s interpersonal history stored within networks of implicit memory. Thus, exploring the clients’ reaction to your gaze may yield valuable information.

**Recognizing Faces and Reading Facial Expressions**

*Laughter is the sun that drives winter from the human face.*

—Victor Hugo

A vital function of the social brain is to recognize faces and assign a value to them; in other words, are they familiar or strange, friend or foe—should I stay or should I go? This involves both determining identity (who is this?) and using facial expressions to guess the other person’s emotional state and intentions (what are they up to?). The first part of this process involves the complex task of recognizing a face from all possible angles, an analysis that is easy for a child but continues to elude the fastest computers. Although the recognition of faces involves both hemispheres, it is a function most suited to the visual-spatial mechanisms and holistic processing strategies of the right hemisphere.

Research with primates has demonstrated that a particular region of the temporal cortex contains cells that are responsive to faces, their identity, and various facial expressions (Perrett et al., 1984). Neurons activated specifically by faces have also been detected in the amygdala.
connecting the reading of others' faces to our own autonomic reactions, emotions, and behaviors (Leonard, Rolls, Wilson, & Baylis, 1985; Perrett, Rolls, & Caan, 1982). The temporal cortex contributes its abilities for complex recognition tasks (i.e., the countless combinations of facial features), while the amygdala and the ompfc add the emotional elements to processing social information. Together they give us the ability to approach friendly faces and make us wary of potential enemies.

Our temporal lobes contain neurons dedicated to faces that are essential to our ability to relate to others. Besides being able to recognize faces and the behaviors of others, we need to experience other people as being different from inanimate objects. You are probably familiar with autism and Asperger syndrome; both disorders are characterized by profound deficits in the ability to relate to others. In interacting with individuals suffering from these disorders, I have been left with the feeling that, to them, I am no different from any other object in the room. Not surprisingly, research has demonstrated that individuals with autism process faces in an area of the right temporal lobe normally used to process objects (Schultz et al., 2000). This finding reflects one of the many neuroanatomical mechanisms underlying profound disorders of relationship.

**Mirror Neurons**

*Behavior is the mirror in which everyone shows their image.*

—Johann Wolfgang von Goethe

Another way in which we link up across the social synapse is with the help of what are called mirror neurons. Let me first describe how they were discovered. Using microsensors, neuroscientists are able to record the firing of single neurons in monkeys' brains. This recording can take place while they are aware, alert, and interacting with other monkeys. Through such methods, neurons were discovered in the premotor areas of the frontal cortex that fire when another primate or the experimenter is observed engaging in a specific behavior, such as grasping an object with a hand (Jeannerod, Arbib, Rizzolatti, & Sakata, 1995). Some of these neurons are so specific that they only fire when an object is grasped in a certain way by particular fingers (Rizzolatti & Arbib, 1998). What is even more interesting is that these very neurons fire when the monkey itself performs the same action (Gallese, Fadiga, Fogassi, & Rizzolatti, 1996).
These neurons have been dubbed mirror neurons because they fire both in response to an observation of a highly specific relationship between an actor and some object and when the action is performed by the observer. Thus, mirror neurons serve to connect our visual and motor systems with frontal systems responsible for goal-directed behavior. For obvious reasons, the same sort of studies are not possible in healthy human subjects. However, noninvasive scanning technologies have been used to extend these findings to human brains. One such study demonstrated that areas in our brain analogous to those containing mirror neurons in primates are activated during both the observation and the execution of hand actions (Nishitani & Hari, 2000). Support for the relationship between these areas in the monkey and Broca’s area in humans comes from positron emission tomography studies showing activation in Broca’s area during the active or imagined carrying out of hand movements (Bonda, Petrides, Frey, & Evans, 1994; Decety, 1994; Grafton, Arbib, Fadiga, & Rizzolatti, 1996).

The fact that mirror neurons fire when the same action is observed or performed leads to some interesting hypotheses about their role in learning and communication. It has always been known that both humans and primates can learn by observation. Because mirror neurons activate for both observation and action, they may be the mechanism for one-trial learning. Also, because these neurons have been found in Broca’s area in humans, mirror neurons may be involved in the imitation, learning, and expression of language (Gallese et al., 1996). Shared actions and turn taking may have been the genesis of protoconversation and semantic language. Some language learning may be jump-started by these mirror neurons within Broca’s area, as the sounds and lip movements of caretakers are imitated. The alternation of mirroring and turn taking seen in mother–infant interactions may be a contemporary reflection of the early evolution of language (Iacoboni, 2008; Rizzolatti & Sinigaglia, 2008).

The most interesting application of mirror neurons to psychotherapy is that the facial expressions, gestures, and posture of another will activate circuits in the observer similar to those which underlie empathy. Seeing a sad child cry makes us reflexively frown, tilt our heads, say “aawwhhh,” and feel sad too. Watching an athlete walk off the field with his head held high and chest pushed out can lead us to feel energized and proud. In these and other ways, mirror neurons may bridge the gap between sender and receiver, helping us understand one another.
and enhance the possibility of empathic attunement (Wolf, Gales, Shane, & Shane, 2000). The internal emotional associations linked to mirror circuitry are activated via outwardly expressed gestures, posture, tone, and other pragmatic aspects of communication. Thus, our internal emotional state—generated via automatic mirroring processes—can become our intuitive “theory” of the internal state of the other. These structures are at the core of our ability to develop intimate relationships, be attuned to one another, and aid our children in shaping a healthy and balanced sense of self.

**Winnicott and the Emergence of the Person**

*Many patients need us to be able to give them a capacity to use us.*

—Donald Winnicott

Donald Winnicott, an English pediatrician and psychoanalyst, developed some basic principles that provide a helpful way of thinking about the social processes which shape these neural structures. His work with mothers and children led him to coin terms such as good-enough mothering, holding environment, and transitional object, which have become part of the basic lexicon of child development. His ideas have been highly influential both because of their relevance to everyday experience and their freedom from obscure jargon.

Winnicott described the core of mothering as providing a *facilitating and holding environment*, which requires both the mother’s empathic abilities and respect for the autonomy of the child. A mother’s devotion to her child allows her to offer an expanding scaffolding that constantly adapts to her child’s changing needs and abilities. Winnicott defined the early and intense focus on the baby as *primary maternal preoccupation*, and understood it to include the mother’s absorption into and attunement to the experiences with her baby’s primitive developmental state. In this process, she utilizes the biochemistry of attachment and the circuits of the social brain to bridge the social synapse between herself and her child. The *good-enough mother*, in Winnicott’s thinking, is a mother who does an adequate job in this difficult, complex, and constantly shifting process of adaptation (Winnicott, 1962).

Winnicott believed that to talk of an infant separate from its mother was a theoretical abstraction. What actually exists is a symbiotic infant—
mother dyad within which the child is nurtured and its social brain is
formed, and from which the infant eventually emerges as an individual
psychological being. Because an internalized mother and the representa-
tion of the mother–infant dyad remain as organizing principles of the
social brain, they continue to impact us throughout our lives. In this way,
an adolescent or adult with good-enough mothering is never really alone.

A central component of development from Winnicott's perspective
depends on the mother's ability to mirror her child. Mirroring is the
process by which a mother attunes to her child's inner world and gives
form to his or her formless fantasies, thoughts, and needs. Mirroring
serves the purpose of taking the disorganized processes within the child,
naming them, and making them a part of the relationship. The child then
learns about his or her inner world through the relationship. Although
many decades before their discovery, Winnicott was describing a process
that relies on mirror neurons to support this deep attunement between
mother and child.

It is not uncommon for women in the third trimester of their preg-
nancy or in the first months after giving birth to report that they feel they
have lost IQ points. Although these changes are often attributed to the
effects of hormones and sleep deprivation, they may also be related to a
shift in bias to the right hemisphere. A shift away from logical and
orderly left-hemisphere thinking to right-hemisphere-biased processing
may allow the mother an increased level of emotional and physiological
sensitivity that enhances the intuitive elements of attachment. A shift of
brain coherence toward the right hemisphere would explain the decrease
in linear semantic processing and memory abilities reported by new
mothers and mothers-to-be. Although such a shift might be very useful
for attunement with an infant, it could be detrimental to functions best
performed by the left, such as finding the right words, remembering
appointments, and following logical arguments. Many new mothers
report an increasing need during the first year to get out into the world
of adults or back to work. This need may parallel a shift back to previ-
ous levels of left-right hemisphere balance.

As the mother gradually recovers from a deep preoccupation with her
infant and again becomes interested in other areas of life, the child is
forced to come to terms with some of his or her own limitations. In an
appropriately attuned parent, a graduated failure of adaptation will par-
allel the infant's increasing abilities, frustration tolerance, and affect regu-
lation. Winnicott used the term *impingement* to describe the impact on the child of maternal misattunements. These can take the form of not appropriately anticipating the child's needs, interfering with the need for quiet and calm, and even underestimating his or her abilities. Parents have to fail to adapt in different ways in order for their children to face the challenges necessary for adequate development.

Minor impingements are challenges that create moderate and manageable levels of stress which the child is able to cope with and master. These experiences likely promote and may even maximize brain growth and neural network integration. Major impingements overwhelm the child's ability to cope and integrate experience in a cohesive manner, resulting in dissociated networking and functional disabilities. Gradual minor impingements force the infant to grow, whereas major impingements can result in derailment of positive adaptation and the solidification of defense mechanisms. Minor impingements are learning-enhancing experiences, whereas major impingements result in decreased neural integration and hamper the child's development.

One of Winnicott's most clinically useful concepts has been the idea of the development of a true and false self. Secure attachments and a sense of a safe world create the context for the development of the *true self*, which represents those aspects of the self that develop in the context of manageable (minor) impingements, support, encouragement, and proper meaning by the caretaker. Respect for the autonomy and separateness of the child motivates the parent to discover the child's interests, instead of imposing his or her own upon them. The true self reflects our ability to tolerate negative feelings and integrate them into conscious awareness and to seek out what feels right for us in our activities, ourselves, and our relationships with others. Winnicott's true self is obviously one in which neural network development has been maximized, affect is well regulated, and emotions and cognition are well integrated. The true self reflects an open and ongoing dialogue among the heart, the mind, and the body.

What Winnicott called a *false self* results from major impingements for which the child is unprepared. Prolonged impingements can result in chronic emotional dysregulation. For example, neglect, abuse, or continuous states of shame can overwhelm the child's natural development and lead to the dominance of emotional defenses. These stressful relationships will also inhibit neurogenesis and proper brain development (Stranahan,
Kahlil, & Gould, 2006). When self-involved or pathological parents use children for their own emotional needs, the child can become compulsively attuned to the parents, creating a false self designed to regulate the parents' needs. Without appropriate assistance in developing his or her self-reflective capacity, such children live through reflexive social behavior and never learn that they have feelings and needs of their own that should be expressed and nurtured. Winnicott understood therapy most generally as a process of controlled regression to a childhood state with the purpose of succeeding in developing a true self in the present which was thwarted in early life (St. Clair, 1986).

**Shame**

_Every word, facial expression, gesture, or action on the part of a parent gives the child some message about self-worth. It is sad that so many parents don't realize what messages they are sending._

—Virginia Satir

During the first year of life, healthy parent–child interactions are primarily positive, affectionate, and playful. Due to their limited mobility, infants stay in close proximity to caretakers, who provide for their many bodily and emotional needs. As the infant transforms into a toddler, a parent's role comes to include protecting the child from danger such as falling down stairs, being bitten by stray dogs, or drinking fabric softener. The emergence of normal, incessant exploratory behavior in toddlers is driven by the brain's intense need for stimulation and growth. Due to the toddler's increasing motor coordination and exploratory drive, parents find themselves protectively saying "no" beginning at about 18–24 months (Rothbart, Taylor, & Tucker, 1989). Affection and attunement, experienced as unconditional during the first year, come to be tied to limit setting, control, and early attempts at discipline.

Shame, appearing early in the second year of life, is both a powerful inhibitory emotion and a mechanism of social control. Thus the positive face-to-face interactions that stimulated excitement and exhilaration during the first year come to include expressions of disapproval and anger. Shame is represented physiologically by a rapid transition from a positive to negative affective state and from sympathetic to parasympathetic dominance. This shift is triggered by the expectation of attune-
ment to a positive state, only to receive negative emotions from the caretaker (Schore, 1994). While it may be hard to believe, toddlers expect their parents to be just as excited as they are about covering the floor with milk or plopping their toys in the toilet. Parental reactions of disapproval or anger are, at first, confusing and difficult to comprehend but soon come to shape the biology and psychology of the child.

Behaviorally, people in a shame state look downward, hang their head, and round their shoulders. This same state (submission) is shown by your pet dog when he hunches over, pulls his tail between his legs, and slinks away as you upbraid him for some canine faux pas. Similarly, this posture in humans reflects social exclusion, loss, and helplessness. During early socializing experiences, shame is the emotional reflection of a lost attunement with the caretaker, drawing its power from the child's primal need to stay connected for survival. Prolonged and repeated shame states result in physiological dysregulation and negatively impact affect regulation, attachment, and the development of networks of the social brain (Schore, 1994).

The return from a state of shame to attunement results in a rebalancing of autonomic functioning, supports affect regulation, and contributes to the gradual development of self-regulation. Repeated and rapid return from shame to attuned states also consolidates into an expectation of positive outcomes during difficult social interactions. These repairs are stored as visceral, sensory, motor, and emotional memories, making the internalization of positive parenting a full-body experience. Thus, the continual experience of attunement, misattunement, and reattunement creates a kind of body memory which becomes an expectation of a positive outcome for relationships and life. Children left in a shamed state for long periods of time may develop permanently dysregulated autonomic functioning along with depression, hopelessness, and despair. As the child graduates into increasingly complex peer group relations, these same physiological processes are connected to popularity, social status, and dominance within groups at school and on the playground.

Because shame is a powerful, preverbal, and physiologically based organizing principle, the overuse of shame in the process of parenting can predispose children to developmental psychopathology related to affect regulation and identity (Schore, 1994; Schore & Schore, 2008). As part of his therapeutic programs, John Bradshaw (1990) refers to "inner
child work” as addressing the long-standing power of these early shame experiences, which he calls “toxic shame.” Shame needs to be differentiated from the later-occurring phenomenon of guilt. Guilt is a more complex, language-based, and less visceral reaction that exists in a broader psychosocial context. Guilt is related to unacceptable behaviors, whereas shame is an emotion about the self that is internalized before the ability to distinguish between one’s behavior and one’s self is possible. If guilt is “I did something bad,” then shame is “I am bad.” We see this often, in individuals who spend their lives taking care of others and doing good deeds in an attempt to make up for some “sin” that they cannot recall.

The Consolidation of the Self

Never be afraid to sit awhile and think.

—Lorraine Hansberry

In Winnicott’s view, too many impingements prevent the infant from experiencing what he called formless quiescence: those moments of safety and calm that teach the child the world can be a safe place. It is in these quiet moments that the experience of self is consolidated, neural networks integrate, and fantasy and reality are gently combined. In essence, good-enough parenting results in the belief in a benign world where one is safe to build an internal experience of self (Winnicott, 1958). Thus, Winnicott felt that a major achievement of early attachment was the capacity to be alone, an ability learned by being alone in the presence of a competent caretaker. These experiences create enough security to allow feelings in the child to spontaneously bubble up with the confidence that they will be manageable and understandable. In this state of mind, the need to employ defenses to cope with external threat and inner emotions is at a minimum. At the same time, parietal-frontal systems involved in imagination and the creation of an inner sense of self become activated.

The manic defenses we often see in our clients result from the lack of the capacity to be alone. Impulsive behaviors and thoughts, disconnected from self-reflective processes, serve to inhibit emotions because to these individuals, to feel is to feel bad (Miller, Alvarez, & Miller, 1990). Slowing down stimulates discomfort, sadness, isolation, and shame, which
become background affect throughout life. If manic defenses are chronically employed, they can become a way of life and keep children and adults from constructing inner imaginal experience and a sense of self. Sadly, many children with manic defenses are mistakenly diagnosed with ADHD. They are medicated to help them cope, while the real problem goes unresolved.

People with manic defenses often mask their inability to be alone by stirring up a constant whirlwind of activities, social interactions, and phone calls. Despite their outward success, and their narcissistic and grandiose attitudes, they often have great difficulties in relationships and report feelings of despair and emptiness. Exploration of their histories usually points to patterns of insecure attachments in which achievement served as the currency for acceptance. Constantly escalating levels of activity are reinforced by praise from others and the avoidance of the negative feelings that bubble up when the patients are quiet or alone. These people often have a hard time relaxing or taking a vacation because the lack of distractions leaves them open to the intrusion of uncomfortable feelings for which they have no effective coping skills.

The inability to be alone is seen most clearly in individuals with borderline personality disorder, who have a catastrophic reaction to real or imagined abandonment. For these people, separation is experienced as a threat to their very survival in much the same way as an infant reacts to the absence or loss of a parent. Their catastrophic reaction in adulthood is likely the activation of an implicit memory of overwhelming abandonment fears from a time before object constancy or self-regulation. It is as if the child within these patients is in a holding pattern, awaiting proper parenting. The extremely emotional life-and-death reactions in borderline patients may be our best window to the chaotic and often frightening emotional world of early childhood.

Summary

The brain is a social organ connected to other brains via the social synapse. Primitive reflexes jump-start the attachment process and are gradually replaced by voluntary behaviors. The motivation to stay connected is driven by biochemical systems we share with our primitive ancestors. While there are multiple channels of communication between
us, vision is an important link across the social synapse and the expressive face a focal point of social information. Theories of psychological development by Winnicott, Freud and others provide us with models for the development of mind embedded in these more basic neurobiological processes. The development of a sense of self requires periods of freedom from external threat and inner turmoil. It also requires the development of frontal-parietal systems responsible for inner imaginal space. Children constantly buffeted by external chaos can remain trapped in a "selfless" state where they are witness to internal impulses and external behaviors with little or no ability to either understand or control what they are doing.