The Norton Series on Interpersonal Neurobiology
Louis Cozolino, PhD, Series Editor
Allan N. Schore, PhD, Series Editor, 2007–2014

Daniel J. Siegel, MD, Founding Editor

The field of mental health is in a tremendously exciting period of growth and conceptual reorganization. Independent findings from a variety of scientific endeavors are converging in an interdisciplinary view of the mind and mental well-being. An interpersonal neurobiology of human development enables us to understand that the structure and function of the mind and brain are shaped by experiences, especially those involving emotional relationships.

The Norton Series on Interpersonal Neurobiology provides cutting-edge, multidisciplinary views that further our understanding of the complex neurobiology of the human mind. By drawing on a wide range of traditionally independent fields of research—such as neurobiology, genetics, memory, attachment, complex systems, anthropology, and evolutionary psychology—these texts offer mental health professionals a review and synthesis of scientific findings often inaccessible to clinicians. The books advance our understanding of human experience by finding the unity of knowledge, or consilience, that emerges with the translation of findings from numerous domains of study into a common language and conceptual framework. The series integrates the best of modern science with the healing art of psychotherapy.

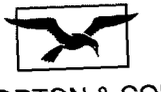
A NORTON PROFESSIONAL BOOK

ART THERAPY & THE NEUROSCIENCE OF RELATIONSHIPS, CREATIVITY & RESILIENCY

SKILLS AND PRACTICES

NOAH HASS-COHEN
JOANNA CLYDE FINDLAY

Forewords by Louis J. Cozolino and Frances Kaplan



W. W. NORTON & COMPANY
New York • London

CHAPTER 5

Relational Resonating: Co-Regulation and Co-Creation

Making my collage alongside my daughter reminded me of doing things together at the kitchen table. Sometimes I was absorbed in figuring out my tree and sometimes I noticed how she was working. I was impressed by the boldness of the way she drew and pasted her images. I realized my process was less clear, and she saw me adding new sheets of paper and starting over. I loved that we seemed to share a private world. I intentionally did not comment on what she was making. We just shared the materials and worked side by side. I felt silently connected in a special way. Joanna Clyde Findlay

IN THIS CHAPTER, WE DISCUSS and illustrate the contributions of visual communication and creative expression to co-regulatory interactions. The premise is that individuals communicate with each other implicitly, without talking or using words, just as much as they do explicitly (Cozolino, 2010; Fonagy, Gergely, Gurist, & Target, 2005; Rothschild, 2000; Schore, 2003). We hold that interpersonal, nonverbal right-to-right hemisphere regulatory communication lies at the heart of Relational Resonating, and the Art Therapy Relational Neuroscience (ATR-N) approach.

Co-regulation's evolutionary purpose supports survival as it assists in the physiological maintenance of homeostasis (Sbarra & Hazan, 2008). The capacity to regulate and self-soothe is furthermore central to successful interpersonal interactions. Without co-regulatory experiences, cognitive and emotional brain resources can also diminish. This is because an attuned attachment relationship relieves some of the burden that independent emotional and behavioral control puts on high-order prefrontal cortex (PFC) function (Hughes, Crowell, Uyeji, & Coan, 2012). Co-regulation represents a dynamic mutual and reiterative process, which systemically supports reparation and personal development and change (Tronick et al., 1998; Tronick & Beeghly, 2011).

Early life mother-child co-regulation fuels the development of self-

regulation, contributing to the development of a secure internal working model (IWM). From infancy through young adulthood, sufficient co-regulation experiences build up the individual's capacity for independent self-regulation, attuned relationships, secure attachment, and coping with change and stress (Hughes et al., 2012). Attuned co-regulatory experiences help balance the stress response, as seen, for example, in normal blood pressure and temperature of babies. Similar down regulated arousal was documented in lowered blood pressure levels of partners that have close daily social interaction (Sbarra & Hazan, 2008). Furthermore, the infant-caregiver implicit communication system provides the foundation of a person's meaning making.

Within the therapeutic relationship, co-regulation is an implicit interactional procedure that evolves into co-consciousness (Tronick et al., 1998; Tronick, 2001). Co-consciousness is a shared meaning system that provides the scaffolding for flexible reflectivity (Fonagy et al., 2005) autobiographical coherency and personal stability (Wallin, 2007). These regulated states contribute to developing interpersonally stable personality traits and an earned relational sense of security (Siegel, 2006). Thus, the function of co-regulation across the life span evolves and includes implicit and explicit communication and meaning-making systems (Badenoch, 2008).

From a neurobiological perspective, several brain functions contribute to regulatory processes. The first are brain lateralization functions: Throughout the life span, attuned right-to-right hemispheric (RH) interpersonal communication serves to facilitate several important purposes. These include access to unspoken emotions, support for active affect regulation development, evolving social and emotional information processing, and confidence in decision making. Left hemisphere (LH) functions contribute to these abilities through explicit verbal processing, resulting in integrated function (MacIntyre, Rogers, & Vallortigara, 2009).

Additional areas responsible for affect regulation and integrative processes are the connections between the PFC and the amygdala (AMY). The AMY processes and prioritizes emotional cues received from the visual cortex, such as facial expressions (Schupp et al., 2007). Face-to-face experiences develop the capacity for trust and self-soothing (Tronick, 2007). Bidirectional feedback loops between the PFC and the limbic areas, the frontolimbic circuitry, are involved in regulation of emotions (Hughes et al., 2012) and in bonding and caring relationships (Siegel, 2012). Neurobiologically, bonding and secure attachment experiences infuse the frontolimbic circuitry with feel-good neurochemistry, including dopamine (DA), serotonin (5-HT), and oxytocin (OXY; Hughes et al., 2012). Mental states are thus comprised of an amalgam of cognitions, feelings, and emotions.

For the experientials and guided experiences, we suggest a sequence of directives that progressively demonstrate affective co-regulation, co-creation, and co-consciousness. These directives illustrate how the interactions between art psychotherapists and clients may provide immediate access to RH nonverbal communication. The first experiential is called My Right Hemisphere. Each group member first creates a color-based impression of her RH, and then imagines parent-child face-to-face and right-to-right communication. Drawing, erasing, and redrawing techniques are used to track this dialogue. Next, we simulate a parent-child dyad art therapy directive, which involves creating a Tree of Life alongside one another. Such co-creative dyadic occurrences have been associated with attachment experiences (Snir & Hazut, 2012). Playful and deliberate use of colors, forms, tactile media, and images, which are primarily processed by right-brain functions, are obvious RH-based microskills. As stated earlier, LH verbal processing of the artwork can further support regulated integration. Finally, a nonverbal Dual Drawing role-play supports adult in vivo co-creative interactions that contribute to co-consciousness and meaningful communication (Moon, 2008). Our ATR-N directives support the development of specific microskills as they attend to a continuous and dynamic process of mutual influences and affect regulation. Within a safe relationship, the interpersonal art therapy laboratory offers a co-regulatory environment. Co-creating alongside each other and together is an ATR-N skill. When the therapist and client work together, yet with separate purposes in mind, the therapist can maintain an attuned environment. Co-creating as well as engaging in response art within and outside of the session allows for the attachment relationship to develop and supports the capacity to process difficult experiences (Fish, 2012; Franklin, 2010). This kind of attuned co-creation offers the opportunity to experience, practice, and develop emotional regulation. Art therapists have developed similar directives that support parent-child attachment processes (Ball, 1998; Brown, 2008; Choi & Goo, 2012; Hosea, 2006; Isserow, 2008) as well as assess attachment styles (Kaiser, 1996; Kaiser & Deaver, 2009).

AFFECT REGULATION

It is through nonverbal interaction that infants and toddlers internalize regulation strategies, practicing expressing and understanding nonverbal interpersonal cues. The caregiver's gestures, tone of voice, eye contact, touch, and facial expressions indicate the intensity, timing, and physical proximity of his or her nonverbal affect. Attuned back-and-forth implicit communication is the carrier of interpersonal meaning, and the overall effect contributes to synchronized resonances (Chused, 2007; Schore, 2008). Neuroscience research

suggests that humans need such exchanges to maintain their social resources (Hughes et al., 2012). The formation of early secure attachments fuels successful adult emotional regulation and teaches how to effectively reach out to others for social and regulatory support (Hughes et al., 2012). Attuned caregiving in the face of stress offers the growing child a supportive model of how to self-soothe and digest overwhelming experiences (Schore, 2003, 2008; Siegel, 2012; Cook, Blaustein, Spinazzola & van der Kolk, 2003).

Insufficient regulatory capacities of physical arousal and emotional states in adults are associated with early on poor caregiver attunement (Siegel & Hartzell, 2003). Children whose parents repeatedly dismiss or reject them may learn to disregard or distrust their emotions, relationships, and even their own bodies. They may dysregulate and disconnect from others if they sense important adults are getting too close or too distant emotionally (Ainsworth, Blehar, & Waters, 1978; Kravits, 2008a). As relationally insecure children grow into adults, an insecure avoidant or anxious IWM expresses as insecure anxious or avoidant attachment styles. When faced with a significant interpersonal stressor, the person may feel numbed or flooded by intense emotions. In order to self-regulate, the relational insecure adult may turn to isolating strategies and will likely avoid, dismiss, or feel deeply ambivalent about close relationships (Hesse, 1999). Cognitive problems with sustaining attention and concentration are also common (Gillath, Giesbrechtb, & Shaver, 2009), which may contribute to reduced rational compensatory coping skills. Overall, insecure, anxious, or avoidant IWM result in inadequate interpersonal strategies, leading to a consistent recycling of excessive dependency and/or disengagement, depression, and anxiety. While difficult, this is an organized pattern of interpersonal interaction. Therefore, it is usually predictable, which makes it easier for the therapist and client to recognize the pattern of insecure behaviors, attitudes, and feelings and work together toward change (Wallin, 2007).

In comparison, disorganized attachment responses can be experienced as chaotic and destabilizing (Cassidy & Shaver, 2010). The pace and intensity of emotions increase under stress, which contribute to feeling like one's emotions are out of control. As a result, the individual may experience a significantly diminished capacity for reasoning, and communication may become incoherent. In other words, a cycle ensues where emotions affect cognitions and vice versa. Repercussions of this course of events are that cognitive and emotional interpretation of verbal communication, facial expressions, gestures, and sensory stimuli becomes skewed. A person with a propensity for negativity, for example, will be even more prone to negative interpretations and to catastrophizing reactions (Lanius, Bluhm, & Frewen, 2011). Because cognitive function is constrained, recognizing and differentiating between

one's own feelings and those of others becomes convoluted and confusing. Subsequently, current stressors may be experienced as if one is a helpless and hopeless child. It may also take the person longer than it would take someone with less negative cognitive patterns to return to a functional baseline (Wells et al., 2009).

Chronic or severe dysregulation of affect associated with disorganized attachment experiences have been hypothesized to interfere with the development of neural connections in critical brain areas and contribute to biological-based dysregulation (Schore, 2001b). Analytical, LH capacities may fail, and emotional RH schemas of the world take over, provoking uninhibited helplessness and fury (Kagan, 2007; Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). This dysregulated state can become chronic, which has been associated with borderline personality disorder (BPD) behaviors (Linehan, 1993a). Among other BPD problems, affect dysregulation is the most damaging to interpersonal functioning. BPD is primarily a dysfunction of the emotion regulation system (Shearin & Linehan, 1994), characterized by a pattern of harmful impulsivity and unstable affects, interpersonal relationships, and identity (Wupperman, Neumann, Whitman, & Axelrod, 2009).

The facility for affect regulation requires the integration of sensory, emotional, and cognitive functions. As emotions transfer from the limbic system to the cortex, the right brain, which implicates the nonverbal, social-emotional self, integrates with the left brain, which dominates language, motor, and cognitive functions. The integration of nonverbal RH communication with LH cognitive processing is well served by art therapy practices (Chapman, 2014).

CO-REGULATION

Emotional expression, communication, and regulation are best contextualized as intrapersonal and interpersonal processes across the life span (Hughes et al., 2012). The function of co-regulation shifts from survival and affect regulation to co-conscious meaning making. Mother and infant attuned interactions, such as gazing, cooing, and smiling, present as a cycle of communication. Should the mother withdraw her participation, for example, by persistently freezing her expression, the infant will visibly react in a distressed manner, eventually turning his or her head away, appearing depressed (Tronick, 1989, 2007). These cycles of effective or ineffective connection, disconnection, and repair then generalize into the development of either trust or security or a distorted sense of the self and the other (Tronick & Beeghly, 2011). Patterns of verbal and nonverbal exchanges between infant and mother

are also social, meaning-making moments. The moment-to-moment communication may be as follows: the infant pulls the mother's hair; her face expresses irritation; and the infant may defend against potential disconnection by raising both arms in front of his face (Tronick, 2007). The mother may repair by playfully blowing on the infant's face. As the baby lowers his hands, he smiles while eye contact and connection are successfully restored.

Co-regulation is hence understood as a continuous dynamic process, in which each person affects the other, rather than the exchange of discrete information (Fogel & Garvey, 2007). As children grow, parents function to help them manage their emotional arousal (van der Kolk, 2005). In early childhood and toddlerhood, the child is seen to become a more equal partner in parent-child exchanges, sharing in turn taking, initiating communication, and maintaining mutual interaction (Kim & Kochanska, 2012). Nonverbal communication through matching intensity of eye contact, tone of voice, and movement remain central to parent-child interactions. The young child's emotional response to an experience is co-regulated by the parent's affective response (Hughes, 2004). In essence, a child's attention is directed by the quality of the parent's attention. Furthermore, how the caregiver processes experience shapes the child's capacity for reflective thought (Fonagy, Gergely, Jurist, & Target, 2005). Parents who provide appropriate vocabulary for children to use allow for the gradual identification and expression of their inner life, supporting such mentalization (Siegel & Payne Bryson, 2012). Mutual influences emerge as the parent's affective communication is impacted by the moment-to-moment connections with the child (Fonagy et al., 2005; Hughes, 2004).

Parent-child dyadic emotional regulation prepares the child for peer interactions, supports practicing autonomy, and frees resources for cognitive growth (Harrist & Waugh, 2002). While preschool children are expected to manage emotions and impulses more effectively, they can still be quickly overwhelmed by the demands of their environment, thus at times needing extra external soothing and support in order to keep their frustrations well managed (Bath, 2008). Accordingly, an inverse correlation was reported between teacher ratings of preschoolers' behavior problems, such as noncompliance or aggression, and the level of attuned mother-child interactions (Dexter-Deckard & Petrill, 2004; Lunkenheimer, 2007). In fact, preschool years are seen as critical to the development of adaptive or maladaptive regulatory abilities (Cole, Teti, & Zahn-Waxler, 2003). What were once evolving nonverbal interactions of parent-infant affect regulation crystallize into dyadic patterns of parent-child interaction (Cozolino, 2013). For example, anxious mothering can look like over controlling and critical parenting, which contributes to the child's internal avoidance and withdrawing behav-

iors. Distant, inconsistent, or hostile parenting can contribute to fear and unremitting aggressive, under controlled behaviors. In contrast, attuned and flexible parenting promotes security. Secure parenting teaches that the repair of relational dissonance and conflict is possible. This modeling and support helps the child experience quick recovery and develop regulated internal working models and behaviors (Granic, O' Hara, Pepler, & Lewis, 2007).

In middle childhood, parent-child mutuality is also negatively correlated with externalizing behavior problems (Lunkenheimer, 2007). Dyadic joint attention, co-occurring positive affect, responsiveness, and cooperation are pathways toward emotional resiliency. The growing child and the environment are mutually influencing systems that actively organize the self. Over time, back and forward transactions between the child and his or her context develop into regulatory traits. The products of past recurring dyadic interactions can support or constrain future dyadic behavioral patterns.

As the adolescent prefrontal brain regions reorganize, attuned dyadic relationships help the teenager manage overwhelming emotional arousal. This entails acknowledging the young person's distress, supportive silence, and an invitation to reflective problem solving (Bath, 2008). In contrast, transactional coercive parenting can turn into a cycle of mutually reinforcing negative affect and disrupted parent-adolescent relationships (Kim, Conger, Lorenz, & Elder, 2001).

The mutual regulation of early biobehavioral processes extends to an adult dyadic intersubjective state of consciousness (Tronick, 2007). Collaboration with another gives the opportunity to expand into more coherent complex states (Siegel & Payne Bryson, 2012). In fact, throughout the adult life span, the capacity for affect regulation is enhanced in the presence and support of trusted others (Siegel & Hartzell, 2003). Robust adult attachment continues to be co-regulatory. Healthy dyadic reparation, recovery from argument, and the return to previous or new ways of relating are secure attachment functions (Gottman & Driver, 2005). Patterns of adult co-regulation form a complex organizing system that includes dynamic connections, disconnections, and repairs (Tronick & Beeghly, 2011). Even the mere presence of support by a parent, spouse, or significant other decreases the amount of independent resources required for emotional and social self-control and contributes to cognitive and mental functioning (Beckes & Coan, 2011). Under affirming interpersonal conditions, the ability to express and regulate emotions motivates social engagement and increases the ability to tolerate negative social experiences. Furthermore, in the face of duress, learning to rely on others permits co-regulation of affect, reducing the likelihood that threat-based circuitry will be activated, thereby promoting resiliency (Beckes & Coan, 2011). It also contributes to improvements in mood, cognitive

functioning, and learning capacity. For example, in groundbreaking interpersonal research, women who held their husband's hands during lab-induced stress showed less activation in fear- and threat-sensitive areas of their brains. In the presence of secure adult attachment figures, women were able to enhance affect regulation by literally holding their spouse's hands (Coan et al., 2006). While loss of an attachment figure can trigger biobehavioral dysregulation (Sbarra & Hazan, 2008), regulatory benefit can still be achieved by calling on mental representations of an attachment figure.

Change in therapy has also been linked to the dyadically regulated relationship between client and therapist. In this type of relationship, co-regulation has been linked to co-consciousness and to shared meaning making. Additionally, implicit and explicit shared emotional dyadic states offer opportunities to practice and experience affect regulation. Thus, we hypothesize that art therapy activities offer an ongoing flow of co-interaction, co-creation, and co-consciousness. Affect regulation and change are supported by the nonverbal and verbal communication, collaborative art making, and mutual witnessing of this therapeutic process.

EXPERIENTIAL PRACTICES AND DIRECTIVES

Experience I: My Right Hemisphere

For the first experiential, we invite the participants to embody their RH, the interpersonal brain. Each group member creates a representation of his or her RH function, particularly as it relates to interpersonal communication and affect regulation. In support of the directive, we showcase the artwork of Alex Grey, who vividly illuminates the experience of human relating (http://www.alexgrey.com). His X-ray vision art *Contemplation* depicts vibrant human biological systems, anatomy, and brain.

> *Alex Grey's painting brought the academic images, drawings, and scans of the brain and body that we had studied to life. It made me think about what goes on inside my skin and brain. I wanted to explore my own brain and what it is like to know the origins of my emotions and behavior as located in my different minds or so-called hemispheres.* Louise Smith

We start by asking participants to: "Make a detailed pencil drawing of a right hemisphere." We then ask them, using color, to "transform the image into My Right Hemisphere." Inspiration for this imagery can be found in Carter (2010). In each chapter, she provides an illustration of the brain that

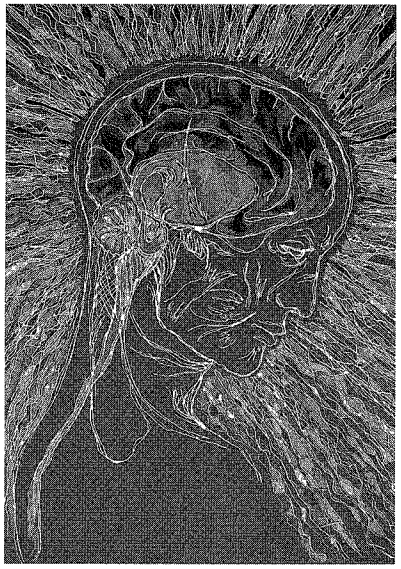


Figure 5.1 *My RH: Mind, Body and Soul.* A dark pink central brain is enveloped by green folds of the neocortex. The entire brain-mind pulses with multi colored energy. Lisa Cerrina

symbolizes its functions. Nonvocal background music or the use of music therapy instruments can also assist in this shift from a cognitive perspective to an integrated RH focus (Scheiby, 2005; Thaut, 2008). The titles that participants give their own art, such as *What My Right Brain Does for Me and What My Left Brain Does*, will usually spontaneously reflect this idea (Figure 5.1).

As we gather to discuss the group's experience of the activity, there is often a lively debate. Some express a preference for left-brain-related tasks, such as the copying of brain images, which involve high levels of cognition, attention, and control. Further, they may comment on the sense of focus and calm brought upon the creation of the controlled pencil drawing. Others are more oriented toward right-brain-related tasks, such as creating a symbolic representation of the brain, which involves emotion. They may report feeling energized by color, process art, painting, and the rhythms of the music.

The experiential leads to a talk about the expression of RH and LH lateralized functions. The RH function is key to understanding the gestalt of the creative experience. It has a role in the processing of visual, prosodic auditory, and gestural signals as well as the holistic reasoning aspects of language, such as intonation and emotional emphasis. In contrast, left-brain functions support the verbal processing of the art. Calling upon both the RH and the LH allows for functional integration and supports affect regulation. Either the pencil drawings or the adding of color or paint may bring on insecurity and emotional dysregulation. These responses may be related to a fear of artistic

failure, fear of judgment, or other personal reasons such as negative memory, requiring affect modulation.

Experience II: Right-to-Right Hemisphere Communication and Co-Creating

In the studio sketching has therapeutic value as it tracks implicit dynamics. Next we ask each group member to sketch the flow of nonverbal exchanges. First is that between a parent and an infant, and then between a parent and a young child. We prompt each person to imagine feeling the physical contact of holding an infant in their arms, the weight and warmth of the baby, gazing face to face, and then say, "Draw the right-to-right interaction of a mother and infant." They may want to explore their own memories of holding or being held. They are invited to conjure up the gentle sense of movement and shifts in posture of mother and child. Some participants feel pressured to literally draw a mother and baby and are reassured that they can simply set an empathic intention to mentalize and explore the experience of the caregiver-infant interaction. As they draw, they search out forms that represent the reciprocal act of communication, including the gestures and facial expressions of parent and infant. In pursuit of attuned representation and mutual regulation, they are encouraged to erase, smudge, draw, and redraw the relationship. Thus mental co-creating occurs. Heavyweight drawing paper is provided with the idea that it can bear the wear and tear of the activity and symbolically support attuned holding. As the images emerge, the pencil or charcoal marks approximate, track, and mirror the represented interactions. While best achieved with wood-based charcoal, using a soft lead-based pencil works as well. Henri Matisse was a master of such techniques, which he used for drawing faces of the women he loved.

Using the left hand to smudge the pencil marks may bring forward unexpressed imagery and deliberately engage the RH, which controls the left side of the body. In general, the right cerebral hemisphere controls the left side of the body, and the left cerebral hemisphere controls the right side. However, a person's hand dominance may not be an indication of cognitive function location. In 95% of right-handed individuals, the left side of the brain is dominant for language. Even in 60–70% of left-handed individuals, the left side of the brain is used for language (Knecht et al., 2000). Participants experiment with what feels right, familiar, or different for them. Sometimes both hands are used. Giving right-to-right hemisphere communication art activates the LH, bringing it cognitively online and allowing for integration of the nonverbal and verbal aspects of the work (McNamee, 2003; Figure 5.2).

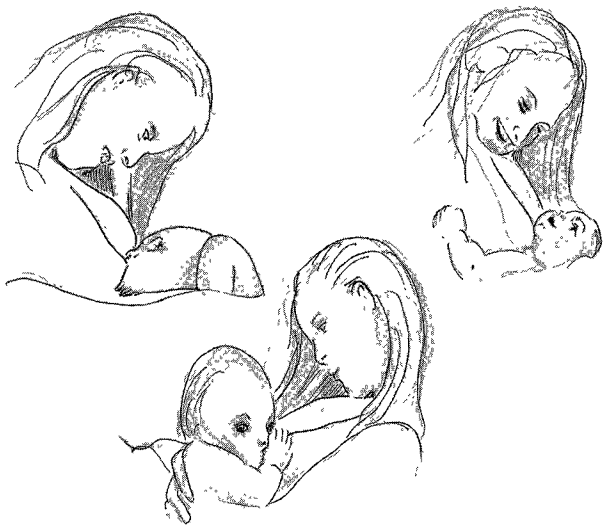


Figure 5.2 *RH-to-RH Mother-Infant Gazing.* Gazing supports the development of affect regulation and growth in infants. In this drawing, the mother intuits the regulatory need of the suckling infant which is to move toward and away from her. Joanna Clyde Findlay

Sketching, erasing, and rubbing out the drawing, followed by a resketch of the mentalized image, leaves energetic tracks that can remind us of gazing, touching, holding, and the good feelings that can be associated with such co-created embracing. These positive feeling states are thought to be mediated by oxytocin (OXY). OXY is a hormone that is thought to be released during breast-feeding, hugging, touching, and orgasm. In the brain, OXY is a neurotransmitter that is involved in social bonding and in the formation of attuned trust between people (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005).

> *The smudging and erasing brought forward images of what an attuned relationship might be. I found the request to sketch the communication between a parent and small child really difficult. It reminded me of my relationship with my mother. I am not sure that she felt comfortable holding me for too long. As we erased, smudged, and redrew more of what we thought, the exchanges made me feel more attuned to the activity and perhaps to myself. It opened possibilities to understand mothering. I started to think about communication more like a loop or a swirl of lines. I guess it helped me understand that the connections between parents and children are always altering.* Lisa Kandros

RH-to-RH communication is involved in mother-infant gazing; it supports the development of affect regulation and growth in infants (Schore, 2008). The RH has, so to speak, an emotional lens, and it is the holder of autobiographical memory. The inclusion of faces and facial expression in the images as well as the use of the left hand intentionally calls on RH functions. The RH stores the mental working models of attachment and is informed by visceral bodily states. It is functionally dominant during the late prenatal stages and the first two years of life. In infancy, RH-to-RH, face-to-face communication is engaged by what has been named proto-conversations (Trevarthen, 2006). Proto-conversations involve attuned vocalizations such as cooing and "umm," hand gestures, strokes, and movements of the arms and head. Proto conversations and facial expression act conjunctly and support the development of secure attachment and effective affect regulation (Hughes et al., 2012; Schore, 2001a; Tronick & Beeghly, 2011).

Between mother and infant, there is a dyadic verbal and nonverbal interlocking of contingent communication where their psychobiological systems are co-regulating (Kravits, 2008a; Tronick, 2001; Tronick & Beeghly, 2011; Tronick et al., 1998). The infant can be observed maintaining the mother's gaze during nursing, then breaking the eye contact, turning away in order to self-regulate. As discussed earlier, should the mother turn away or develop a still face, difficulties with emotional regulation may result in depression. The mother may talk to the infant and the infant will reengage. The marking lines left during sketching can be seen as mental and executed correspondences of proto-conversational gestures. These are symbolic of self-regulation cycles.

Similarly, we ask for a drawing of a parent–young child interaction: "Draw yourself together with your very young child, or draw a parent, or art therapist and young child interaction." This is an ATR-N adaptation of the kinetic family drawing: "Draw your family doing something together" (Burns & Kaufman, 1970). Instead of action, the focus is on intimacy and co-regulation. Unlike the kinetic family drawing, which is a projective assessment measure aiming to elicit a family's dynamics, this request seeks to promote the client's insight into, and empathic understanding of, the experience of attuned nonverbal communication.

In order to get a felt experience of what such communication entails, and to support the clinical skill development of those who might be working at early childhood centers, we may ask our group members to manifest such proto conversation experiences. Using the art to mirror actions or games, such as peekaboo and the hand pile game, the focus is on being mindfully present, in the moment, and responsive to the other. To the older child, turn-

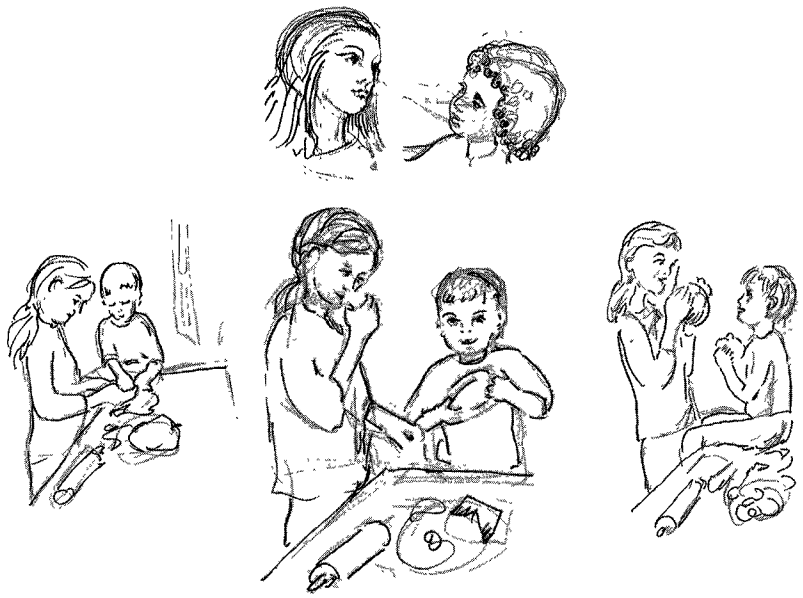


Figure 5.3 *Caregiver-Child Gaze.* Gestures used in the art-making reflect therapist-child co-regulation. Joanna Clyde Findlay

ing to the art material or art object offers a means to take a break and regulate his or her feelings. The child client approaches the art therapist and the art making, withdraws to recompose, and then approaches the therapy process again (Figure 5.3).

In the drawings, the markings may include clues to the parent's or therapist's perceived relationship with the child. This visual trace representation of the therapeutic experience is a metacommunication. It is symbolic of the kind of expression, communication, and reappraisal of emotions that affect regulation entails. The metacommunication assists the therapist in sensing the nonverbal message sent by the client's RH. Such communication has been named a "special realm" (Schore, 2009, p. 178). It occurs via nonverbal micro communication, such as bodily movements, postures, gestures, facial expressions, and intonations. It is likely that this kind of communication is also infused with OXY release (Diamond, 2001). Nonverbal communication and its accompanying biophysical effects vitally inform the interchange between therapist, client, and artwork. This micro communication informs the syntax, semantics, and grammar of the therapist-to-client-to-artwork communication. Furthermore, it has been suggested that adults who maintain long-term secure attachments gain from repeated exposure to OXY, facilitating more rapid stress regulation (Diamond, 2001).

We suggest that art therapists look with their right brains at the art for positive therapeutic gains, as well as for signs of disrupted therapeutic alliances, relational security, and attachment (Chapman, 2014). These may take the form of refusal to make any art, or disconnectedness from the therapist. In these ways, the client's approach to the art, as well as the art itself, can provide insights into the dynamics of attachment and affect regulation. The art making processes provide unique opportunities for developing or sustaining affect regulation.

Experience III: Tree of Life

Drawing on our own experience, we ask each group participant to: "Create a tree of your development." Working side by side on a shared table, each pair of participants creates in a shared space. The co-creation between two close group members will hopefully lead to an experience of co-regulation. Each individual has his or her own paper and collage materials. Our ATR-N collage materials typically include brain-based images, such as neurons, the nervous system and bodily organs. Images of neuronal interlocking dendrites may help participants recall that optimal interpersonal exchanges can shape the social brain throughout the life span. Often, the artists will begin at the base of their Tree of Life and work upward through cutting, pasting, gluing, and drawing. The image of a tree lends structure to the directive, positively suggesting growth and mirroring the individual structure of a neuron branching out. As the participants work next to a trusted other, without talking, they often let the other use a glue stick, pause and look at their neighbor's work, and accommodate each other's movements. This response-based physical isomorphism mimics response art making. Response art making is a general term for using the art to respond to each other in dyadic interaction (Bush, 2012).

> *I figured out that the base of the tree referred to my childhood, and that each branch was expressing a part of my development. It became clear that relationships are the core parts that organize my life. This realization was echoed by my current relationship with Lisa, who was working right alongside me. I liked working next to Lisa as she seemed so focused and calm, and although I often looked at what she made and thought it was better than my work, her calm soothed me. I could then see that my work was progressing also. When we discussed our collages at the end, I really liked that she saw my tree as a strong tree, and I decided to call my collage,* I Can Bend but Not Break. Jonathan Chris

The Tree of Life directive is also applicable to older children and parent-child dyads co-creations. For example, therapeutically encouraging a parent and child to create side by side can offer a supportive environment for processing stressful memories, increasing empathic interactions, and shared meaning making. This directive brings forward reflections on personal memories within a relational context. It may evoke positive or negative childhood experiences and provide reparation. In childhood, a secure state of mind is experienced when children receive consistent attuned comfort and encouragement from a caregiver, especially when confronted with a stressor (Siegel & Hartzell, 2003). They experience pleasure and excitation in relationships and learn to find comfort in being with others and relating as they are in the process of learning novel information (Kravits, 2008a). When a child or adult creates an art directive, such as the Tree of Life, in the presence of a significant attachment relationship, they are better able to mobilize strengths (Proulx, 2002a). An emergent property of an attachment relationship, co-regulation can take on diverse forms such as eye contact, touch, smell, or cognition (Hughes et al., 2012). In the ATR-N context, the parent lends actual support in the form of helping with the media and emotional encouragement as the child builds representations of his or her world. Thus, current attachment intimacies and security are reinforced through an attuned connection (Siegel & Hartzell, 2003). Talking about the image further assists in the processing of memories, attitudes, and beliefs. In fact, telling the stories of our experiences is a lifelong process that supports integration of affect and cognitions (Siegel & Payne Bryson, 2012). Not only the child but also the parent can experience side-by-side support (Figure 5.4).

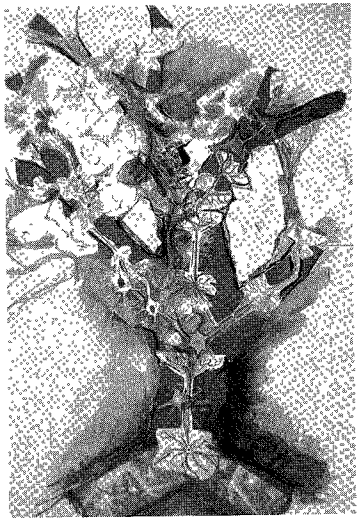


Figure 5.4 *The Tree of My Development.* Brown paper strips form the background for a collage of cutout photocopies of neurons with added accents in red and orange. Shading in blues and greens surrounds the trunk and highlights the spreading network of connecting neurons. Joanna Clyde Findlay

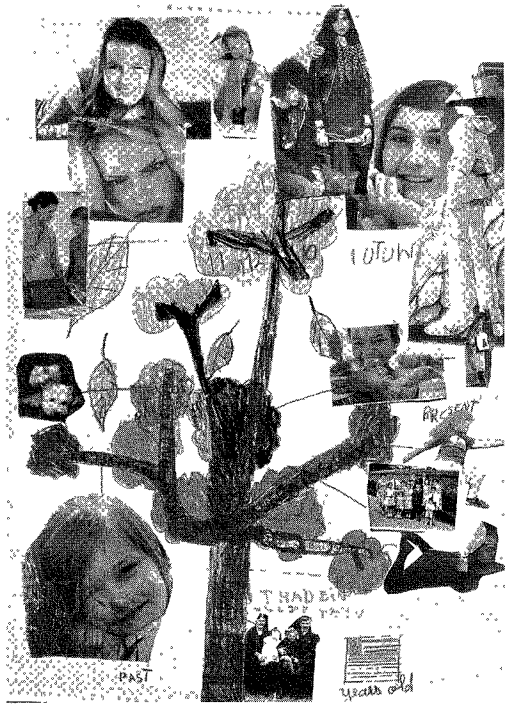


Figure 5.5 *The Tree of My Growing Up.* A green tree trunk extends upwards, becoming brown and gray. Autumnal colored leaves are clustered around the branches. At the branch ends the young artist also glued collage images of young girls at varying ages. Jean Clyde

As Joanna's nine-year-old daughter collaged, she seemed to be attracted to images of people from the collage box. She confidently drew her outlined tree and then decided to have the different branches refer to her significant memories. She placed her birth, and where she was born, at the base, and then identified starting school, getting a dog, and relocating at different ages. At each place, she selected, cut, and glued an image of an appropriately aged child. When she reached the upper parts, she grouped together ages 10 through 14 to express her concerns with the upcoming changes she foresaw. After completing the coloring of the tree with the autumnal colors of the day outside, she added the words past, present, and future, moving from the base to the treetop. The process of talking through her important memories and future concerns in the secure presence of her mother helped Joanna's daughter to manage her mixed feelings about moving to a new city and changing schools (Figure 5.5).

> *My brain felt fizzy going back in time. It felt unusual to do this. It came back to me. I am glad I went back and can remember sad and happy memories. I can see that my memories and feelings can be mixed.* Jean Clyde

The titling of the collage and the verbal processing are co-regulatory processes that can hold and integrate memories and emotions. A gentle discussion of the side-by-side experience and sharing of the work's title or story evokes co-consciousness and promotes shared meaning making. Co-creation within an affirming relationship can support co-regulation. In adults, this takes the form of shared consciousness. We suggest that intentional and attuned, side-by-side creation offers opportunities to practice the kind of micro regulatory social-emotional processes described in the literature (Gavron, 2013; Gillespie, 1994; Proulx, 2002b; Regev, 2014; Snir & Hazut, 2012; Tronik et al, 1998; Tronik, 2001; Tronik & Beeghly, 2011). Although this literature is for the most part focused on children, it applies to adults as well as it is likely that internal working models of attachment are involved. The sharing of the pairs' mutual experience and response art making contributes to increased feelings of social ease within the larger group.

Experience IV: Dual Drawing, a Response Art Regulatory Opportunity

Dual drawings provide an interpersonal opportunity to focus on the delicate interplay of nonverbal discourse; the space of the page becomes a shared and explored territory that can be redivided and redrawn. The marks and lines move toward and away from each other, as they may link, search, withdraw, conflict, or combine. The co-creators may seek or avoid eye contact; one person may lead, the other follow; the tempo may charge or wane; the gestures and movement over the page may bristle with emotion or flow in attunement. When the therapist and client make art together, they embody attuned AATR-N microskills. The therapist ensures that there is sufficient space for the client to create art without overusing the space, and symbolically lends emotional resources.

In pairs, seated across from each other with a large sheet of paper between them, we prepare for a role-play of a client-therapist dual drawing (Gillespie, 1994; Oster & Crone, 2004; Regev, 2014). Each pair receives a child age group and situation to role-play where they choose to use either oil pastels or markers. The pre-established situation is written up and provided to the pair without discussion, allowing all the group members to focus on their partnership. Each therapist and client pair agrees to choose one color and, either with or without a pre-established theme, draw together (Riley, 2001). Following the therapist's guidelines to: "Use marks in order to talk together or to imagine an ideal world together," they first draw without speaking or writing words (Figure 5.6).

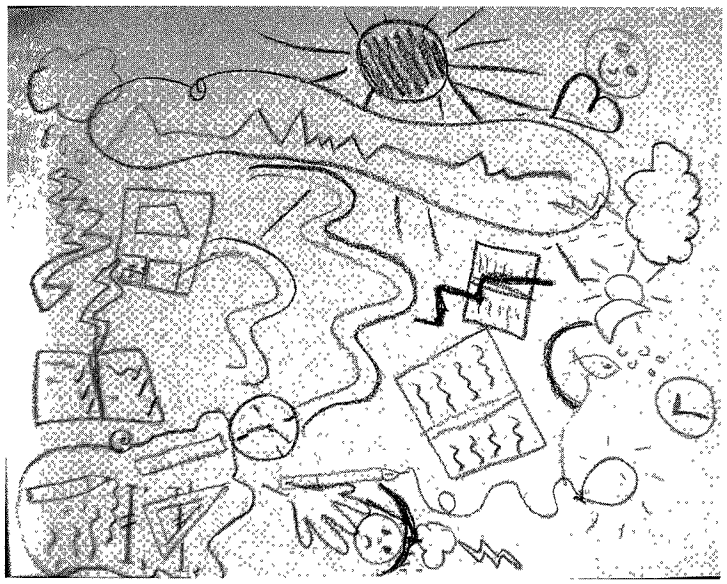


Figure 5.6 *There is Always Someone who Loves You.* Jean's worries about schoolwork are in blue lines while Joanna's comforting lines are in red. Joanna Clyde Findlay and Jean Clyde

I found this relaxing to do. I find that with homework, I have some good times and some bad times, but I know someone is there for me. Whenever I drew sad things, my Mum would draw happy things, which would comfort me. We understood each other without talking. Jean Clyde

At first I struggled with how to let my daughter know that the way I put my lines next to hers was to show that I was there for her. As she drew images of things associated with homework, I realized all I could do was show I had noticed, that I was there. I made an umbrella to shelter her from the storm, but she still drew clouds. It was a visual reminder that I cannot remove her experience of her problems, but I can be available to her. When we came up with our individual titles, she at first called the drawing The Good and Bad Bits of Homework, *and I named it* Being There for You, *but then I asked what we could call it together and I found her title a beautiful summary of our process:* There is Always Someone who Loves You. Joanna Clyde Findlay

Once the drawing is completed, the therapist and the child-client title the drawing separately, and then together, discuss and agree on a shared name and narrative. This titling represents a shift in acknowledging the shared process; it builds in reflective mentalizing and develops a co-created nonverbal experience. Titling is one way in which the therapist seeks to support the client. The role-play partners then discuss their specific exchanges.

The larger group then gathers in a semicircle to look at the images, which are laid out on the floor. The pair shares the dyadic nonverbal exchanges expressed in the visual traces on the sheets of paper with the group, making it a social experience. The lines and marks represent the pair's interactions, moving backward, forward, and across. While the experience may be felt with varying degrees of satisfaction, the pair is provided with the opportunity to describe their process and feelings as well as gain compassionate insight into each other's view. The felt experience is an interpersonal gestalt of regulatory relationships, and the image provides a safe depository for the process. This mutual experience models how the therapist and client use himself or herself, and the art making, to co-create attuned emotional states for the benefit of the therapy. Discussion of the shared creation of the art provides valuable feedback to each dyad and to the group (Figure 5.7).

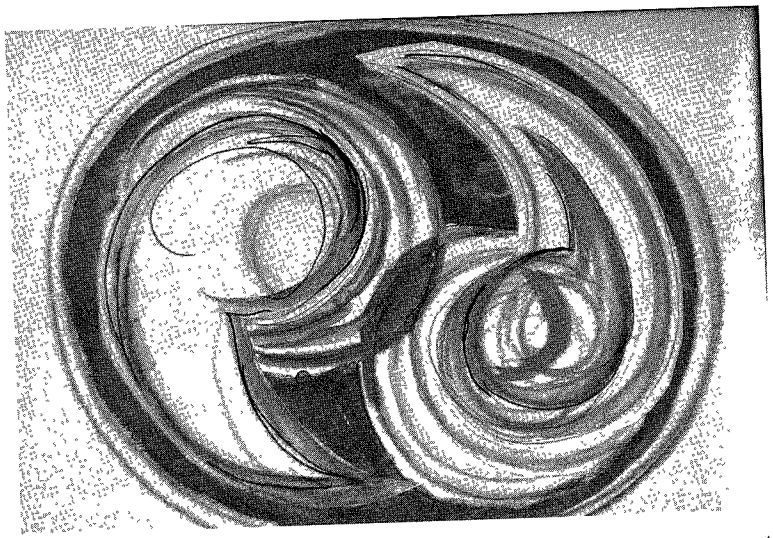


Figure 5.7 *Therapist-Client, and Partner-to-Partner Dance.* In my mind, this image is symbolic of how each person's capacity for co-regulation informs the whole. Embedded on a red background [illegible] and a light red-turquoise teardrop balance each other. Joanna Clyde Findlay

> *My partner was role-playing her feelings for me. I found paying attention to her, being there for her, and listening, just with my blue marker, very powerful. Sometimes she moved her red lines away when I tried to come near. If I made a squiggle echoing hers, sometimes she seemed to like it; sometimes I sensed I was too close. I really felt we were "talking." It was amazing how accurately we both experienced these lines and marks when we talked about it after.* Louise Smith

Within the therapeutic setting, mutual regulation of affect needs to be established. A complex, co-constructed procedure evolves between client and therapist (Tronick, 1998). This implicit process of matching, mismatching, reparation of communication, and regulation of physiological homeostatic states is co-created. Within the group, members are asked to take their dyadic drawings and respond with art making to the dyadic shared imagery and symbolism. Response art sharing within a group can be modified for individual work (Chilton, 2014; Franklin, 2010) and for mother child therapy (Gavron, 2014). Gavron's work is interesting as she has developed a variety of art directives to assess dyadic interactions and work with parent-child dyads.

Similar to verbal microskills, the skillful art therapist uses response art in order to query, clarify, interpret, solidify, consolidate, and express connectivity. This is a visual paraphrase and dialogue that embodies attunement. Response art done after session can also be brought to supervision (Fish, 2012) and back to session (Chilton, 2014).

As implicit dyadic states become explicit and co-conscious, shared meaning emerges. This embedded experience of coherent relating is then mentalized and generalized (Tronick, 1998). Thus what began as RH-to-RH intersubjective infant-mother communication evolves into adult-to-adult co-regulation. Thus co-regulation is both a concrete and mental property of the relationship itself and co-creates itself throughout the life span.

RELATIONAL NEUROSCIENCE: REGULATION

Co-regulation is associated with three interpersonal neurobiology topics and domains. The first is cortical specialization and hemispheric lateralization, specifically, connectivity between the RH and the LH. The second topic relates to how cognitive emotional interactions are expressed via bidirectional cortical-to-subcortical connections. This frontolimbic connectivity involves the AMY, PFC, and orbitofrontal cortex (OFC). Last, the neurochemistry of good-feeling neurohoromones, namely OXY, DA, and 5-HT, are involved in affect regulation.

Hemispheric Lateralization

Integrated functioning requires coordination of the RH and LH. While the RH and LH share more functions than is commonly believed, dominant lateralized trends are associated with each hemisphere (Carter, 2010). Each hemisphere processes inputs differently, provides specialized outputs, and sometimes competes with the other, and depending on the circumstance, we may call upon one hemisphere more than the other.

Developmentally, the RH dominates in infancy (Siegel & Payne Bryson, 2012). Visual-spatial RH skills are heavily involved in learning how to reach, crawl, or toddle. During middle childhood, the corpus callosum (CC), the wide band of nerves that connects the two hemispheres, enhances change and learning as it thickens, acting as an important neuropathway. The impact of such learning alters and changes neuronal growth and even survival. The LH progresses further during the second year of life, explaining the burst in language skills. By 18 months, the RH has enough sensory and motor maturation that children can focus their energies on the LH and hone their mental capacities. As the LH matures, first in the parietal and then in the frontal lobe, the language centers in the toddler's brain are connected, enabling them to engage in symbolic thought. Until children can use language for self-expression, they borrow the cognitive capacities of an adult to regulate affect and label their experience. Memories and thoughts that are separate from immediate sensory input are generated as the LH matures, allowing children to reflect, intuit, and connect ideas.

Lateralized Brain Functions

RH and LH functions may vary in different individuals, especially in those with histories of neurodevelopmental challenges or in those who have sustained an injury to one side of the brain, in which case the other side may compensate (Stiles, Reilly, Paul, & Moses, 2005). Yet, as a whole, each side of the brain is predisposed to handling certain types of task.

The four principal lobes, the frontal, temporal, parietal, and occipital lobes, are mirrored in each hemisphere. The lobes have shared functions and specialized-lateralized functions listed in the diagram. For example, both the frontal lobes control planning, sequencing, and abstract thought. The left is specialized for the production of speech and the right for the interpretation of facial expressions. In general, the RH favors visual and nonverbal perception and processing. The LH favors verbal analytical processes (Table 5.1).

The linear reasoning functions of language, such as grammar and word production, are often lateralized to the LH of the brain. The LH processes

Table 5.1 Left and Right Hemisphere Functions

LEFT Hemisphere	RIGHT Hemisphere
• organized, objective, cognitive	• implicit, felt social/interpersonal self
• explicit, linguistic self	• holistic, intuitive, synthesizing
• verbalizing, naming, and labeling	• divergent, random thinking
• verbal analytical	• language intonation and emotional emphasis
• logical reasoning	• gestalt processing
• detailed, linear, sequential processing	• kinesthetic
• abstract	• art and music processing in non-artists
• language	• nonverbal perception and processing
• speech/grammar production / syntax	• prosodic auditory and gestural signals
• language comprehension	• visual-spatial processing
• fact retrieval–computation, calculation	• hand-eye coordination
• decision-making processes	• mental rotation of physical shapes
• positive pleasurable experiences biased	• self-regulate social circuitry
• cause and effect	• recognition of facial expression
• avoidance	• negative experiences biased
• mid-range affect	• withdrawal
• neutral of affect	• high affect

verbal memory, language comprehension, and speech output. Fact retrieval and exact arithmetic calculation are left parietal region specializations. Art therapy directives calling for verbal processing of art activities call upon the LH's analytic verbal processing functions. Within the therapeutic relationship, talking about the art product and process may contribute to bilateral integration (Chapman, 2014).

The LH role in affect regulation involves labeling and verbalizing what has been experienced (Lieberman, 2007). Verbal processing seems to engage in a cortical shift from RH to LH, further modulating affect. The LH houses the individual's conscious, linguistic self, and processes information in a detailed, linear, sequential, language-based manner. The LH is implicated in decision-making processes and is more commonly responsible for processing pleasurable experiences (MacNeilage et al., 2009).

Holistic reasoning functions of language, such as intonation and emotional emphasis, are often lateralized to the RH (MacNeilage et al., 2009). The RH, which specializes in understanding the gestalt of things, processes visual, prosodic auditory, and gestural signals that can induce instant emotional effects. Sound and music as well as nonverbal color and sensory stimuli, such as paint, can provide a gateway to RH function as they stir up nonverbal feelings and memories. Through the right parietal lobe, the RH processes visual-spatial perception, involving hand-eye coordination and the

mental rotation of physical shapes in the environment. Thus the RH com prises the physical-emotional self of how we relate to and interact with our surroundings. The RH also coordinates an organized sense of the body in space, a function needed to effectively engage in art making.

The RH houses the social-emotional self and holds the frontal structures integral to the interpersonal sense of self, particularly in the right OFC (Schore, 2008). It is biased toward emotional stimuli and communication in a relational context. The OFC is essential in our capacity to self-regulate. This structure is imprinted by stressful misattunement in addition to stress regulating repair and reattunement in the early developing RH. The right OFC fronto-limbic circuitry is structured by one's emotional and social history. It is central to the ability to empathically understand the states of others and to be able to interpret their intentions. This is the social circuitry that contributes to co-regulation and which is activated by left-to-left eye gaze. In adults, the RH ultimately becomes dominant for the processing of social information.

The RH allows us to recognize facial expressions and changes of voice intonation in the context of emotions (Brück, Kreifelts, & Wildgruber, 2011; Schore, 2008). Attuned RH-to-RH communication allows access to unspoken emotions and supports the active development of affect regulation (Schore, 2003). Dominant in intuition, fantasy, and associational and holistic processing, the RH responds to cues from both internal and external stimuli immediately translated via limbic subcortical structures into emotions. In times of distress, strong affect is processed and communicated via the RH, which dampens LH language functions and logic. For example, speechless states and automatic reactions are characteristic of strong emotional responses. Depression has also been linked to a hyperactive RH. Research suggests that the RH is likely involved in withdrawing from life experience, whereas the LH is more involved in approaching the world (Wager, Phan, Liberzon, & Taylor, 2003). It is important that the therapist be able to communicate in RH language, especially because the RH dominates in avoidant fear-based reactions (Hass-Cohen, 2008a). The RH's extensive connections to midbrain circuitry, is associated with fear and joy. Therefore the RH is more immediately responsive to survival-based danger cues than the LH. RH-based interpretation of the world also forms the basis of our social experience throughout the life span (Schore, 2001b).

The LH functions in the middle range of affect and is biased toward prosocial emotions (Schore, 2001a). In order to achieve cognitive and emotional flexibility, the therapist may therefore encourage the fearful, RH-activated client to engage with art making. At the same time, the therapist may work with the LH-activated client to modulate his or her emotional avoidance

(Hass-Cohen, 2008a,). Image making may directly access the social-emotional self, providing the opportunity to process, self-regulate, and connect.

The art therapist can benefit from knowledge of the role of these brain regions and structures as they contribute to Relational Resonating and co-regulation. RH processes can be intentionally accessed via use of sensory-stimulating media, such as paint, using the left hand (for right handers, for smudging and erasing) and playing music. Sharing the art making space, creating alongside clients, and paying attention to nonverbal exchanges with clients can permit RH-to-RH attunement and reparative experiences of co-regulation. Calling on both RH and LH functions in the making and then the verbal processing of art making supports the development and stabilization of integrated responses.

Bidirectional Cortical Limbic Connections

Early life co-regulatory, face-to-face experiences develop the capacity for trust and self-soothing (Tronick, 2007). Multilateral brain processing supports the interactional co-regulatory experience associated with dyadic and individual meaning making. This integrated emotional and cognitive mentalization capacity uses mental representations for understanding and responding emotionally to others (Vrticka & Vuilleumer, 2012). Central to affect regulation capacities are the connections between the PFC regions and the AMY. Top-down, cortical regulation of limbic emotions contributes to affect regulation, and limbic emotions influence cognitions. The fundamental fronto-limbic brain regions include the OFC, dorsal regions of the PFC, the nucleus accumbens, the AMY, the hippocampus, and the insula (Hughes et al., 2012). The OFC is also implicated in fronto-temporal areas associated with cognitive mentalization, specifically the medial prefrontal cortex, the superior temporal sulcus (STS), and the temporoparietal junction (TPJ). Thus an understanding of a complex feedback loop of fronto-limbic and temporal regions has emerged as a cognitive-emotional amalgam (Vrticka & Vuilleumer, 2012).

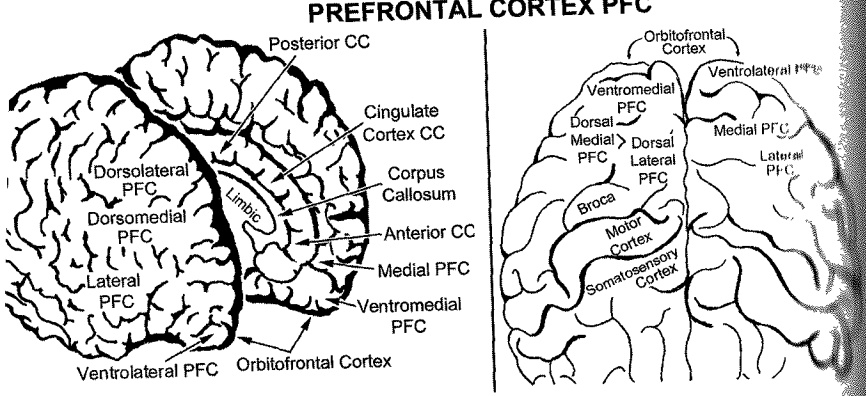
Prefrontal Cortex and Amygdala Connections

Connections between the PFC and the AMY serve to modulate response to such fear-based emotions (LeDoux, 2003). Located in the limbic system, the AMY is implicated in affect regulation, as it is responsible for the rapid nervous system fear response. There are direct neural connections between the AMY and the visual cortex, where the AMY prioritizes social-emotional cues received from the visual cortex. The AMY then automatically coordinates affective interpersonal learning experiences, processing facial expressions, and

(Schupp et al., 2007). Connected to the hippocampus, the AMY
ıippocampal-based memories of fear. In general, the PFC acts to evalu
tential threats that may be aroused by emotional triggers such as color
e, and shape (Hass-Cohen & Loya, 2008, pp. 99–101). The PFC
; the AMY's stress responses. Infants and young children with limited
:apacity rely on their parents to evaluate threat. They therefore must use
PFC resources when they have to regulate on their own than they do
ɔarental support. Thus, co-regulation conserves cortical resources. Across
'e span, adults and children with low expectations of co-regulation within
ıre relationship need to rely on independent self-regulation, which con
tes to a depletion of PFC resources (Hughes et al., 2012). This depletion
constrain development as resources and decision making are geared
rd survival.

itofrontal Cortex Neural Connections

:ific regions of the PFC have consistently been implicated in emotion
lation and decision-making (Phillips, Ladouceur, & Drevets, 2008). The
licated regions include the OFC and the dorsolateral prefrontal cortex
'FC), specifically the dorsomedial prefrontal cortex (dmPFC), the ventro
ral prefrontal cortex (vlPFC), and the anterior cingulate cortex (ACC
ıre 5.8).
Anatomical data support the hypothesis that the OFC may mediate the
ulation of important emotional information (Kringelbach & Rolls, 2004).
:onnects higher-order dlPFC regions, dmPFC, and subcortical limbic



The Prefrontal Cortex. The dlPFC, the dmPFC, the vlPFC, the OFC, the ventromedial

regions. The OFC is situated where the cortex and subcortex meet. Sitting at the top of the limbic system, just behind the eyes, it is part of a layered network of interconnected limbic regions, which include the AMY and the insula. The insula is considered the fifth lobe. Tucked behind the intersection of the frontal, parietal, and temporal lobes, it connects to physical bodily functions.

Research suggests that attachment experiences, including the nonverbal face to face transactions of affect co-regulation between caregiver and infant, directly impact the imprinting of the OFC (Schore, 2000). This fronto-limbic region, which is especially expanded in the RH, has a critical period of growth from around 10 months until the middle to the end of the second year of life. The OFC has a role as a mediator in the control of behavior. It is the bottom-down action of the circuitry in the right OFC that helps to dampen the AMY's reactivity (Phelps, Delgado, Nearing, & LeDoux, 2004).

A complex interplay between genetic, environmental, and epigenetic factors can form neural pathways that can result in dysfunctional stress regulation and fear appraisal strategies. The OFC systems in the RH can be structurally impacted by chaotic experiences of co-regulation in infancy (Schore, 2009). Such psychobiological changes alter the cortical top-down regulations of affect regulation. Under stress, the altered OFC inefficiently regulates the limbic physiological processes that underlie emotion. Vulnerability to later psychiatric disorders can be based in impairments to the cortical-subcortical circuitries of this prefrontal system.

Similar to the fronto-limbic circuitry, fronto-temporal circuitry also involves the AMY, striatum, insula, the cingulate cortex, and the hippocampus which have been identified as active in emotional evaluation and regulation. In addition, within the fronto-temporal areas, the mPFC, STS, the TPJ, and the OFC are dynamically involved in cognitive mentalization (Vrticka & Vuilleumier, 2012). The TPJ is at the juncture of the temporal and parietal lobes. Located within the temporal lobe, the STS activates in response to the human voice and is involved in the perception of gaze, emotion, and motion (Vrticka, 2012). Frontotemporal processes regulate and bias emotion-cognition interactions (Ray & Zald, 2012). Neural projections to and from the OFC, the dmPFC, and limbic regions contribute to the regulation of fear-based responses (Phillips et al., 2008). Thus, the OFC system monitors feedback about the current internal state and external changes in order to make assessments of coping capacity. In other words, the OFC has direct links to the autonomic nervous system, where it is central to the homeostatic regulation of bodily and motivational states, as well as to attachment-based affect regulation (Schore, 2009). Based on this review, the interconnection of cortical and limbic brain regions does not support the idea that cognition and emo-

tion form separate processes in different regions of the brain. Shifting cognitions and emotions combine, contributing to novel mental states (Salzman & Fusi, 2010). Moreover, emotional and cognitive linkages support adaptive social behavior.

Neurochemistry

Neurotransmitters, neuropeptides, and hormones (particularly OXY; dopamine, DA; and serotonin, 5-HT) are involved in attachment formation, mood regulation, and behavioral control (Stanley & Siever, 2010). Biologically, the fronto-limbic affect regulation system interfaces with reward-based neurochemistry. Part of the limbic-basal ganglia, the nucleus accumbens, receives major inputs from dopaminergic neurons, connecting experiences of affect regulation, pleasure, addiction, fear, and aggression (Carlson, 2013).

Oxytocin

Produced in the hypothalamus and stored in the pituitary gland, OXY is a neuropeptide found exclusively in mammals (Kalat, 2012). OXY has been implicated in a wide range of mammalian behaviors, including birth, breastfeeding, sexual behavior, maternal behavior, social bonding, and pair bonding (Sbarra & Hazan, 2008). In infants and adults, OXY and the endogenous opioids are implicated in the brain reward systems. Oxytocinergic activity in the hypothalamus, nucleus accumbens, ventral tegmentum, and AMY appear to influence attachment security (Hughes et al., 2012). The physiological reward systems link the neuropeptide OXY and the endogenous opioids in caregiving and pair bond behaviors, which help to regulate the autonomic nervous system and alleviate stress (Diamond, 2001; Machin & Dunbar, 2011). The influence of OXY in adult attachment has been conceptualized in several ways. It increases bonding of sexual partners, reinforces social behavior, acts as a conditioned stimulus in attachment, and attenuates separation distress. In adults, sexual and other intimate behaviors such as cuddling activate OXY and increase mesolimbic and prefrontal DA activity. These systems facilitate pair bond formation. The pleasurable aspects of the release of OXY and opioid system activity via social and sexual contact act as conditioned stimuli when paired with an attachment figure (Sbarra & Hazan, 2008). These associations strengthen and become internal working models through dopaminergically mediated experiences of security (Coan, 2010).

The epigenetic mechanisms, or gene-environment interactions, which can be induced by early life experiences, continue across the life span. In adults, the conditioned association between the rewards of OXY release and the presence of a specific person bears a strong resemblance to the opioid theory of

social attachment (Machin & Dunbar, 2011; Sbarra & Hazan, 2008). This model suggests that the rewarding effects of social contact facilitate learning and guide in attachment, making attachment bonds inherently pleasurable, reducing distress, and attenuating responses to social separation. In this way, the neurochemistry reinforces attachment behaviors and promotes resilience to the impact of stress. Impairments in the quality of early experiences seem to have different effects on the oxytocinergic system (Nolte, Guiney, Fonagy, Mayes, & Luyten, 2011). There appear to be gender differences in the effects of OXY; OXY output in the face of stress may be greater in females than in males (Taylor et al., 2000). The estrogen-enhanced antianxiolytic effects of OXY are especially evident in females and may operate to selectively influence women's tending and befriending behaviors. Yet the female need for repair behaviors, some of which may fail, can possibly lead to maintained stress responses over time (Sbarra & Hazan, 2008).

Dopamine

The ventral tegmental area, a group of neurons at the very center of the brain, plays an important role in reward circuitry using the neurotransmitter DA (Carr, 2008a; Kalat, 2012). The release of endorphins in the ACC also embeds attachment experiences in the frontolimbic circuitry (Eisenberger, Taylor, Gable, Hilmert, & Lieberman, 2007; Hughes et al., 2012). Endorphins function as neurotransmitters and are the body's natural opioids and painkillers. Most commonly associated with physical exercise, they are produced in the pituitary gland and stimulated by the hypothalamus, inducing analgesia and a feeling of well-being (Carlson, 2013).

Implicated in all reward-driven learning, DA is a neurotransmitter and a hormone. Movement-related actions, basic emotions, visceral functions, reward-based learning, and decision making emerge from three DA pathways: the mesolimbic, the mesocortical, and the nigrostriatal (Carlson, 2013). Mesocortical, mesolimbic DA pathway activation helps motivate feelings and desires and is associated with gaining knowledge and positive relationships. The mesocortical DA pathway modulates higher-order cognitive processes, assigning positive and negative values to emotions, ideas, and experiences. Mesocortical, nigrostriatal pathway neurons note errors while a person is predicting rewards. Error detection promotes assessing how to alter goal-oriented behavior (Carr, 2008a). DA pathways have been implicated in attachment research via repeated experiences of pleasure as a positive reinforcer in caregiver-infant bonding. Research on genetic influences on transgenerational patterns of attachment implies that anxious attachment is correlated with a polymorphism of the DRD2 dopamine receptor gene (Vrticka & Vuilleumier, 2012).

erotonin

he serotonin (5-HT) neurotransmitter is believed to contribute to main uining homeostasis and restoring internal functioning to baseline (Heisler et l., 2003). It broadly contributes to all aspects of behavior and cognition as vell as stabilizing perceptual and cognitive information. 5-HT neurons are lustered in the brain stem, the basal ganglia, the limbic system, and the neo :ortex (Carlson, 2013). Serotonin receptors are especially concentrated in the AMY and OFC. Well known for its involvement in mood and anxiety disor- lers, 5-HT has an inhibitory function that suppresses behavior. Food intake, olay, and sexual behavior are reduced when 5-HT levels increase. Levels of 5-HT are associated with trust and social relatedness, caring, and grief. The AMY is balanced by 5-HT, helping to reduce the intensity of the startle response. However, it is the balance between 5-HT and another neurotransmitter, norepinephrine (NE), that is important in emotional regulation. While 5-HT modulates impulsive behavior on a cortical level, NE makes the person respond to danger. It appears that raised NE levels and reduced 5-HT levels caused by early life stresses may lead to impulsive adult behavior (Hart, 2008). Variations in the 5-HT transporter gene are implicated in attentional biases. An individual's stress response pattern, including 5-HT action, can be a risk factor for the development of anxiety disorders, which affect attachment patterns (Nolte et al., 2011). Epigenetic processes, or the expression of genes as influenced by experiences and the environment without altering DNA sequence, are increasingly understood to affect the manifestation of early attachment experiences. Avoidant attachment has been associated with a variability of the $5HT_{2A}$ which is a serotonin receptor gene (Vrticka & Vuilleumier, 2012).

CREATE PRINCIPLES AND CLINICAL APPLICATIONS

The primary focus of the ATR-N activities in this co-regulation chapter is the CREATE principle of Relational Resonating. The work focuses on social-emotional co-regulation and co-creation. Image making may directly access the social and emotional self, providing clients with opportunities to process emotions, co-regulate, and self-regulate. We highlight RH function in My Right Hemisphere as central to affect regulation. Affect regulation is mediated by social connectivity.

Relational Resonating ATR-N nonverbal microskills engage the RH and encourage nonverbal RH-to-RH communication, which is central to the development of attuned contingent communication. We have operationalized Relational Resonating to mean co-creation, co-consciousness, and meaning making. We describe a sequence of ATR-N directives, media, and processes

that promote Relational Resonating. First, working with color can shift attention to the RH's propensities and sensitivity to a gestalt of sensory information. Listening to quiet scribbling and some background music, and considering art making sounds during the Dual Drawing responsive art making or co-creating of images privileges RH auditory processing. The second directive to draw the dynamic flow between mother and child, Right-to-Right Hemisphere Communication, expands the focus of the experiential to social-emotional processes. During this time, smudging and erasing with the left hand actively promote RH function and track and mirror Relational Resonating. During nonverbal Dual Drawing, marks, gestures, pace, space, rhythm, and eye contact support the development of co-communication skills. Working with clay, extenuates this reflective mentalization (Bat Or, 2010). Third, working side by side to make a personal Tree of Life collage of autobiographical memories further enhances Relational Resonating. Art responses in the shared space give rise to synchronized, coconscious states and enhanced meaning making. Sharing art materials and a creative workspace reinforces attuned nonverbal RH-RH support as well as shared consciousness and meaning. Finally, taking turns to draw in silence during the Dual Drawing encourages reciprocity and RH attunement. Reaching out across the page and sensing whether or not to touch the other's forms during Dual Drawing embodies attuned RH-to-RH communication. Once implicit attunement and understanding are established, titling and discussing the art provides explicit support for the LH cognitive and verbal functions.

Being seen, heard, listened to, and felt by others reinforces clients' affect regulation skills. Sharing art making space, creating alongside clients, tracking nonverbal exchanges with clients, and explicating the processes provide reparative relational experiences. In addition to the responsive art, verbal responses can augment hemispheric connectivity. Knowledge of hemispheric bias allows art therapists to encourage the RH-activated client to express percolating emotions, while engaging in verbal communication, and to work with the LH-activated client to modulate emotional avoidance. This integrative work is supported by client-therapist in-session response art; the therapist responds both verbally and nonverbally in the art to the client's emotive or cognitive expressions. The therapist can also take notes to accurately reflect on the verbalization that was taking place at the same time that the art making was happening. Post session, the therapist's self-art making and the review of transcripts can support the therapist's hemispheric integration.

Embodied Creativity art activities help recall co-regulated moments and life experiences. Prompting a mother to recall holding her infant can bring on strong memories; it activates an IWM of holding, being held, or wishing to be held. Creative embodiment is associated with movement. Fine motor

vements, such as leaning forward, moving away, looking up, or meeting other's eyes, encourage this mentalizing. Representing symbolic and ual movement, art that is made by smudging with the non-dominant ıd or with both hands, can arouse these memories. Experiencing and repenting positive bodily communication can start a reparative process for ents recalling negative experiences as it sculpts the brain memory centers to onsolidate the memory differently.

Expressive Communicating of emotions is critical to self and co-regulation reenberg, 2011). Implicit and explicit interactions are supported through e use of color, tactile smudging, tangible collage images, and content-rich rectives. Opportunities to practice affect regulation of emotions are prolded throughout a sequential process. For example, silent expectations and nsion that are built up during the Dual Drawing directive which intensify noting stimulate the need for emotional expressivity. Released during the scussion of the drawing, verbalizing this expression contributes to a sense of notional togetherness. Similarly, using the non-dominant left hand can ontribute to both the expression of the anxiety, confusion, and positive joy ıat this experience provides. It is during this process that negative emotions an spontaneously be transformed into positive ones. We also use listening to ıusic as a way to stimulate emotional responses.

These ideas also serve to promote Adaptive Responding. As described, the lirectives can be stressful for some individuals. When these challenges can be esolved, resiliency is supported. The invitation to add color to a drawing can e demanding for some clients as it exposes personal or emotionally vulıerable meaning. The opportunity to discuss this experience and label the ıroused feelings can increase a sense of control. Additionally, as previously liscussed, sketching the mother-child relationship in Right-to-Right Hemisphere Communication can create tension. Clients, whether mothers or children, can find themselves personally implicated as they may question and reference their own experiences as mothers or of being mothered. Smudging and tracking allow for active changing of the art, which can support a sense of current mastery and internal control. Co-creation also models how communication can be altered.

The challenge of holding an entirely nonverbal exchange based on marks and gestures during the Tree-of-Life and the Dual Drawing activity can be stressful. Participants can doubt their ability to nonverbally read their partner's drawing or be present during these dyadic experiences. Making, and then processing, autobiographical memories in one's Tree of Life within a secure relationship provides opportunities for tolerating difficult memories and leaning on a trusted other's support. Working alongside, or with, a trusted other can ease anxiety as it offers an opportunity to reduce the need

to rely on self-resources. Subsequently the discussion of experienced secure attuned interpersonal interactions within a like-minded group of people can facilitate beginning changes in social relating. For example, while visually telling one's personal story with trusted others can aid in self-acceptance. Thus, safe exposure of personally meaningful material within small groups permits participants to progressively build trust within the community. Similarly, the dyadic joining with a family member can be greatly supportive and reinforces reflection, flexibility, and coping. Dyadic work activities such as collaborating to choose a title and post-drawing discussion allow for restitution of troubled connections. In summary, the relational-based ATR-N directives can interrupt the automaticity of anxiety and/or fear-based responses. This may allow higher cortical structures to inhibit and help recondition such reactivity and contribute to the capacity for self-regulation. Repeating such experiences may over time inhibit and help recondition fear-based reactivity and contribute to earned self-regulation.

The CREATE principle of Transformative Integrating is demonstrated by the sequence between the experientials and structured processes within each directive. There are two sequences that promote an integrated autobiographical sense of the social-emotional self. The first moves from representing the intrapersonal social-emotional self (drawing the RH) to IWM representations (mother-infant drawing). The second sequence gives opportunities for co-created implicit and shared meaning-making experiences (mother-child drawing and dual drawings). Several processes within each directive promote lateral and vertical brain integration. Adding color, which is associated with the expression of emotion, to the pencil drawings of the brain helps integrate cognitive and emotive brain centers while consolidating a more expressive understanding of the self. During the mother-child and dyadic drawings, engaging in nonverbal art making, and then in the verbal titling and discussion of the art, contribute to integration of lower ventral brain regions with higher dorsal ones; ventral areas are associated with implicit emotional, cognitive, and interpersonal functions and dorsal ones with explicit function. Likewise, shifting from the nonverbal gestalt of understanding a partner's drawing in the Dual Drawing directive to processing it verbally with the person promotes RH-LH integration.

The CREATE principle of Empathizing and Compassion is central to the experientials of this chapter. Right hemispheric emotional recognition as well as nonverbal communication and expression of emotions pertains to our capacity to understand and empathize with another's emotional experience. Moreover, the group context for art making supports developing a more vibrant empathic appreciation of the differences and similarities of relational experience and creativity. The ATR-N dyadic pairing interventions and pro-

cesses described can support such sensitivity and attunement. For example, participating in nonverbal Dual Drawing directs attention to how body language, hand gestures, and marking work in sync with one's facial expression, allowing the whole body to convey meaning. Next, gently negotiating the subtleties of creating alongside another in an intimate space, sharing materials, and accommodating another's movement invites mutual consideration and compassion.

Witnessing and discussing the caregiver-child and dyadic drawings facilitates an appreciation of different ways in which implicit attachment can manifest. Perhaps it is the novel experience of nonverbal engagement that can provide a shift toward empathy, especially for clients who are more familiar with engaging in verbal confrontation. Experiences of co-creation can further promote empathic awareness at the level of meaning making and co-consciousness as shared representations are mutually understood.

CHAPTER 6

Relational Resonating: Autobiographical Memory

The year that our youngest, third daughter was born marks the number of years that we have lived in the United States of America, so a quarter of a century and growing. . . . It never ceases to astonish me how long it has been. Some time ago, my cousin asked me if I recall the time she came to visit us in Jerusalem. Our eldest, our son, had just been born. I did not remember. It was the first time that I realized that much of my autobiographical memory of events, whether here or in my country of origin, has been washed away by the impact of our migration. Rather than events, I remember people. Events are veiled by a swishy mixture of grays; a landscape of fluffy clouds. Overall, I have an excellent memory. For example, I can easily recall the art of my clients, and I love and can easily recall information. I tell myself that what is important is that I remember people and can easily recall and bring up the comforting memory of relationships. Noah Hass-Cohen

AUTOBIOGRAPHICAL MEMORY PROVIDES a comprehensive context for further exploration of the CREATE principle of Relational Resonance. Ideally, autobiographical memory is a contained and coherent organized sense of one's history and sense of self. Comprising sensory felt and contextualized memories, and individual emotion-based events, autobiographical recurring memories tend to be abstract, familiar, and integrated (Buck & Alea, 2005). Autobiographical memories are generally organized as a series of personal episodes that are tied together with temporal, visual, and spatial associations. Across the life span, these self-defining memories are mental signposts of our experiences within a specific time and context. Thus, autobiographical memory holds our unique sense of self in the past, present, and future.

Autobiographical memory is theorized to serve three functions: self,