It’s fascinating to learn what’s happening in our brains as we feel accepted or rejected by people closest to us or important to us. What’s happening in our brains as we experience a sense of connection and belonging or disconnection and isolation. (You may have experienced reactions in your own brain as you even read words like acceptance or rejection or experienced either one so far today.)

While we hope it’s Love that makes the world go round, it IS human beings relating to one another that makes the world go round, either keeping it healthy and viable one generation to the next or threatening to destroy it.

Relating to one another, one on one, couples, families, or in larger social groups, is the most complex thing human beings do, more complex than writing a symphony or running a government or solving global warming, and the need to relate, to be emotionally and socially intelligent, has driven the evolution of the human brain to be the most complex anything in all of existence.

It becomes important, as clinicians, to understand what’s happening in our brains, ours and our clients, in the therapeutic relationship, to understand what attachment theory and research over the last 50 years and modern neuroscience of the last 20 years are telling us:

1. our earliest relationships actually build the brain structures we use for relating lifelong;
2. experiences in those early relationships encode in the neural circuitry of our brains by 12-18 months of age, entirely in implicit memory outside of awareness; these patterns of attachment become the “rules”, templates, schemas, for relating that operate lifelong, the “known but not remembered” givens of our relational lives.
3. when those early experiences have been less than optimal, those unconscious patterns of attachment can continue to shape the perceptions and responses of the brain to new relational experiences in old ways that get stuck, that can’t take in new experience as new information, can’t learn or adapt or grow from those experiences. What we have come to call, from outside the brain looking in, as the defensive patterns of personality disorders. What one clinician calls “tragic recursive patterns that become encased in neural cement.”
Fortunately, the human brain has always had the biologically innate capacity to grow new neurons – lifelong – and more importantly, to create new synaptic connections between neurons lifelong. All of us can create new patterns of neural firing from new experiences. All of us can pair old even maladaptive patterns with new, more adaptive, patterns of neural firing. All of us can all create new neural circuitry, pathways and networks that allow us to relate, moment by moment in new, healthier, more resilient ways. All of us can store those new more adaptive patterns in both the structures of explicit memory, making them retrievable to conscious awareness and conscious healthy functioning, and in the structures of implicit memory, making them the new habits of relating.

This neural plasticity of the brain was confirmed by neuroscientists in the year 2000. That’s just 8 years ago. Modern neuroscience IS new. All the new technologies that allow us to see what’s happening in the brain, as we think of a loved one or plan what to have for lunch, are new.

90% of what we know about how the brain works has been learned in the last 20 years. Dan Goleman wrote in his introduction to *Social Intelligence*, which came out last year, that most of the understanding we have about the neurological substrate of things like empathy, emotional regulation, the effect of trauma on explicit memory, interoception – how we know what’s going on in our bodies …..hadn’t even been discovered yet when he wrote *Emotional Intelligence* 10 years before.

In that time there’s been an explosion of discoveries relevant to addressing the wounds of less-than-optimal attachment: the social engagement system of the brainstem, the fight-flight response of the amygdala, mirror neurons, bonding hormones, the social-emotional bias of the right hemisphere, the positive bias of the left hemisphere, the role of the pre-frontal cortex in attunement and learning the “rules” of attachment, the resonance circuits we can use in empathic therapeutic relationships to catalyze brain change in our clients.

The more we can become comfortable applying these discoveries to our interventions with clients, and the more we can learn specifically which interventions will most effectively accelerate change in our clients’ brains for the better, the more immediate and enduring our therapeutic interventions will be.

Interpersonal neurobiology, pioneered by Dan Siegel at UCLA, is a new field attempting to bridge the discoveries of neuroscience to the clinical world. Much of what I am presenting here has been informed by the trainings and writings available in this field, especially from Louis Cozolino’s book: *The Neurobiology of Human Relationships: Attachment and the Developing Social Brain* and Bonnie Badenoch’s new book, just out this summer, *Being a Brain Wise Therapist*.

This article offers recent research findings, new hypotheses and theories, but also practical skillful means to incorporate into your ongoing work with clients. I’m hoping all of this rings true to experienced and dedicated clinicians at the level of common sense. I’m aware of three things as we begin.
1. All theoretical orientations have their own lenses about psychopathology and therapeutic healing, with their own vocabularies. Both attachment theory and neuroscience give us new lenses with which to view our clients and our interactions with them (not contradictory, quite complementary) and also new vocabularies. Soon there will be a glossary available as an appendix to this article to clarify terms and concepts in a big download of information.

2. We all have the brains we are going to be learning about here, and we all have one or more of the attachment patterns we are going to be learning about here. We are human. So, it’s possible that this material can trigger thoughts and feelings and defenses about our own experiences even while we are applying this to our clients. I hope to call upon your own considerable experience with these processes to stay well within the window of tolerance.

3. I attended a daylong training in the neurology of awakening recently, taught by neurologist Rick Mendius and clinical psychologist Rick Hanson. Rick Mendius suggested so much of what we are learning about the brain is so new, tip of iceberg, to talk about this at all we have to be comfortable “venturing into error”. I love that. We are venturing into error together.

1. The brain is a social organ, developed and changed in interactions with other brains

We begin with the brain, understanding now that the brain is a social organ, developed and changed in interactions with other brains.

There is nature; we are genetically programmed to walk, talk, learn to share, recognize an “I” separate from “you”, on a developmental timetable. That development, however, is always stimulated or kindled by experiences we have in interactions with other people, other brains. It IS interacting in relationships that stimulates brain structures to activate and mature. This is true on the individual level and on the social level.

On the individual level, the neurons in the limbic regions – the seat of our emotional learning that is foundational to our subjective sense of personal and social self – are not fully connected at birth. They are genetically primed to form synaptic connections through the relational experiences we have with those closest to us. Caregivers activate the growth of those regions of the brain – through emotional availability and reciprocal interactions. This includes the hormones of bonding and pleasure that are released in intimate and contingent relating. That is nurture.

Patterns of energy and information laid down in these early moments of meeting develop the actual structure of these limbic regions. This means that the very foundations of perception, particularly in regard to relationships, relies on the quality of these earliest interactions with our parents. *It is essential to understand experience dependent maturation of the brain to understand the importance of early attachment experiences to shape the brain and our patterns of relating and to embrace the power of new attachment relationships in therapy to re-wire the memories learned with this part of the brain.*
At the social level, it is now hypothesized that the need to communicate, non-verbally and verbally with fellow members of our clan or tribe on the savannah to survive, is what drove the phenomenal growth of the cortex in humans – the “higher brain” with all of its amazing capacities of empathy, consciousness, planning, language, thinking, discernment.

So it’s not just that we have empathy because we have the pre-frontal cortex in our brains but that we have highly evolved complex brain structures like the pre-frontal cortex because they are developed and matured by empathy. As Cozolino says, we are not the survival of the fittest; we are the survival of the nurtured.

This highly evolved human brain is the most complex structure and the most dynamic process – noun and verb – in existence. 100 trillion cells in 3 pounds of firm tofu between our ears. Of which 100 billion neurons are gray matter that are the working clipboard of the brain. Each gray matter neuron is capable of connecting with – and communicating with – 7,000 – 10,000 other neurons. Those who have done the math have calculated that the number of synaptic connections – and thus neurochemical messages – possible in each human brain is 1 to the millionth power, numbering more than atoms in the universe [estimated at 1 to the 80th power].

These brain cells fire 10 – 100 times a second, sending neurochemical transmitters across the synaptic cleft to be received by another neuron. In one hand clap, billions of neurons fire in our brains. So the brain operates in a dynamic oscillation of a fraction of a moment of firing, a fraction of a moment of quiet, a moment of activity, a moment of rest. There is a moment of change, and there is a moment of stability. These oscillations are integrated across brain structures, from the bottom up and top down and right-left and other ways, too, to create continuity – yet flexibility – of self, other and relating.

These oscillations of stability and change are what underlie neural plasticity. And they are what allows us to use moments of change in the brain to help clients change their lives.

How the brain works… how relational learning works

Any experience cause neurons in our brains to fire. Repeated experiences cause neurons to fire repeatedly. Neurons that “fire together wire together,” strengthening neural connections. Strong neural connections become neural pathways and neural networks. This experience-triggered neural firing is how ALL neural pathways become patterns of response, and how all structures of the brain mature. This is how all patterns of attachment are laid down in the brain; it is also how they can change.

I’m sure many of you by now are familiar with Dan Siegel’s hand model of the brain. The arm and wrist are the spinal column and brainstem of the brain. The brain stem regulates the internal homeostasis of the body: heart rate, respiratory rate, digestion, through the autonomic nervous system (ANS) – the extension of our brain throughout our body. The ANS has two branches, the sympathetic (SNS) of arousal and the parasympathetic (PNS) of calming.
These two, arousal-calming, gas and brakes, are part of the completely unconscious social engagement system that regulates the energy level or vagal tone of our bodies. Too much SNS and too little PNS, we feel restless, agitated, stressed, all the way to panic attack. Too much PNS and too little SNS, we feel slow, lethargic, numb, all the way to collapsing in a faint. When there is a balanced vagal tone, we are happy campers.

When we feel safe in relationship, we stay within our window of tolerance and our cortex stays functional. When we perceive threat or danger, the SNS arouses the amygdala to prepare for fight or flight. We can experience this as an emotional hijacking; our rational self temporarily nowhere to be found. When we perceive a life threat, the PNS calms down everything, down to the point of shut down. We go numb and freeze.

We share these functions of the brain with all life forms down to reptiles; there’s no consciousness awareness yet; there’s no attachment going on here yet. Though, with conscious awareness later, when we say someone makes us sick to our stomach or someone is breaking our heart, it is information from the internal regulation of bodily states that unconsciously informs that subjective experience.

Next, the thumb, folded into the palm, one on each side actually, represents the mid-brain limbic regions, sub-cortical but just a few cell layers away from the pre-frontal cortex (PFC). The most well-known structure of the limbic system is the amygdala, almond shaped structures of perception-appraisal-response. Our 24/7 alarm center, constantly scanning the environment for threat or danger, even in our sleep. The amygdala generates the fight – flight response, very important to attachment. We share this with mammals and birds.

The amygdala is also the core of our interactive social processing and the center of our emotional learning. The amygdala assesses every experience, including relational experience, for safety or danger, for pleasure or pain, and pairs each experience with an emotional valence, an emotional charge, positive or negative, that makes us approach or avoid similar experiences in the future. The more intense the emotional charge, the more neurons will fire in our brain and the more likely we will register the experience in implicit memory.

Any such experience that is also processed with the conscious awareness of the cortex can be stored in explicit memory. We consciously learn to approach or avoid this or that person or emotion again. But the amygdala itself operates below the level of the cortex, below the radar of conscious awareness, and it stores all of its responses to experience in implicit memory, outside of awareness.

The amygdala operates much faster than the more complex cortex – 200 milliseconds to trigger fight or flight rather than the 3-5 seconds of the cortex that notices we just got in somebody’s face or bolted out of the room just precious seconds before. So the processing of the amygdala does not have to come to our awareness for an experience to register and be stored in our implicit memory. 80% of the time it doesn’t.
Here’s the zinger about all this. Any emotional-relational-social experiences that are processed before the brain structures that can process experience consciously are fully mature, before 2 ½ -3 years of age, those experiences are stored only in implicit memory, only outside of awareness. This includes ALL early patterns of attachment. The research has proven “beyond irrefutability” that attachment patterns stabilize in our neural circuitry by 12-18 months of age. They are stable and unconscious before we have any conscious choice in the matter and unless new experiences change them, will remain stable “rules” of relating well into adulthood.

Unfortunately, for purposes of attachment, Cozolino suggests that because the amygdala is the structure of both our social emotional processing and is our fear center, the negotiation of relationships and the modulation of fear so overlap, our earliest relating, our earliest implicit experience of self can have a bias toward the negative. Because, evolutionarily, members of our species who were nervous, anxious, on alert, tended to survive. Those who are nice and mellow got eaten.

The hippocampus, one on each side of the temporal lobe near the ears, are part of the limbic system but as they mature, at about 2 ½ years of age, they begin translating experience into explicit memory, a vital link to cortical functioning. With explicit processing, conscious processing, we begin to remember our experiences, including relational experiences from 2 1/2 – 3 years of age on. So, the temporal lobe of the cortex is where memories of attachment experiences are stored, consciously and unconsciously; it’s where they get stuck, and when brought to consciousness, where they can change.

The hypothalamus located deeper in the limbic system releases many different hormones to regulate the amygdala. A very important one, that researchers have begun to understand more fully in the last 5-10 years, is oxytocin – the bonding hormone that is released through touch, warmth and movement, such as breastfeeding and orgasm. Oxytocin calms the amygdala, it can spur the pre-frontal cortex to grow GABA bearing fibers down to the amygdala and quell the fear response. Why hugs make us feel safe and bonded to the person who is helping to release oxytocin in our brains.

We are learning that even a visual image of someone we love or feel safe with can release oxytocin in our brains. Since imagining something is as real to our brains as seeing something for real – i.e., the same neurons fire if we imagine a banana as when we see a banana for real – remembering people who have given us unconditional love, or our clients remembering us giving them unconditional positive regard, can release oxytocin and calm down the fear center.

I can share an example of this from my own experience. In July 2003, I chose to have lasik eye surgery to correct lifelong near-sightedness and astigmatism. The operation is risky, so I went into the operation with considerable anxiety. I had asked friends to think of me on the day of the operation, at the time I was actually in surgery, so I felt
resourced and not alone during the procedure. I had to remain conscious during the operation and focus my eyes on
the light beam above me so the laser could track exactly where to remove the fluid in the eye which would re-shape
the cornea and create the lens that would allow new 20-20 vision. So, while lying on the gurney staying as still as I
could be, I thought of all my friends thinking of me, taking in the sense of love and caring I knew was being sent my
way.

About 10 minutes into the operation, quite suddenly, all sense of anxiety ceased completely. I was flooded with a
sense of love and belonging that was quite over-powering. There was nothing to be afraid of, nothing at all.

This serene peacefulness lasted until the surgery was finished. It lasted for the next 8 months. I was aware that, in
situation after situation that would have caused anxiety in the past, I was not feeling any anxiety. Just feeling aware
and moving right along.

I had a chance to ask Dan Siegel about this experience at an attachment conference at UCLA the following spring.
He told me that, indeed, the pre-frontal cortex can grow neuronal axons down to the amygdale; it’s only a few cell
layers away. And these neuronal fibers can carry GABA (gamma butyric acid) down to the amygdala; the GABA
will extinguish the fear response.

Later I learned about the role of oxytocin, the bonding hormone I released in my brain by concentrating on feeling
so loved by my friends, to activate this pro-active, regulatory response of the pre-frontal cortex.

The back of the hand and the fingers, folded over the thumb down toward the bottom of the palm, represent the
cortex of the brain – the “higher” brain of the “clever apes.” The cortex has many lobes specializing in many
complex functions; these functions must be integrated for healthy relational functioning. Occipital lobes in the back
of the brain for visual processing, parietal lobes in the mid-back region, the right side for location of body in space,
the left side for the boundary of self and other. The sensory motor strip just in front of the parietal lobes that feeds
information about the body. The temporal lobes on the side of the head, the site of auditory processing, speech
comprehension, language and memory. The frontal lobes in the front of the brain for attention and concentration,
organization and planning, abstract thinking and reasoning, judgment, decision making, creativity.

It’s the last two knuckles of the middle two fingers, curled over the limbic region (thumb), that are essential to the
complex cortical functions of emotional regulation and empathy, essential to understanding and changing patterns of
attachment. The structures that make up the middle pre-frontal cortex (MPFC) – the ventral (front) medial) (middle)
and orbitofrontal (behind the eyes) cortices and the anterior cingulate (even closer to the limbic regions) which
focuses attention, are what make up the social brain. The middle pre-frontal cortex IS our social brain. Only a few
cell layers away from the limbic regions, it is what regulates or overrides the rapid emotional signaling and response
of the amygdala. The dorsal lateral pre-frontal cortex on the sides of the frontal lobes, (the knuckles of the little finger) is the area of working memory, the chalkboard of the brain, where we can retrieve stored memories into conscious awareness and play with them. Where we can reshape than with new experiences before re-storing them in structures of memory.

How relational learning works
John Bowlby, British psychoanalyst, founder of attachment theory, hypothesized that attachment is all about safety and protection and emotional regulation in times of perceived threat or danger. Attachment is part of a 3-part motivational system of fear–attachment-exploration. Fear triggers attachment behaviors. The safe haven of secure attachment soothes the fear of the amygdala, and opens exploration. (rapprochement and bye- mom!) Exploration eventually bumps us into something that triggers fear again which shuts down exploration and triggers attachment behaviors again which soothe the fear again and open exploration cycle of safety-exploration again.

It has been amply demonstrated by Allan Schore that the need for emotional regulation is what drives attachment behaviors. Affect regulation is the engine of attachment and attachment is what drives the development of the pre-frontal cortex, the brain structures that do that. Dan Stern and Peter Fonagy have amply demonstrated that it is the need for empathy, the need to be seen, understood and reflected that drives the intersubjectivity that develops theory of mind. I know that you know what I know and I know that you can also know something different than what I know.

So how parents – and therapists – use empathy and bonding and reflection to regulate fear, anxiety and shame, and soothe the firing of the amygdala, and help the other discover who they are by seeing and accepting them first, this attunement and feedback are so very determinative of attachment patterns and are a crucial part of their healing.

So, even before consciousness develops, the parent is regulating the emotions of the baby through their own pre-frontal cortex, brain to brain regulation. The baby is “borrowing” the PFC functioning of the parent to regulate their emotions. And the baby is introjecting the reflections of who they are from the parent to develop the internal working models of who they are in relation to the other. As the baby’s PFC develops from these experiences, they can begin to regulate their emotion on their own. They can begin to have self-awareness and self-reflection on their own.

The 9 functions of the pre-frontal cortex are:

1. regulation of body – SNS-PNS balance
2. attuned communication, felt sense of other’s experience
3. regulation of emotions
4. response flexibility – pause, options, evaluate options, appropriate decision
5. empathy
6. insight – self awareness
7. fear extinction – GABA fibers to amygdala
8. intuition – deep knowing without logic
9. morality – behaviors based on empathy.

Research has shown that 7 of the 9 functions of the PFC are outcomes of secure attachment. Research also shows that all 9 functions are strengthened in mindfulness practice, internal attunement rather than interpersonal attunement. So a therapist’s mindful awareness of their own internal states strengthens the same pathways of the brain we need to become aware of another person’s internal states. (Mindfulness and psychotherapy is another article.)

The laterality of the two hemispheres of the cortex is important here. The right and left hemispheres of the brain develop at different rates and specialize in different functions, allowing a much greater complexity of functioning than if they were duplicating each other. The right hemisphere of the brain grows larger in volume and more rapidly than the left, from before birth through 18 months of age, which completely coincides with the developmental timetable of when attachment patterns are being stabilized in the brain. These patterns of attachment are stored in our memory in the mode of RH processing. The right hemisphere processes experience differently from the left – non-verbally through body sensations, visual images, emotions, and holistically – it processes the gestalt of someone’s face or energy globally, all at once, rather than in a linear data bit by data bit mode. The right hemisphere is where we get our “gut” intuitive sense of things and the gestalt of things as a whole. The right hemisphere is the seat of the social and personal self. The right hemisphere regulates the sub-cortical limbic system and is dominant for social-emotional processing. Our attachment patterns are stored in this mode.

The left hemisphere is developing all along but goes through a growth spurt from 18 months to three years of age and becomes dominant after that, except for a period of re-organization during adolescence when the two hemispheres battle it out for dominance. Why, with the amping up of hormones, too, adolescence is such a stormy period. This adolescent period coincides with the need for attachment patterns to change, moving the focus from leaving parents to focusing on peers and forming one’s own family. The left hemisphere of the brain processes logically, linearly, linguistically, through symbols and words; it is dominant for cognitive processing.

Remember, both hemispheres do process experience consciously, it’s just that what comes to consciousness in the right hemisphere is images, sensations, emotions and what comes to consciousness in the left is words and symbols. The right hemisphere decodes our relationship experience; the left hemisphere describes it.

Because the right hemisphere develops early and the left hemisphere develops later, and because the right hemisphere is more neuronally connected to the limbic system than the left, it has a negative bias toward anxiety,
shame, depression and withdrawal, which can impact our experience of attachment and make it harder to change those patterns. There is a corresponding bias in the left hemisphere toward positive emotions, humor and mania, and approach.

“An unfortunate artifact of the evolution of laterality may be that the right hemisphere, biased toward negative emotions and pessimism, develops first and serves as the core of self-awareness and self-identity. To be human may be to have vulnerability toward shame, guilt and depression. So although both sides of the brain are involved in emotion, the dominant role of the right hemisphere in defensive and negative emotions gives it executive “veto power” over the left. Just as the left can block emotional and visceral input from the right, the right can override conscious processing and emotional well-being in reaction to threat.” [Cozolino p. 78] Think about this for ourselves and our clients.

The corpus collosom, running right down the middle of the brain front to back, is what begins to integrate the information between the right hemisphere and the left hemisphere at about 12 months of age. What’s important about any of this brain functioning is integration. The brain is about teamwork; various parts of the brain firing together in synchrony There is bottom-up information from the limbic system about the emotional charge of any experience and top-down regulation of our reflexes and emotions; there is right left integration of feelings and thoughts, integration of positive and negative responses. The more integrated neural pathways, networks, structure are, the better the brain functions

2. How attachment shapes the brain and what patterns of attachment are embedded in the neural circuitry of the brain that shape our 3 R’s, relating, regulation of affect, and resilience, for the rest of our lives.

Dan Siegel has proposed a resonance circuit in the brain.

* Various structures cooperating with each other

* to support the processes of interpersonal resonance, attunement, and empathy * that activate neurons in the limbic regions and the middle pre-frontal cortex

* and stimulate neurons there to fire together, wire together

* and strengthen the synaptic connections for the circuits and pathways

* that become our internal working models, templates, schemas, mental representation of self and other in relationship.
This resonance circuit begins with sensory input – what we see, hear, smell, touch of another. Then mirror neurons, which were discovered in the cortex at the crossroads of visual, motor, emotional processing, communication, language, cohesion and empathy not even a decade ago, fire when I observe and comprehend an intentional behavior in you. The exact same neurons fire in my brain as are firing in your brain when I observe the intention of the behavior you are doing, or when I imagine myself doing it. If you make a random gesture of moving your hand toward your mouth, nothing much happens. If you pick up a glass of water and move it toward your mouth, the same neurons are firing in my brain as I perceive and comprehend your intention as are firing in your brain as you do that intentional behavior.

When we are attuning to another’s behavior and expressions of intention – facial expressions, body gestures, tone of voice, mirror neurons fire in our brain. Information from these mirror neurons travels from the cortex of our brain through the insula – a structure buried deeply in our brain that is located at the interface of the cortex and the limbic regions. The insula carries information down from the cortex through the limbic regions to the neurons of interoception – how we sense what is happening internally in our bodies. The information gathered through interoception, tension, tightness, tiredness, travels back up through the insula through the limbic regions where the sensations are given emotional meaning, back up to the structures of the middle pre-frontal cortex. The insula integrates somatic experience with conscious awareness. We feel pain when another feels pain. Cozolino notes that this insula, though a very small part of the brain, is an evolutionary masterpiece.

Remember one of the 9 functions of the pre-frontal cortex is attunement – we interpret our felt sense of the other’s experience. Another function of the PFC is empathy – to communicate that felt sense, nonverbally being even more important than verbally. This resonance circuit is essential to stimulating growth of all 9 functions of the PFC, including regulation of body, regulation of emotion, extinguishing fear, response flexibility, self awareness etc.

This resonance circuit operates in the brain of the parent attuning to his or her child; it’s what stimulates the developing brain of the infant to process and know its own experience; its experience metabolized and reflected back by the parent becomes encoded in the infant’s neural circuitry. Because you know what’s in my mind and heart, I can know it, too. These patterns do stabilize in the brain by 18months of age, rendering them as Cozolino says, of permanent psychological significance.

This resonance circuit operates in us as therapists as we attune to our clients. And clients experiencing us attuning to them as they share their experience are also receiving our unconditional acceptance of that experience which re-wires their sense of it and their sense of self.

This resonance circuit helps us understand the neurobiology operating in the development of each of the four styles of attachment identified over 40 years of attachment research. How relational experiences, the meaning the
developing brain gives those experiences, create conclusions or models of how life works. These models create anticipations of what to expect in the future which shapes, filters, distorts our perceptions and response which can reinforce our conclusions. None of this is an issue if attachment is secure, but this process is very much an issue if attachment is less than secure. These distortions become the Truth of the Way Things Are. They become defenses which block learning and prevent change.

Mary Ainsworth at the University of Virginia identified three styles of attachment that have since been proven to be universal across cultures: secure, insecure-avoidant, insecure-anxious. Mary Main and Erik Hesse of U.C. Berkeley discovered a fourth less common style – disorganized – occurring within the other three styles rather than all the time.

*If the parenting style of the parent is Responsive:* the parent is available, present, predictable, sensitive, focuses attention on baby, is emotionally attuned, empathically resonant, contingently reflective of baby’s inner reality, reciprocally communicating in tones, gestures, facial expressions as well as words, if engagement-disengagement follows the baby’s lead, if the parent is able to hold-process-regulate baby’s affects (soothe distress, amplify joy), effective in interactions –

*Then the attachment style that develops in the child is likely to be Secure:* the child feels safe and protected, feels “felt” in their own reality; feels affects regulated and soothed; learns to self-soothe; develops trust of the caregiver as a safe haven, internalizes mother as a source of comfort, the child pro-actively seeks connection, trusts its own capacities to activate a response; the child expects others to be attentive, helpful, encouraging of autonomy; *there is a flexible focus on self-other-world.*

*Securely attached children are likely to become Secure-Autonomous adults.* They believe relationships are generally safe and people are generally helpful; they are comfortable with emotions, intimacy, inter-dependency; they tolerate relational frustration well; are optimistic about relationships lasting and being satisfying.

*If the parenting style of the parent is Dismissive:* the parent is indifferent, distant, neglectful, absent, rejecting, shaming, blaming, critical, judgmental, physically-emotionally unavailable, ineffective in regulating affect –

*Then the attachment style that develops in the child is likely to be Insecure-Avoidant:* the child withdraws from interactions, is seemingly indifferent to parent; the child doesn’t seek or expect comfort or soothing; there is a defensive exclusion of affects (numbing out); *there is a focus on self or world, not other.*

*Insecurely-avoidant children are likely to become Insecure-Avoidant adults:* emotionally shut down; devaluing relationships and feelings; uncomfortable with intimacy, vulnerability, dependency. There is difficulty trusting; they can be aggressive or hostile.
If the parenting style of the parent is Pre-occupied: inconsistent, unpredictable, sometimes attentive and loving, sometimes harsh or punitive, sometimes over-involved, sometimes off in their own world –

Then the attachment style that develops in the child is likely to be Insecure-Anxious: the child is insecure about the reliability of the parent for safety-protection; they are not easily soothed; ambivalence: they are sometimes clingy and possessive, sometimes angry-defiant. There is an internalization of anxious mom. There is a focus on others, not on self.

Insecurely-anxious children are likely to become Insecure-Anxious adults: they are subject to abandonment fears; there is chronic vigilance about attachment-separation, there is emotional dysregulation and anxiety, passivity and lack of coping; there can be a victim stance.

If the parenting style of the parent becomes Disorganized: if the parent, even temporarily, is fragmented, disorganized, dissociated; or is frightening, bizarre, abusive, traumatizing to the child –

Then the attachment style of the child can become Disorganized: the child can become, even temporarily, helpless, paralyzed, fragmented, chaotic dissociated; they cannot focus; they cannot soothe.

Experiences of disorganized attachment can lead to an Unresolved/Disorganized adult: there are difficulties functioning; they are unable to regulate emotions; there are dissociative defenses.

What’s happening in the brain as these attachment styles operate in adult life?

When a person is experiencing the safety of a secure attachment relationships there is no over-arousal of the sympathetic nervous system; everything is OK and humming along. There is a flexible balance of stimulation – vitality – and regulation – calm or ease. When there is insecure attachment – either style – there IS arousal of the SNS. Relationships mean danger, so the brain prepares for flight or fight.

In insecure-avoidant attachment, the coping mechanisms of avoidance, withdrawal, minimizing, focusing externally, over-regulate the body and any emotional signals that might come through. There is flight from feelings and people. There is a shutting down of core affect, a de-valuing the importance of relationship. A person may be functioning well in the outside world but clueless about interpersonal interactions or even their own inner world. They can present as under-stimulated and over-regulated.

In insecure-anxious attachment, the sympathetic nervous system is over-stimulated and under-regulated. The personal can feel flooded with stress, fear of abandonment, panic and not be able to self regulate enough, not enough calming of the parasympathetic nervous system. There is energy for fight; people engage through anger aggression.
In disorganized attachment, “fright without solution,” there can be such a sense of danger or life threat, even the momentum of the amygdala, the flight-fight response, collapses. Only the brainstem is operating. The parasympathetic nervous system over-regulates bodily energy to the point of paralysis and helplessness. Clients can appear catatonic.

What clinicians need to face directly in healing attachment trauma is that the coping strategies in less than secure patterns of attachment are defensive – they create barriers to emotion, to the full range of human emotions that are important signals of what to pay attention to in our lives and in others’ lives. They create barriers to the skillful regulation of emotion, creating avoidance or flooding rather than skillful experiencing, processing, managing, moving through. They create barriers to healthy relating, if relating is going to trigger unbearable emotions of fear, shame, loneliness, despair. So clients regulate closeness-distance by dismissing, focusing on self rather than other, or clinging, focusing on other rather than self, or by losing focus altogether, rather than flexibly focusing on self and other, the hallmark of secure attachment.

Why Allan Schore said “The security of the attachment bond is the primary defense against psychopathology.”

3. How we harness the neural plasticity, resonance circuits and social engagement system of the brain (ours and our clients) to help clients move from the misery of being disconnected, unaware and stuck in old patterns of relating to the well-being of being connected, aware, and flexible in their relating.

We know the brain is a dynamic system. Neurons constantly firing; structures constantly processing new experiences. Of course, if neurons are not used, if they don’t fire, they die off, by the millions. If neurons are not connected to other neurons, they are pruned, just as human beings shrivel and die when isolated and disconnected.

The brain is a social brain. And experiences in relationship are the most powerful interventions we have to harness that neural plasticity to help clients fire and re-wire neurons in new ways.

When clients experience something new about themselves while in relationship with us, and that new, more positive experience is repeated and reinforced over time, they develop new neural circuits that store the new, more positive sense of self in conscious, explicit memory, available as a reference point from then on.

When clients experience something old or afflictive about themselves while in relationship with us, and that old memory, however negative or traumatic, is paired with the positive experience of being seen, accepted, cared about, made sense of, the pairing of acceptance with old trauma, repeated often enough, modifies the old circuits and they are returned to explicit or even implicit memory modified, over time transformed.

Because the attachment patterns we want to re-wire are stored only in the mode of right hemisphere processing, – sensations, images, including dream images, emotions – and outside of awareness – we MUST use the resonance
circuits to access those old implicit memories and pair them with new, more positive experiences in a right hemisphere mode.

*Right brain to right brain therapy* is Allan Schore’s phrase for the kind of therapy essential to re-wire the brain’s patterns of attachment. The attachment-based, emotion focused therapies that are most effective in helping clients re-wire their brains and heal attachment traumas – Diana Fosha’s Accelerated Experiential Dynamic Psychotherapy (AEDP) for individuals, Sue Johnson’s Emotion Focused Therapy (EFT) for couples, and Dan Hughes’ Dyadic Developmental Psychotherapy (DDP) for children and families – zero right in on attuning to non-verbal right brain signals of facial expressions, body language, tone of voice, eye contact, to help clients use the social engagement system of the therapeutic relationship to regulate affect and create new corrective emotional and relational experiences. They focus on the relationship, therapist and client, client-client in couples and families, right here, right now, in this room, in this moment, exploring engagement – dis-engagement, closeness-distance, intimacy and individuation, creating a new experience of relationship, thus creating new pathways, new internal working models in the brain, and a new experience of self in relationships. They create the self-empathy, self compassion, self acceptance that makes it safe enough to evoke, explore and let go of the old internal working models of attachment when insecure or disorganized.

[See Appendix A at the end of this article – Therapist as Attachment Figure – for sample interventions from AEDP to transform attachment patterns.]

I do want to say that while right brain techniques are essential to accessing the old internal working models, and secure attachment is essential to creating new internal working models, we still use the miraculous powers of the left hemisphere – to observe, meta-process, reflect, comprehend, and choose – to learn new patterns of attachment that are more secure, more functional, more resilient. Ultimately it is the full integration of right hemisphere and left hemisphere modes of processing that leads to the new internal secure base that is the foundation of healthy, resilient functioning, in our brains, in our lives. And as better brain functioning supports better emotional-social-relational intelligence, the resulting secure attachments support better functioning brains.

David Wallin’s *Attachment in Psychotherapy* gives an excellent model for shifting attachment patterns. Empathy and bonding in the relationship create safety to explore the inner emotional world, the personal belief systems, the dysfunctional patterns of defense, that keep us blocked. Moving from the “me” perspective – “what’s happening to me is awful and it’s the only thing that’s happening. There is no other reality. And I’m the shame based victim of it. There’s nothing I can do to change this.” To the “I” perspective. “I can see that this is happening in the moment and there are reasons why it’s happening. But it’s not the only thing that has ever happened to me; other things could be happening. I can become an effective agent in my own behalf and act to change what’s happening or how I’m responding to it.”
As the client moves through new attachment and awareness to conscious self-reflection, the self awareness creates options, choices for new behaviors, new learning. The new choices, the new experiences, the new learning, reinforced often enough, re-wire the brain. That’s what neural plasticity does. New experiences (not blocked by old defenses) creates new neuronal firing; repeated firings strengthen the synaptic connections and creates new pathways that become the new habits of responding. Conscious habits at first, but eventually unconscious habits of new competencies.

A learning model I learned from Dan Clurman is useful here:

Unconscious incompetence: We don’t know how to do something, and we don’t even know that we don’t know; clueless.

Conscious incompetence: We know we don’t know how to do something; sometimes we are painfully aware of our incompetence.

Conscious competence: We master something; we become skillful and adept.

Unconscious competence: We know how to do something so well we don’t even have to think about it any more.

David’s model, by the way, moves from being unaware and stuck in an embedded perspective of “me” through the self-aware, reflective and choiceful perspective of “I” to mindful awareness and choiceless awareness of “non-self” which can completely dissolve old stuck patterns, not just re-condition or re-wire them. (That’s another talk on Mindfulness and Psychotherapy.)

*How does the social engagement system that regulates us into physiological balance fit in?* When we feel safe in relationship, our sympathetic nervous system is not aroused. Our natural tendency as human beings to move toward remains operative. We engage, we interact, we bond. The functioning of our higher social brain, our middle pre-frontal cortex, stays on line. If we feel safe in engaging, interacting, bonding in relationship, even when there is a perceived threat or danger, we will still move toward. We will engage with a safe other to regulate our emotional distress. That is the essence of secure attachment. This connection-bonding releases the oxytocin that calms down the amygdala; the fear center stops firing its signals of alarm and we relax.

I saw most powerful example of this in a documentary on Mother Teresa and her nuns working around the world with the displaced and the outcast. This scene was in Beirut, a nun holding a young child about 14 months old while Beirut was being bombed. The child was terrified, screaming, crying and thrashing around. His eyes were darting everywhere, no focus at all. The nun held the child in one arm and placed her other hand on his heart. She spoke to
him in a soft soothing voice with a steady eye gaze. In less than two minutes child’ eyes locked on hers, his crying stopped. His breathing slowed down; his body relaxed. He was connected and safe. The cortex came back on line. That is the magic in less than 2 minutes; one brain engaging with and regulating another brain.

When we can’t or won’t use the social engagement system – eye contact, emotional connection and empathy, soothing voice, hand on heart – then we regulate through the limbic system. No more “high road” regulation of distress. The cortex goes off line and fight-flight, moving against or moving away; takes over. (The anxious or avoidant attachment styles). At least there is still vagal tone, there is still movement. This is where earlier embedded patterns of coping show up. Under stress we contract and react in old habitual ways rather than the new healthier ways we have learned since.

If the amygdala is signaling us that this relationship is not only threatening or dangerous but life threatening, fight or flight won’t work; we freeze. This is the response of the brain stem. Freeze, numb out, shut down, play dead so the lion won’t eat you. Even action tendencies of the amygdala go off line. We become paralyzed. There is profound dissociation, no contact; this is disorganized attachment. When clients go into this state, the priority is to get them back into contact, back into connection, even if its into conscious fear or conscious anger. The limbic regulation of insecure attachment is at least an organized state of attachment. Then, of course, we continue to work to bring the of unconscious embedded patterns into conscious self awareness and self reflection so the cortex is engaged again and the client can make conscious skillful choices.

Eye gaze is such a key part of the social engagement system to regulate emotions and maintain a sense of connection. We orient to eye contact within hours of birth. Steve Porges found, when there is eye contact and connection and then a sudden break in the eye contact, the rupture immediately triggers a “separation distress response” in our brain stem, unconscious and hard-wired in.

So, in secure attachment, when we are self regulating through the higher cortical part of our brain, we seek eye contact with a safe other. We seek engagement, connection, acceptance, refuge looking by into the eyes of another.

When the higher cortical regulation goes off line or never happened, when we are regulating from the amygdala, the fight flight system we tend to look at the other person’s mouth – am I going to be eaten?

If we are responding from our brainstem, which gets down to a shame based survival strategy, we look down or away, hiding from the other. When we experience re-connection, acceptance again, where there is relief or hope, our eyes tend to look up, heavenward.
So leading the clients toward secure attachment is not just “How do you imagine I am experiencing you?” but “What do you see when you look in my eyes?”

A helpful hint from Allan Schore: we can look into the client’s left eye – which is most connected to the right hemisphere of the brain – to get more accurate read of their emotions. Their right eye is more connected to the left hemisphere and will give us info about what they are thinking rather than feeling. The two can be quite different.

This social engagement system is especially relevant when working with couples or families, where partners or members of family are dysregulating each other and not soothing one another.

Sue Johnson’s Emotion Focused Therapy for Couples is hallmarked by having couples present a typical example of how they interact with one another to bring into the room and into awareness the approach-avoid behaviors of insecure attachment, though called pursuer-distancer, or blame-attack – withdraw. Once the elements of that relational dance are identified, the therapist helps each partner in the couple speak to and feel the emotional needs underlying that behavior, usually tremendous longings for safety and closeness, but also deep fear of being rejected, being found inadequate, or being ignored. EFT therapy addresses the attachment longings, injuries, and fears; it helps each partner be able to be honest and vulnerable about their own fears and receive-believe the fears of the partner. With defenses down and hearts open, the couple creates a change event, a new experience of each other, a more secure attachment that becomes the new benchmark for relating from now on.

One of the things Stan Tatkin suggests doing with couples, based on the neuroscience of emotional regulation, is rather than have an arguing couple take a time out and separate for 20 minutes on their own to re-regulate their cortisol level – cortisol is the stress hormone; it blocks the cortex from functioning properly, have you noticed? If it’s safe he has them hug for 20 seconds instead. A full-body, 20 second hug will release oxytocin in the brain and calm down the limbic system. The partners are regulating each other rather than going off by themselves to self-regulate, and that builds attachment.

4. Here are practical take-aways: what clients can do with you or on their own to change their brains.
1. Help clients interact with other healthy brains.
“All this talk therapy is just an excuse to hang out long enough for the relationship to do the healing.” – SEPI conference on Attachment and Relationships, 2002

Because our brains are social brains, developing most efficiently in interactions with other brains, it’s essential that clients hang out with other healthy brains besides you one hour a week in the consulting room. Mary Main and Erik Hesse discovered that if one partner in a relationship has a secure attachment style, the other less-than-secure partner
can grow into earned secure attachment in 3-5 years without therapeutic intervention. We are learning how to accelerate that process.

Support groups, therapy groups are excellent adjunctive resources. Group experiences like Mindfulness Based Stress Reduction or yoga classes, where there is valuing of awareness and acceptance, can be excellent.

Personal growth workshops can help clients learn to experience, process, manage, express their own emotions and challenge them to skillfully process the emotions of others, strengthening the circuits of empathy and self-reflection. Expressive arts workshops and authentic movement classes can help clients express deep emotional experiences without words, without conscious processing.

2. Help clients improve their brain functioning.

Mindfulness, as a process of intra-personal attunement, uses and strengthens the same resonance circuits that empathy does and develops all nine functions of the PFC. Mindfulness trains the brain to focus attention on the felt sense of direct experience in the moment with acceptance and compassion. There doesn’t have to be any spiritual or transcendent overtones to do this. Mindful awareness of experience changes the brain. One of the more dramatic discoveries of modern neuroscience is that mindfulness causes a “left shift” in brain functioning. Over time, mindfulness activates the innate positive bias of the left hemisphere, so that experiences are processed in a more positive slant. The body scan form of mindful awareness is easily taught and can also be useful.

For most of us, even stopping long enough to do a practice like mindfulness or body scan will slow down the bio-rhythms of our stressed out lives, bringing us into more ANS balance and better vagal tone. Deep breathing, progressive muscle relaxation, even placing a hand on one’s heart, as the nun did for the child in Beirut, improves functioning of the deeper parts of our brain we don’t pay enough attention to.

Self-empathy, self-compassion, self-acceptance can be strengthened at home by a loving kindness practice, a gratitude practice, a forgiveness practice, a practice of taking in the good.

Neurofeedback is a relatively new technique to improve brain functioning. It doesn’t work on attachment per se or any symptom or issue per se. The mild electrical stimulation of the brain through electrodes placed on the scalp stimulates parts of the brain that are under-firing and calms down parts of the brain that are over-firing. Neurofeedback promotes more synchrony of neural firing in the brain. More parts of the brain firing together in an integrated harmony results in better brain functioning in general.

3. Harnessing neural plasticity
Guided visualizations that use imagery and imagination are powerful tools of brain change. Not just positive affirmations using the words of the left hemisphere to antidote negative messages of the right hemisphere. Guided visualizations use the right hemisphere mode of processing – images – to re-wire old patterns in the brain.

We can teach clients to imagine and evoke a felt sense of their Wiser Self, or a Wise Guide, or a safe haven, all of which can be powerful resources for their internal secure base.

We can teach clients to create an intra-psychic secure attachment between their own Wiser Self and any part of themselves – wounded inner child or inner parts or inner voices work – that needs safe holding, soothing and acceptance.

We can use Gestalt techniques to teach clients to visualize a True Other to their True Self. The True Other could be us or anyone else that holds them with unconditional positive regard and helps release the flow of oxytocin in the brain. Oxytocin is the bonding hormone; the subjective of experience of it in body is profound oneness and OK-ness.

We can use guided visualizations to create portrayals – where a client remembers a traumatic event, an attachment injury. They imagine the scene vividly and then begin to imagine a different outcome, a wished for outcome. Portrayals don’t re-write history, but they DO re-wire the brain.

If you have questions about any of these, call me or e-mail me; I’m happy to discuss them and help you find resources.

I hope you are encouraged to venture into the unknown with your clients, even venturing into error, as you use the amazing capacities of your brain and theirs to heal old attachment wounds, re-wire old patterns and help them move into more and more well-being and resilient relating.

Appendix A: Therapist as Attachment Figure and Sample AEDP Interventions

**THERAPIST AS ATTACHMENT FIGURE**

1. *Techniques of responsive parenting*
   - be present, attuned, curious, attuned, empathic
   - accurately mirror client’s inner reality; reflect on that reality in room with us

2. *Moment-to-moment tracking of non-verbals*
8-second moments
vitality affects

3. Privilege relational-emotional experiences in therapeutic dyad over relational experiences outside the room, over any other kind of experience/story outside the room; make focus explicit.

4. Stop attacks; cultivate self-empathy, self-compassion
   - create safe haven, internal secure base

5. Soften, bypass, confront any defenses that block direct experience of emotion and/or connection. Acknowledge/honor usefulness of defenses at one time for survival; de-pathologize, reframe as necessary at one time but now getting in the way.

6. Help client experience and regulate feelings they have warded off as too dangerous or shaming to experience on their own, including positive affects.

7. Co-create relational-emotional “moments”
   - present moments
   - “now” moments
   - “wow” moments

8. Therapy creates new attachment experiences, thus new internal working models of relationship, regulation of affect, resilience. New experiences become reference points, comparison points to change old patterns of attachment and help client create internal secure base.

SAMPLE INTERVENTIONS

1. Responsive parenting – becoming an attachment figure
   - I sense you might be feeling a little nervous as we begin our session today. Is that right?
   - You’re feeling discouraged about where you are in your life right now. Can you say more about that?
   - As I hear your talk about your brother, I notice something starts to come up in me, right here, in my chest. Can I check that out with you? I’m feeling…an ache, maybe some sadness, a loneliness. Are you feeling anything like that right now?
   - When you say you can’t trust your wife any more, is there something underneath? Some sadness underneath…some deep, deep sadness?

2. Moment-to-moment tracking of non-verbals
   - Something just shifted; did something just change for you? Can you let me know what you’re feeling in your body right now?
   - I notice your hands shaking and scratching as we talk; is there something happening in your hands we need to know about? If your hands had a voice, what would they be saying to us right now?
I notice your energy is different in your body now…more relaxed? Lighter? What’s your sense now?

3. Privilege relational-emotional experiences in therapeutic dyad; make focus explicit
   - What are you experiencing right now, here with me, as we sit together? What’s it like to be experiencing this here now with me?
   - What are you feeling right now? Where are you feeling that in your body? What’s it like to feel that with me? What are you feeling between us right now?
   - Is it hard for you to look me in the eyes as you share this with me? What happens as you try to look me in the eye? What do you see in my eyes as we experience this here together? What do you see in my eyes as I feel what you feel?

4. Stop attacks; cultivate self-empthay, self-compassion
   - Whoa! There’s that inner critic again. Can we just set that voice aside for now and go back to what you were feeling just before?
   - What would happen if you let in that I care about you? That I am so deeply moved by the work you are doing?
   - You can be so harsh on yourself for feeling upset with me! I feel so tender toward that part that feels upset, that needs to be upset with me. Can you feel some compassion for that part that feels upset, that needs to feel upset? If your daughter Kelly were that upset, how would you feel toward her? How would you comfort or soothe her?

5. Soften, bypass, confront any defenses
   - It seemed like you were about to respond to what I just said and then you backed off. What comes up as you begin to respond directly to me?
   - Any time we begin to get near the emotions around your father leaving, you seem to change the subject. Is there something difficult about feeling those feelings and sharing them with me?
   - If we could set the anxiety about being weak or vulnerable in front of me aside for just a moment, what would your heart want to say; what would your heart want me to know about you?

6. Experience and regulate feelings
   - You know I want to go back to something that happened just a moment ago. You were saying something about your boss and your eyes flinched, just for a moment, and I let it go by, but I wonder if something came up just in that moment that we should pay attention to?
   - You seem angry right now, yet you’re holding back on letting that anger out. Can you let me know just how hard it is for you to let the anger out; what do you imagine would happen if you began to let your anger out?
• So much pain; so very much pain. I can feel the pain as we sit here. Can you let me feel that pain with you? Can you feel that pain with me, just let it be there?
• Let it come, let it come. It’s OK, I’m right here; it’s been wanting to come for such a long time.
• You’re not alone; I’m right here with you.

7. Co-create and reflect on relational-emotional moments; meta-processing
• I’m feeling touched as I hear you say that. I’m so moved that you would share this with me.
• We’ve been through such a wave of grief here, and now….there seems to be something else. A letting go…a sigh of relief? What’s happening now?
• Whew! That was quite a ride! And what’s going on now? What are you feeling now?
• What’s your sense of what’s happened here today? How do you make sense of what we’ve experienced here together today?
• You’ve opened up and shared of much of your frustration and anger with me today. How do you feel about your anger now?
• You started out today by saying you weren’t sure what was going on with you, what to focus on. Then here we did this deep piece of work about the loss of your best friend in high school, and felt so much loss, so much loss. How are you feeling about yourself now, having experienced so much loss, really letting yourself feel it? What’s your sense of yourself now?

8. Create new attachment experiences
• Do you think you could stand up for yourself with your sister now the way you did to me last week about the fee?
• How can you remember what it’s like in here, trusting yourself to know how you feel and what you need, when you speak to your boss next week?

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