



GAINS LIVING JOURNAL SPECIAL CONFERENCE EDITION:  
*THE POWER OF PLAY*



## The Power of Play for Mind-Brain Health

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*Featuring –*

- *New reading: A preview of a new book chapter on play by Stephen Porges; GAINS Advisory Board and Executive Board Members share stories and reflections about play in healing.*
- *A special collection of reprints about interpersonal neurobiology and play, including book chapters from Cozolino, and from Badenoch and Kestly, as well as articles from past GAINS publications.*
- *Poetry, An IPNB Fable with a Playful Challenge, Visual art and Inspiration*

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*This 2015 issue of GAINS Special Edition publications celebrates the Power of Play. Reading these interpersonal neurobiology informed writings, you'll consider the neural circuitry that supports and more essentially, requires play, for the unfolding of human potential for movement, expression, joy, connection, and emotional and relational regulation. You'll reflect on the qualities of mind and relationship that grow through play. You will learn through stories about patients, students, and families who are touched by the power of play. You'll be asked to consider the essential importance of play for mind health, brain and body health, and a well-lived life. As is the GAINS tradition, this publication mixes scientific writing with stories, reflections, and art, as we appeal to left- and right-mode ways of understanding.*

*You are invited to bring your own playful self to your reading. Pause to consider your present life: what was the last playful experience you had? Notice how remembering it—how it felt in body and mind—shifts you. Linger with this, if you like. Of course, humans can make play into serious business—consider the complex, big-money music or fashion industries, with seeds in banging spoon rhythms or playing dress-up. And lucky humans have jobs and careers where work feels playful some amount of the day. How do you play at work? Beyond work, do you put a bit of play into every day?*

*In college I was fortunate to learn from Brian Sutton-Smith about play as a natural, developmental necessity and a historical and cultural reflection, legitimizing play in so many ways—a gift for a striving student from an achievement-focused family. The field of “play studies” has grown quite a bit since then, and theorists have delineated multiple types of play, and continue to debate its purpose. (One “gather all versions” hypothesis could be that play, which comes in multiple forms, has multiple purposes, including preparation and development of survival skills, regulation skills, and relational skills; all types of learning; the production of rewarding sensations and emotions; stress relief; identity development; group bonding and more!) The 2015 Interpersonal Neurobiology Conference, sponsored by Lifespan Learning Institute and held at UCLA, examined play and creativity in psychotherapy, considering mindfulness, neuroscience, and relationship. Some of the folks who presented at this conference generously shared chapters and articles with us for reprint: Louis Cozolino shares a chapter on play as the most natural form of learning; Theresa Kestly, in a chapter she co-wrote with Bonnie Badenoch, tells a play therapy story of IPNB-in-action; and Terry Marks-Tarlow explores the patterns of our fractal self that can be illuminated in our play.*

*What is Your Personal Playstory? What messages did you get about play when you were growing up? Which forms of play did your family, your schools, your peers encourage or discourage? How have you kept or changed those beliefs about play through your life? Do you use play to heal and teach?*

*Kirke Olson expands our look at play in education with a reprint of his examination of how play is good for teachers as well as students. And my IPNB-twist on a classic fable is reprinted, this time offering a play-as-you-read challenge—how many of the IPNB allusions and references can you spot?*

*We have some brand new treats for you too. Stephen Porges has graciously shared a preview of his next book, with a pre-publication chapter on play as neural exercise. Other new offerings include reflective, illustrative, personal stories about the power of play from Ross Ungerleider, Patty Wipfler, and Lauren Culp. Richard Hill introduces us to the concept of curiosity for possibility, and how that relates to play. Extras sprinkled throughout the book include quotes, poems, beautiful photos, even a comic! Every author's bio contains at least one link to their books, sites, and additional resources for your continued explorations of IPNB. And GAINS welcomes you to join our IPNB community, at [MindGAINS.org](http://MindGAINS.org).*



*I hope this ebook sparks new ideas, as you consider [The Power of Play for Mind Brain Health](#). As a clinician, a healer, an educator: wonder about how you can utilize your playful aspects, and the playstory of those you work with; ponder how can you bring a playful attitude, invitation, or intervention into a challenging situation. In your personal life: embrace and expand the ways you play, when you play, and with whom you play. What can you do today, and this week, to invite your self and those around you to more play?*

*With gratitude to the authors and readers, Play On!*  
*Debra Pearce-McCall, Editor*

### Did you know...

playing with your baby, turning him every which way, improves his sensory integration? When he is a little older, as he rolls down a grassy hill, swings high in the sky, slides, walks on an uneven surface (like a sandy beach), balances on a teeter tooter, or rocks on an exercise ball, the delicate labyrinth in his inner ear is tuned for balance and learns to coordinate information from many senses.

At the same time, the sensory nerve endings in his muscles, tendons and joints strengthen their communication with his brain so he has a good sense of how to use his body.



\*[www.spdnetwork.org](http://www.spdnetwork.org)/[www.sinetwork.org](http://www.sinetwork.org)/  
[www.kidfoundation.org](http://www.kidfoundation.org)/[www.sensoryresources.org](http://www.sensoryresources.org)

GAINS is grateful to our Advisory Board Member, highly respected and influential neuroscientist Stephen Porges, PhD, for sharing this new, pre-publication chapter on play. Please do not quote, reference or distribute this without direct permission from the author. For more about Stephen Porges and his work see author information at end.

## Play as a neural exercise: Insights from the Polyvagal Theory

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We often think of play as an amusement or a diversion from the “real” work in our lives. When we observe children playing, we might judge the time engaged in play as a distraction from opportunities to learn. This view, denigrating play and revering classroom learning opportunities, is consistent with our cultural view of education. Educational systems attempt to maximize opportunities for classroom instruction and to minimize opportunities for social interactions available during recess and other interactive forums such as team sports, music, and theater. From an educator’s perspective, play is the antithesis of learning; play steals the precious time that could be dedicated to learning. This perspective is based on assumptions derived from learning theories that were outlined by behaviorists about 100 years ago. What if this perspective, prevalent in our society, is outdated? What if play, rather than displacing learning experiences, actually provides a neural exercise that would facilitate learning?

Is our conceptualization of play inadequate? Are our views of play restricted interpretations dependent on a limited understanding of learning embedded in our educational institutions, parenting styles, and expectations of socialization? Can we take a different perspective and emphasize that play provides opportunities to exercise features of our nervous system that would foster learning and social behavior? If play were perceived from this perspective, then play, as a neural exercise, might foster state regulation, enabling individuals to transition efficiently from active to calm states. Consistent with this perspective, the ability to move rapidly into a calm state would facilitate efficient learning and optimize spontaneous and reciprocal social behavior.

The importance of play is dismissed in the cognitive-centric world of education. Within theoretical models of learning, little importance is placed on how bodily feelings, as an intervening variable, influence the ability to learn. Although we may want to sit and attend, at times our body may want to run, fight, or hide. Calmly sitting enables us to attend and to efficiently learn. However, when our body wants to run, fight, and hide, we are in a physiological state that supports defense. During these physiological states, neural feedback from our body to the higher brain structures will interfere with cognition and learning. Missing from the cognitive-centric perspective is the role that play may have in strengthening the neural circuits that can rapidly down regulate defense systems to foster learning by enabling us to sit calmly and attend.

The roots of play are linked to the evolution of a neural mechanism that enables mammals to shift between mobilized fight/flight and calm socially engaging states. From an evolutionary perspective, mammals had to rapidly detect whether a conspecific was safe or dangerous. If the



interaction was dangerous they needed to be in a physiological state that would produce sufficient energy to defend (fight) or facilitate an instantaneous escape (flight). If the interaction had cues of safety, then the physical distance could be reduced and physical contact might ensue and terminate with mating behaviors.

To mate or to be in close contact with a conspecific, defense reactions have to be inhibited before cues of aggression or fear are expressed. An immediate decision has to be made to distinguish potential mate from potent threat. This process was so important to survival of both the individual and the species that the neural mechanisms were subjugated to brain processes outside the realm of conscious awareness.

Within the context of the Polyvagal Theory, the instantaneous process of evaluating risk outside the realm of awareness is called neuroception. Neuroception is the neural process through which our body reacts to features in the environment and shifts physiological state to deal with potential risk. Neuroception is not perception, because the process does not require awareness. If the cues trigger a neuroception of safety, our physiological state calms immediately, then we can easily socially engage or attend. If the cues trigger a neuroception of danger, our body prepares for movement. If the cues trigger life threat, then we lose social contact and immobilize. Although we are not aware of the “stimuli” that trigger our sense of danger or safety, we can become aware of our bodily responses triggered by neuroception. Thus, the cues from our body influence our personal comfort, which will vary as contexts and interactions with people change.



Functionally, play is a neural exercise in which cues triggering neuroception alternate between danger and safety. As an example, we can think of the simple game, peek-a-boo, that a mother may play with her infant. By hiding her face and removing the cues of safety normally generated by the social engagement system (prosodic voice, facial expressions), the mother is creating a state of uncertainty in the infant. This state of uncertainty is followed by the mother startling the infant by showing her face and saying “peek-a-boo!” The sequence of the peek-a-boo game is ended, when the mother uses a prosodic voice with warm facial expressions to calm the startled infant.

Deconstructing the behavioral sequence involved in “peek-a-boo,” we see the neural exercise embedded in this play behavior. First, the initial hiding of the mother’s face elicits a state of uncertainty and vigilance. This state is associated with a depression of the infant’s social engagement system including a withdrawal of the myelinated vagal pathways to the heart. This puts the infant in a vulnerable state in which a “startle” stimulus could easily recruit sympathetic activity to support mobilization (i.e., fight/flight behaviors). The mother provides the startle stimulus by showing her face and stating “boo” in a relatively loud and monotonic voice. The acoustic features of the mother’s vocalizations support the unpredictable presentation of the

mother's face, since the vocalizations of "boo" have acoustic features that are associated with danger and lack the prosodic features that would be calming. The cues of this sequence trigger a neuroception of danger, which recruits increased sympathetic activation. The next step in the sequence of this game provides the opportunity for a neural exercise that would promote resilience and enhance the infant's ability to calm.

After the infant is motorically and autonomically activated by the "boo," the mother needs to calm the infant with her social engagement system using a prosodic voice with warm facial expressions. The prosodic voice and warm facial expressions trigger a neuroception of safety and the infant calms as the social engagement system comes back online and the myelinated vagal pathways down regulate the sympathetic activity. When effectively implemented, "peek-a-boo" provides opportunities for the infant to "neurally navigate" through a sequence of states (i.e., from calm, to vigilant, to startle, and back to calm). Repeating this game provides opportunities for the social engagement system to efficiently down regulate, via social interactions, sympathetic activation. The child will need this "neural" skill to adapt in the classroom. In fact, the ability to have the neural resources to regulate biobehavioral state is as important as IQ and motivation in predicting classroom performance.



We as mammals have a social engagement system that evolved to employ cues from face-to-face interactions to efficiently calm our physiological state and shift our fight/flight behaviors to trusting relationships.

Kittens playing provide a translatable example. I recall what I had been taught about the play of cats and other mammals in graduate school. In courses in comparative psychology and animal behavior we were taught that kittens were practicing their hunting and aggressive skills. However, when I revisited these images from a Polyvagal perspective, the behaviors may have served another purpose. Visualize kittens playing, they are in bouts of rough and tumble play. They are using their claws and teeth, but rarely will injure each other. In fact, if you have a kitten you may be surprised that they know when to retract their claws and relax their jaws once they make a gentle bite. However, an extremely important feature often goes unnoticed. The kittens

maintain face-to-face interactions during most of the “play.” If a bite hurts, there is an immediate face-to-face interaction in which their social engagement systems interact and they cue each other that there was no intention to injure. But kittens, like children, vary in their ability to be aware of the other in a play scenario. If the awareness of other is poor, then injury may occur. In primate social groups, the juveniles who enthusiastically engage but, due to a lack of awareness of other, may injure peers are ostracized and marginalized from social groups.

Similar “play” sequences occur with dogs. Dogs will play a structured game of chase. One dog runs and is chased by another. When the dog chasing catches the other dog, the dog may bite the rear leg to inform the dog being chased that it is caught. The caught dog turns towards the other dog to initiate a face-to-face interaction to determine whether the “bite” was aggressive or play. If it is play the two dogs interact via their social engagement systems (i.e., face to face) and then the game continues with a role reversal. If it is aggressive, then face-to-face is replaced with a face to neck attack.

We can observe similar situations on the playground. For example, when playing basketball, players are often shoved and fall. If the social engagement system is employed following this event, aggressive behaviors will be dampened. For example, aggression is defused, if the person, who did the shoving, makes eye contact with the person on the floor, helps the other person off the floor, and asks if the person is OK. However, a fight might be triggered, if the person who did the shoving just walks away. In my talks I use an example from a professional basketball game in which this sequence results in a fight between Larry Bird and Julius Irving (Dr. J.).

By deconstructing the play of mammals, whether we are observing kittens, dogs, or children on the playground, we see a common feature of behaviors that simulate features of fight/flight that are actively inhibited by social engagement behaviors (e.g., facial expressions, head gestures, prosodic vocalizations). In the examples above we can see that play transitions into aggressive behaviors, if the social engagement systems are not employed to down regulate any potential neuroception of danger.

The process of play is about active inhibition of the neural circuit that promotes fight/flight behaviors. Play functions as a neural exercise that improves the efficiency of the neural circuit that can instantaneously down regulate fight/flight behaviors. If we translate this into the classroom, we can identify children with difficulties in down regulating the neural circuits that promote fight/flight behaviors. These children have difficulties in sitting, in attending, in listening, and in socializing. If we watch these same children on the playground, we might see deficits in their ability to play with others. They may not accurately anticipate the behaviors of others and instead of a reciprocal interaction in which there is reciprocal inhibition of fight/flight behaviors, they may functionally be physically bouncing off their peers.

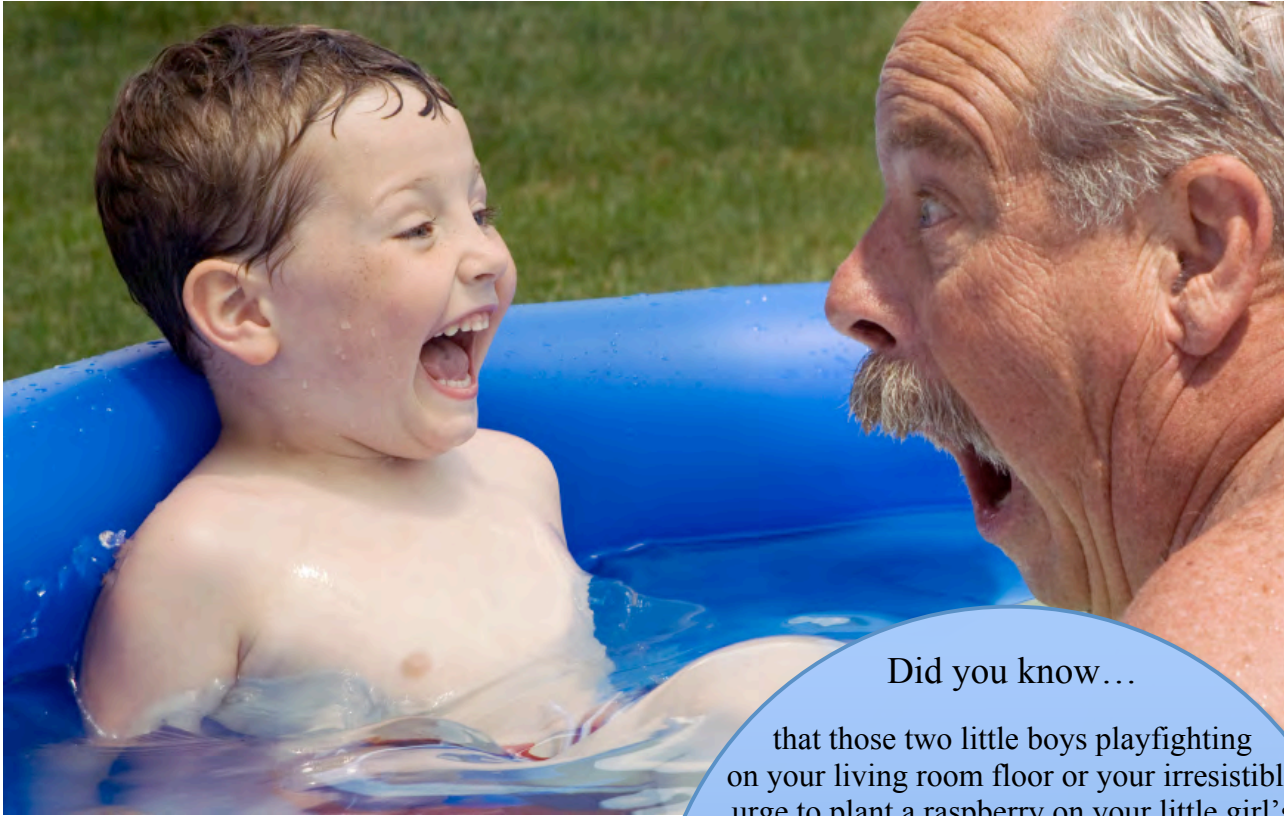
When we are in neurophysiological states supporting mobilization and shutdown, our cognitive processes are greatly compromised. However, we have a neural circuit that can rapidly down regulate mobilization behaviors to foster the calm states that optimize learning and social behavior. Although play is frequently characterized by movement and often recruits many of the



neural circuits involved in fight/flight behaviors, it may be operationally distinguished from defense, since it is easily down regulated by the social engagement system. However, the effectiveness of the social engagement system to down regulate fight/flight behaviors requires practice. This practice may start early in a child's development through play.

In this paper the definition of play requires reciprocal and synchronous interactions using the social engagement system as a “regulator” of mobilization behavior (e.g., fight/flight). This definition of play may differ from the world in which play is used to describe interactions between an individual with a toy or computer. Play with a toy or computer lacks face-to-face interactions and will not “exercise” the social engagement system as a regulator of the neural circuits that foster fight/flight behaviors. Thus, as mammals, we need to respect our phylogenetic heritage and appreciate the importance of synchronous face-to-face interactions as an opportunity to exercise our social engagement systems. As the neural regulation of our social engagement system improves, we gain resilience in dealing with disruptions in our lives. Many of the features of play are shared with psychotherapy. A deconstruction of a therapeutic session will find the client (and often the therapist) shifting states from calm to defense and back to calm. Fortunately, we as mammals have a social engagement system that evolved to employ cues from face-to-face interactions to efficiently calm our physiological state and shift our fight/flight behaviors to trusting relationships.

**Stephen Porges, PhD** is a Research Professor in the Department of Psychiatry at the University of North Carolina at Chapel Hill. His work on the autonomic nervous system and development of Polyvagal Theory has led to a new understanding of mechanisms involved in behavioral regulation and social engagement behaviors, and the key importance of neuroception, and influences clinicians in a range of healing professions. In addition to his major theoretical contributions, he has advanced scientific measurement of biobehavioral variables. This chapter is a preview from an upcoming book; a collection of his research is available in his first book, *The Polyvagal Theory*. Dr. Porges speaks throughout the world about Polyvagal Theory and its applications to typical and clinical populations. [His website has great resources, including articles, videos, podcasts, measures, and an invitation to share your story about how the theory has helped you personally or professionally.](#)



Did you know...

that those two little boys playfighting on your living room floor or your irresistible urge to plant a raspberry on your little girl's tummy until she squeals with delight are actually developing their brains' capacity for emotional regulation? Body-to-body play, whether rough-and-tumble or gentle, releases brain-derived neurotrophic factor (BDNF), promoting development of the prefrontal cortex for better executive function and emotional regulation. At the same time, their brains are bathed in the chemicals of well-being - opioids - while stress hormones are reduced.\*

\*Margot Sunderland, *The Science of Parenting*

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## Chapter Eleven

### How Play became Nature's Pedagogy

*Study forced on the mind will not abide there...train your children in their studies not by compulsion but by games...*

*Plato*

Humans are a playful species as are marsupials, birds, turtles, lizards, and fish (Burghardt, 2005). We chose to play, not because we have to, but because it's rewarding and fun. For most of us, play conjures up images of children running, jumping, and laughter. But what exactly is play and what relationship does it have to learning?

A stumbling block to grasping the importance of play in Western educational theory is our tradition of idealizing rationality, memorization, and abstract thinking. Most of us were raised with the notion of learning as the "work" of childhood as opposed to a natural state of brain, mind, and body. In actual fact, the evolution and development of the brain is based on the stimulation of the body and the senses in interaction with other people. These physical and social experiences turn out to be the infrastructure of our rational and abstract capabilities. Although little formal study has been dedicated to the relationship of play to learning, it appears that play can be utilized as both a motivational tool and teaching method (Mann, 1996). Is it possible that play is a means of learning rooted within our brains' deep history?

Early evolutionary theorists felt it unnecessary to study play because it appeared to have no role in survival. They now believe that the adaptive function of play must be proportional to the amount of energy it requires and the number of neurobiological systems that support it (Caro, 1988). It is now thought that play has many important roles in building skills required for adaptation and survival (Byers & Walker, 1995; Pellegrini et al., 2007). Sea gulls purposely drop and catch objects in a manner that simulates the skills they need to hunt, while dolphins create rings of bubbles to swim through in order to perfect the accuracy of their swimming (Gamble & Cristol, 2002; McCowan et al., 2000). Many animals, including humans, engage in rough and tumble play to test their strength and establish social hierarchies.

Play is thought to have evolved in mammals along with the emergence of maternal behavior, nursing, and social vocalizations, pointing to its importance in forming bonds and sustaining ongoing attachment relationships (MacLean, 1985). From the early months of life, a game of peek-a-boo brings joy to both children and adults by stimulating the biochemistry of well-being and reward. Play among males and females serves as a precursor and means of rehearsal for more mature courtship and mating behavior (Pellis, 1993; Pellis & Iwaniuk, 1999). Throughout life, playful actions are experienced as expressions of positive feelings, safety, and togetherness (Hannikainen, 2001). The play animals engage in is moderated by factors such as the amount of social contact, the availability of food, and their familiarity with the environment. And just like learning, play only occurs in the absence of danger, when food is available, and when the physical and social environments are conducive to well-being.

Within the brain, play behavior is organized within the basal ganglia and cerebellum as well as cortical and subcortical regions of the brain dedicated to sensory, motor, and emotional behavior. A game such as “Simon Says” stimulate all of these brain regions, providing the opportunity to practice and improve inhibitory motor control while building cortical executive networks. Play is reinforced within these neural networks through the activation of dopamine, endorphins, and serotonin. The stimulation of these biochemicals associate play with social connectivity, feelings of well-being, and a sense of accomplishment. The types and amounts of rough and tumble play are modulated within each species by other neurochemicals such as testosterone and adrenaline (Vanderschuren et al., 1997).

With the emergence of language in humans, physical play was reshaped into word games, debate, arguments, and friendly verbal banter. All this verbal play strengthens the organization of mental structures, while sustaining interest and excitement about remembering and learning (Singer & Lythcott, 2002). Although imaginative behavior seems disconnected from physical activity, the two are inextricably interwoven evolutionarily and neurobiologically. We know that imagining behavior helps subsequent performance just as our abstract and imaginative processes are replete with physical metaphors. For example we “try on” new ideas or “explore” novel solutions. Imagination can even be considered a form of mental play.

Freud saw play as the first crucible of self-expression while Bettelheim felt that a child’s play helps us learn how they see the world. Play provides learning experiences that result in expanded behavioral repertoires in social animals and expanded abstract abilities in humans (Baldwin & Baldwin, 1974). As children age, we witness that the level of abstraction involved in their play continues to expand (Elder & Pederson, 1978).

## Play and Social Learning

*Children’s playings are not sports, and should be deemed their most serious actions.*

*Montaigne*

Most male animals engage in play fighting, referred to as rough and tumble play (RTP). RTP builds strength, stamina, and the skills needed for hunting and protection (Barber, 1991; Bell et al., 2009). On a group level, RTP enhances group coordination among animals that hunt in packs and serves as a context for learning turn taking, sharing, and a sense of fairness (Bekoff, 2001; Pellis & Pellis, 1991). By stimulating all of the actions of fighting in the absence of physical injury, distress, or regret. RTP allows for both skill building and social bonding (Boulton & Smith, 1992). The positive emotions generated during RTP inhibit aggression against those who you are attached to and may need on your side in real life battles. The exaggerated moves, fakes, and attempts at deception may all be related to predicting, anticipating, and thwarting the behaviors of other players (Smith, 1982; Spinka et al., 2001). Football, rugby, and many other sports are obvious descendants of these primitive activities.

Tickling is a mock attack on vulnerable parts of the body that tests ones strength and methods of escape in a friendly manner. Like play, tickling is also shared by other species. Rats have been found to emit ultrasonic sounds in anticipation of play suggesting that they also find play both desirable and rewarding (Knutson et al., 1998). These vocalizations can be increased by tickling areas of the rats’ bodies that are target points for play, like the nape of the neck (Panksepp, 2007). Because they occur only in response to positive and playful social interactions, rats appear to be laughing when they are enjoying themselves.

Play appears to be necessary for the normal development of social communication and the appropriate use of aggression (van den Berg et al., 1999). Play fighting helps to establish a dominance hierarchy in a controlled manner while modulating aggression (Drea et al., 1996; Smith et al., 1999). Playful approaches of a subordinate to a dominant serve to maintain friendships while participation in RTP enhances likeability (Pellis, 1993, Smith & Lewis, 1985). Children are usually able to differentiate RTP from real fighting via facial expressions, verbalizations, and inferences about intent (Costabile et al., 1991; Smith & Lewis, 1985). Boys are much more aware of the role RTP holds in establishing a dominance hierarchy while girls are much more likely to see it as simple play (Pellegrini, 2003).

I received a lesson in establishing dominance many years ago. I spent a week on a reservation in southern Arizona with some very interesting people, one of who owned an even more interesting Alaskan albino wolf. After a few days, it became clear that he was not just a big dog – this wolf was stronger, more agile, and more intelligent than any dog I had ever encountered. He understood very complex commands and was able to jump to the top of a six-foot wall and quickly walk along it without a slip. When he became too warm, he could dig down many feet until finding a temperature that suited him. One such den had actually undermined the foundation of his owner's house.

One day, we pulled onto the campus of the University in Tucson with the wolf in the back of a pickup truck. When the wolf jumped from the cab, a dog of about the same size ran up to him and they immediately began to sniff each other in all the appropriate places. Within seconds they darted from the sidewalk into a large grassy area surrounded by hedges. They both took off at full speed and when they got to the hedge, the dog crashed out of control into the bushes while the wolf gracefully sprang over them onto the far wall. The dog, composing itself, shot once again across the courtyard with the wolf in pursuit. In no time, the wolf was on the dog's tail. He subtly tripped the dog that again went rolling in a cloud of dust. The dog jumped up, shook off the dust, and headed straight for us. It arrived at our feet simultaneously with the wolf, rolled on its back, and bared its neck to the wolf. In under a minute, we had witnessed the establishment of the dominance hierarchy of a new pack. These two could now cooperate and get along clearly knowing who was boss.

Play serves many important roles in social learning and the solidification of group structure (Parrott & Gleitman, 1989; Poirier & Smith, 1974). As a fan of sports and sports radio, I listen to endless discussions about the relative merits of players, teams, and how they match up against one another. Common topics include relative strengths, skill sets, and how the athletes' emotional maturity impacts their performance and abilities to play well with others. Since sports are so popular, I have to assume that the interest, intensity, and emotion we invest in them is somehow connected with our deep history.

It certainly appears that athletes and sports fans are engaging in the same interpersonal and abstract processes involved in organizing hunting or warrior parties. I am not the first to suggest that sports are the forums of civilized combat: bats and balls have replaced spears and swords, and man-made rules are substituted for the variables encountered in nature or on the battlefield. But the same mental and social skills required for survival during most of our evolutionary history are all employed in sports. Perhaps this is why guys who play ball on the weekends are called weekend warriors and why teams are said to battle, fight it out, and clash with one another.

Our natural interest in play can also serve as a platform for learning knowledge and skills. Not so coincidentally, I first learned how to calculate averages and percentages by figuring out baseball



statistics in elementary school, making my interest in sports a motivational tool for skills in other areas of learning. I am also able to recognize the thousands of faces I saw on baseball cards half a century ago and even remember a lot of the players' names. Table X summarizes some of the research findings from a variety of studies on learning, play, and the brain.

<b>Learning, Play, and the Brain</b>	
The amount of play is regulated by endorphins, dopamine, and serotonin	<sup>1,2,3,4</sup>
Rough and tumble play is regulated by testosterone and adrenaline	<sup>9</sup>
Early social isolation results in an increase of play during adolescence	<sup>6</sup>
Social isolation increases play fighting	<sup>7</sup>
Play deprivation brings about a rebound when play is reintroduced	<sup>8</sup>
RTP stimulates brain growth factors and mRNA in the amygdala and DLPFC and stimulates considerable gene expression in many areas of the brain	<sup>10 &amp; 11</sup>
Play stimulates the growth of the medial portions of the prefrontal cortex	<sup>12</sup>
Social play correlates with prolonged development and proximity	<sup>13</sup>
Species with more postnatal development play more and engage in more complex play	<sup>15</sup>
The amount of play correlates with brain size across rodents, marsupials & primates	<sup>14</sup>
Adult-adult play fighting correlates with larger amygdala and non-visual cortex	<sup>16</sup>
Frequency of play correlates with cerebellum size across species	<sup>17</sup>
<sup>1</sup> Calcagnetti & Schechter, 1992; <sup>2</sup> Humphreys & Einon, 1981; <sup>3</sup> Vanderschuren et al., 1997; <sup>4</sup> Panksepp et al., 1979; <sup>5</sup> Homberg et al., 2007; <sup>6</sup> Hole, 1991; <sup>7</sup> Beatty et al., 1982; <sup>8</sup> Panksepp & Beatty, 1980; <sup>9</sup> Thor & Holloway, 1983; <sup>10</sup> Holloway & Suter, 2004; <sup>11</sup> Ikemoto & Panksepp, 1992; <sup>12</sup> Beatty et al., 1981; <sup>13</sup> Gordon et al., 2003; <sup>14</sup> Gordon et al., 2002; <sup>15</sup> Bell et al., 2010; <sup>16</sup> Diamond & Bond, 2003; <sup>17</sup> Iwaniuk et al., 2001; <sup>18</sup> Lewis, 2000; <sup>19</sup> Pellis & Iwaniuk, 2000; <sup>20</sup> Pellis & Iwaniuk, 2002; <sup>21</sup> Lewis & Barton, 2004.	

As we can see from the available research, play enhances sensory-motor development, social-emotional skills, abstract thinking, problem solving, and academic achievement (Hofferth & Sandberg, 2001). It also suggests that the dichotomy between education and play may have little grounding in neural reality or the deep history of our brains (Burghardt, 2005). Whether we call it learning, or play, we are looking to engage in some endeavor in a productive and meaningful way that stimulates our brain to be “turned on and tuned in.” Whether in the studio, on a ball field, or in the classroom, attaining and maintaining this state of mind is the goal of most teachers in the service of turning out creative and lifelong learners. The best way to teach the brain of a student may be to disguise it as play.

### **The Acting and Reacting Brain**

Earlier we discussed how the brain came to be a social being by evolving within a matrix of others. We now take another step back into our deep history to explore an even more fundamental reality, the fact that we live in a three-dimensional world that moves through time. The most basic role of a nervous system is to react to the physical environment in ways that supports survival. And although we in the west tend to think of our minds as separate from our brains and bodies, the infrastructure of our brains and our abilities to think are grounded in physical experience. As we

gradually unravel the mysteries of brain functioning, we face the challenge of figuring out how the brain has adapted to both physical space and the passing of time. As we do we see more clearly the fundamental unity of mind, brain, and body.

Mirror neurons, those wonderful cells we discussed in the last chapter, reveal an intricate, interdependent relationship between the frontal and parietal cortices and how our brains process time and space. Among other things, the frontal lobes specialize in sequencing cause and effect relationships and connecting them with future goals. The parietal lobes organize and interconnect spatial maps of the body and the environment. Together, the frontal and parietal lobes construct our experience of space through time and allows us to navigate the physical world. In fact, neural circuits which connect and coordinate the frontal and parietal lobes may function together in ways which have been previously been attributed to the frontal lobes.

The implications for education include a deeper appreciation of the sensory-motor contribution to conceptual and abstract learning. Even when we engage in imaginative processes, we are still relying on images of three-dimensional space, which activate and involve parietal regions. This neurological reality parallels discoveries in modern physics that our underlying experience of space and time are inextricably interwoven.

### ***General Functions of the Prefrontal Lobes***

#### ***orbital and medial regions:***

attachment<sub>1</sub> / social cognition<sub>2</sub> / thinking about a similar other<sub>3</sub> / self-referential mental activity<sub>4</sub>

appreciating humor<sub>5</sub> / encoding new information<sub>6</sub> / sensory-visceral-motor integration<sub>7</sub>

estimating reward value & magnitude<sub>8</sub> / sensitivity to future consequences<sub>9</sub> / achieving goals<sub>10</sub>

stimulus independent thought<sub>11</sub> / inhibitory control in emotional processing<sub>12</sub> / decisions based on emotional information<sub>13</sub>

#### ***dorsal and lateral regions:***

cognitive control<sub>14</sub> / directing attention<sub>15</sub> / organizing temporal experience<sub>16</sub> / organizing working memory<sub>17</sub>

organizing episodic memory (right) <sub>18</sub> / voluntary suppression of sadness<sub>19</sub> / learning motor sequences<sub>20</sub>

decisions based on complex information<sub>21</sub> / thinking about a dissimilar other<sub>22</sub> / the integration of emotion and cognition<sub>23</sub>

<sup>1</sup>Minagawa-Kawai et al., 2009; Nitschke et al., 2004; <sup>2</sup>Berthoz et al., 2002; Mitchell et al., 2005; <sup>3</sup>Mitchell et al., 2006; <sup>4</sup>Gusnard et al., 2001; <sup>5</sup>Goel & Dolan, 2001; <sup>6</sup>Frey & Petrides 2000; Nobre et al., 1999; <sup>7</sup>Ongur & Price 2000; <sup>8</sup>Bechara et al., 1998; Gallagher et al., 1999; Gehring & Willoughby, 2002; Kringelbach, 2005; Krueger et al., 2006; O'Doherty, 2004; <sup>9</sup>Bechara et al., 1994; O'Doherty et al., 2002; <sup>10</sup>Matsumoto & Tanaka, 2004; <sup>11</sup>McGuire et al., 1996; <sup>12</sup>Dias et al., 1996; Simpson et al., 2001; Quirk & Beer, 2006; <sup>13</sup>Malloy et al., 1993; Teasdale et al., 1999; Beer et al., 2006; <sup>14</sup>Koechlin et al., 2003; <sup>15</sup>Dias et al., 1996; Fuster, 1997; Nagahama et al., 2001; <sup>16</sup>Knight & Grabowewsky, 1995; <sup>17</sup>Rezaei et al., 1993; Petrides et al., 2002; <sup>18</sup>Henson et al., 1999; <sup>19</sup>Levesque et al., 2003; <sup>20</sup>Pascual-Leone et al., 1996; <sup>21</sup>Kroger et al., 2002; Malloy et al., 1993; Teasdale et al., 1999; <sup>22</sup>Mitchell et al., 2006; <sup>23</sup>Gray, Braver & Raichle 2002.

Neural fibers connecting the middle portions of the frontal and parietal lobes serve the integrative function of linking right and left hemispheres, limbic and cortical structures, as well as anterior and posterior regions of the cortex (Lou et al., 2004). This may give rise to a global workspace or “central representation” allowing for conscious working memory and self-reflection (Baars, 2002; Cornette et al., 2001; Taylor, 2001). Frontal-parietal circuits appear to be involved in sustained focus and updating of information in working memory (Edin et al., 2007; Sauseng et al., 2005). They also work together to analyze the context and location of specific aspects of the environment and

interrupt ongoing behavior in order to direct attention to new targets (Corbetta & Shulman, 2002; Peers et al., 2005). Add P-FIT references here

Research suggests that the parietal lobes participate in the creation of internal representations of physical objects as well as the actions of others (Shmuelof & Zohary, 2006). In other words, the parietal lobe allows us to internalize others by creating representations of them in the three dimensional space of our imaginations. This allows us to both learn from others and carry the memories of others with us when they are absent. Frontal-parietal networks may be primarily responsible for the construction of the experience of self and others (Lou, Nowak & Kjaer, 2005). These inner “objects,” as described by psychotherapists, likely contribute to emotional regulation and the sense of continuity of self through time (Macrae et al., 2004; Tanji & Hoshi, 2001).

### ***Specific Functions of the Parietal Lobes***

<i><b>Hemisphere</b></i>	<i><b>Function</b></i>
Right	Analysis of sound movement <sup>1</sup> / General comparison of amounts <sup>2</sup> / Attention <sup>3</sup> / Own-face recognition <sup>4</sup>
Left	Verbal manipulation of numbers <sup>5</sup> / Mathematics <sup>6</sup> / Multiplication <sup>7</sup> / Motor Attention <sup>8</sup>

#### ***Bilateral Findings***

Visual-spatial workspace<sup>9</sup> / Visual-spatial problem-solving<sup>10</sup> / Visual motion<sup>11</sup>

Construction of a sensory-motor representation of the internal world in relation to the body<sup>12</sup>

Internal representation of the state of the body<sup>13</sup>

Verbal working memory<sup>14</sup> / Retrieval from episodic memory<sup>15</sup> / Ordering of info in working memory<sup>16</sup>

Controlling attention to salient event and maintaining attention across time<sup>17</sup>

Preparation for pointing to an object<sup>18</sup> / Grasping<sup>19</sup> / Movement of three dimensional objects<sup>20</sup>

A sense of “numerosity” defined as non-symbolic approximations of quantities<sup>21</sup>

Processing of abstract knowledge<sup>22</sup> / Perspective taking<sup>23</sup> / Processing of social information<sup>24</sup>

<sup>1</sup>Griffiths et al., 1998; <sup>2</sup>Chochon et al., 1999; <sup>3</sup>Newman et al., 2003; <sup>4</sup>Uddin et al., 2005; <sup>5</sup>Dehaene et al., 2003; <sup>6</sup>Molko et al., 2003; <sup>7</sup>Chochon et al., 1999; <sup>8</sup>Molko et al., 2003; Rushworth et al., 2001; <sup>9</sup>Newman et al., 2003; <sup>10</sup>Newman et al., 2003; <sup>11</sup>Antal et al., 2008; <sup>12</sup>Grefkes & Fink, 2005; Wolpert et al., 1998; <sup>13</sup>Wolpert et al., 1998; <sup>14</sup>Jonides et al., 1998; <sup>15</sup>Wagner et al., 2005; <sup>16</sup>Marshuetz et al., 2000; Van Opstal et al., 2008; <sup>17</sup>Husain & Nachev, 2007; <sup>18</sup>Astafiev et al., 2003; <sup>19</sup>Mountcastle, 1995; <sup>20</sup>Orban et al., 1999; <sup>21</sup>Castelli et al., 2006; Fias et al., 2003; Lemer et al., 2003; <sup>22</sup>Fias et al., 2007; <sup>23</sup>Ruby & Decety, 2001; Vokeley et al., 2004; <sup>24</sup>Iacoboni et al., 2004; Jackson & Decety 2004.

Contrary to popular belief, studies of primate brain evolution suggest that it is the expansion of the parietal, and not the frontal lobes, that is the benchmark of the transition to the human brain (von Bonin, 1963). Could the fact that we don’t generally think of the parietal lobes as a component of the executive brain reflect a cultural bias? As we discussed earlier, Western thought is characterized by equating intelligence with abstract thought as opposed to emotional judgment, physical abilities, and introspection. The emergence of self-awareness was likely built in a stepwise manner during evolution through a series of overlapping “maps” of the physical environment, then of self *in* environment, and later of self *as* environment. Thus, the emergence of imaginal abilities allow us to create an increasingly sophisticated inner topography that is grounded in the structure of our physical environments.

The imaginal workspace afforded by the combination of good frontal and parietal functions, allows for the creation of an inner reality organized by both space and time. Within this inner world we can imagine ourselves, experiment with alternative perspectives and emotions, and rehearse for behaviors in the external world (Knight & Grabowecy, 1995). Our ability to be “mindful” relies upon learning how to use these frontal-parietal capacities as we build and elaborate the architecture of our mental experiences. Without the ability to reflect on, imagine alternatives, and sometimes cancel reflexive motor and emotional responses, there is little freedom from just being a biological machine reacting to the environment (Schall, 2001).

## **Navigating Physical and Social Space**

*It is better to travel well than to arrive.*

*Buddha*

Our usual focus on teaching conceptual and abstract information makes it easy to discount the role of the body in learning. Yet, the evolutionary history of all learning is grounded in the navigation of space. This may be why the hippocampus, which serves as a cognitive map of the environment in mammals, is the portal to all explicit learning in humans. It is also why using the large muscles in our legs results in the secretion of neural growth hormones that cross the blood-brain barrier enhancing plasticity and learning. Our muscles have evolved to tell the brain to pay attention and learn when we are moving around.

Knowing where to go and how to get there requires at least two interwoven spatial maps—one of the physical environments and another of our bodies. The hippocampus organizes a spatial map of the environment, and grows and shrinks based on the navigational demands placed on it. At the same time, the parietal lobes, which evolved from the hippocampus, constructs maps of the body and the body in space to allow for goal-directed navigation through space (Maguire et al., 1998). We witness the development of these neural networks in a child’s sensory-motor development through behaviors such as walking, throwing a ball, or being able to open a box of cookies.

Another central aspect of living is navigating our many interpersonal relationships. The sensory, motor, and spatial components of our attachment systems become interwoven with our experience of self, other, and the physical environment. Think for a moment about how we describe our interpersonal emotions—we *fall* in love, *fly* into a rage, or have a hard time *handling* what a loved one has told us. Even the words bonding and attachment evoke an image of the joining together of two separate objects in space. Attachment schema are not abstract concepts, they are stored in systems of procedural memory and manifest in our musculature, posture, gait, and interpersonal stance. People can tell us they love us but we also have to feel it in our hearts. We learn to love in our bodies and brains and within our many networks of implicit procedural memory.

## **Procedural Memory**

*Memory is the mother of all wisdom.*

*Aeschylus*

Procedural memory is a primitive form of memory we share with all other mammals. It does not involve or require conscious memory or self-reflection that does not involve conscious awareness or self-reflection. Procedural memory is a subcategory of implicit memory involving the storage of sensory motor, visceral, and emotional experiences that allow us to engage with our physical and

social worlds. Physical abilities such as walking down stairs, serving a tennis ball, or brushing your teeth would all be examples of procedural memories. Once we get to the stairs, walk onto the tennis court, or look at ourselves in the bathroom mirror, these behaviors go on automatic pilot and free us to think about other things. In fact, consciously thinking about doing things stored in implicit memory can impair performance. Golfers can spend a lifetime perfecting their swing while attempting to empty their minds.

As basic biological strategy is to approach or avoid the things around us depending on their social value. We approach what we need, what feels good and what reduces anxiety, while avoiding what is frightening or causes us pain. Thus, by definition our movements are goal-oriented and the neural networks controlling movement motivation and goals have evolved in an interwoven fashion (Rizzolatti & Sinigaglia, 2008). As we navigate our worlds, our brains automatically generate a myriad of options, paths, and potential strategies designed to get us what we need based on past experience. In other words, when we encounter something or someone in our environment, our brains activate preexisting procedural memories that allow us to engage with it. These systems create *affordance*, our ability to engage meaningfully with the objects and people around us. An affordance is neither objective nor subjective, but an interaction that emerges from the interaction between self and world (Heft, 1989; Kyttä, 2002).

A familiar example might be when we are sitting in a café talking with a friend and the waiter sets before us a cup of coffee, sugar, cream, and a spoon. Our implicit procedural memories allow us to use our hands automatically to engage these objects such that we are able to mix our personal blend of ingredients while not missing a word of the conversation. This is a complex goal-directed task that allows us to utilize our environment (affordance) with minimal conscious attention. At the same time, our ability to use language, read facial expressions, and empathetically attune to our friend allows affordance with our friend.

In his study of how English children interact with the natural environments, Moore (1986) discovered that children tend to focus on specific features with which to interact. Some examples were relatively smooth surfaces for *running*, things for *climbing* (trees), places for *hiding* (bushes), slopes for *sliding* down, obstacles for *jumping* over, and objects for *throwing*. This suggests that children naturally make connections between objects and what to do with them. In other words, they spontaneously generate affordance categories. It is not coincidental that the salient environmental features related to their play are also those that were historically relevant for survival - to hunt for food and escape from danger.

We can easily expand the idea of procedural learning to attachment relationships. Imagine sitting with a new friend and his three-year-old son, paying special attention to their many interactions. When we first enter the house, the child holds his father's leg, leans into it, and rolls around the back so as to watch us from a safe vantage point. A little later he presents his finger, which he has pinched in the door of a toy car for his father to kiss. At another point, he sneaks up from behind with a pillow and hits his father on the head as an introduction to some rough and tumble play. Still later, he finishes his juice box and hands it to his father with the words "all done." These interactions demonstrate the boy's ability to successfully use his father for safety, solace, stimulation, and service. These affordances are driven by mutual instinct and emotion, and are reinforced through decreases in anxiety and increases in positive feelings triggered by these interactions.

Based on experiences like these, this child will likely enter school with the expectation of similar positive and useful connections with his teacher. He may assume that the teacher will also be a



source of safety, solace, stimulation, and service and then build upon the affordances he has developed at home. In interacting with the teacher, he will learn affordance strategies for the classroom such as raising his hand, sharing with his classmates, and approaching his teacher for comfort.

Thus, when a child has had positive and rewarding experiences with parents and other authority figures, they are more likely to be able to use the teacher as a source of emotional regulation and learning. Reflected in a relaxed body, leaning toward the teacher when something interests him, curiosity, and optimism about being a successful learner. In turn, this state of mine maximizes neural plasticity and learning in the student and promotes enthusiasm in the teacher. The opposite would be the anxious or traumatized learner who sees the teacher as a threat and lacks the skills to afford the materials placed in front of him. Some children enter school without many of the affordance skills required to successfully utilize teachers and classrooms. In many instances, affordance needs to be taught before content to establish a medium for learning.

Why students succeed or fail in school is strongly determined by whether they possess affordance patterns that match the context and climate of the classroom. Culture, language, and the values in their families are parts of this, as are the social and emotional factors necessary for neural plasticity. A child from the Sahara desert flown to the English countryside may have the affordance for a tree as a source of shade rather than something to climb. This would have to be demonstrated and learned over time. In a similar way, we shouldn't assume that when presented with rows of desks, books, and a smiling face at the front of the room, a student sees and experiences the same thing we would if we were in their seat. While this disconnection is more obvious after a drastic cultural change, it is less obvious when the disconnection has an emotional cause. Because a lack of affordance is often tied to neglectful or traumatic attachment experiences, anxiety and fear usually goes hand-in-hand with learning difficulties. In these cases building affordance patterns needs to precede learning curriculum.

In our old way of thinking, perception was the emergence into consciousness of what was impinging on our senses. We now know that perception involves constructing experience within our brains. Thus to perceive is to construct the current situation based on past learning. Affordance is an important aspect of this construction, as it allows for preparation to respond with sensory, motor, and emotional programs tailored to particular situations. Affordance is the flip side of ergonomics, the study of how useable the tools in our environment are to us. Affordance determines our mind's ability to grasp the tools and opportunities in front of us. Therefore, play in the form of physical activity, expressive movement, and social interaction are all central to optimal learning. A teacher who profoundly understood and embraced these principles was Albert Cullum.

### **Elementary School Teacher: Albert Cullum**

*We are most nearly ourselves when we achieve the seriousness of the child at play.*

*Heraclitus*

Over the course of his long career, actor turned elementary school teacher Albert Cullum wove his loves of acting and teaching into a living classroom experience. As a teacher in a middle-class suburb he did not face the challenges of poverty or community violence. As he saw it, his enemies were complacency, mediocrity, and a blind acceptance of the status quo. He faced these challenges by making education a sensory, motor, and emotional experience through the skills he learned

while on the stage. While initially drawn to the classroom to be a star, his goal became to make a star of each of his students.

Early on, Cullum realized that when play becomes the *modus operandi* of the classroom, disciplinary problems decrease while attention and learning increase. He felt that it was the nature of children to learn through active and imaginative play, which in turn, stimulated enthusiasm, imagination, and openness to new ideas. He structured all of his learning activities to channel his students' youthful energy toward productive ends. Cullum used the works of Shakespeare and Shaw as vehicles to teach language, history, and human values, while encouraging self-expression and personal transformation.

Cullum's use of plays to teach elementary school was something many of his colleagues believed impossible. In an era characterized by "Dick and Jane," Cullum opted for *Romeo and Juliet*, *Macbeth* and *Lear*. By presenting his students with highly challenging content, he communicated a message of confidence and faith in their intelligence, maturity, and capabilities. Cullum found that when he presented even his youngest students with a worthy challenge they rose to the occasion, bonded more closely with one another, and gained self-confidence. The engagement with the material via performance led to an embodiment of knowledge and made each student a hero by being a cast member of a timeless story.

He believed that by playing these heroic roles, young children find themselves fighting for bigger things in life. The entire process is a vote of confidence in children and is bound to build self-esteem while the physicality of acting allowed children to learn the lessons of each play not only through words, but also in their bodies, minds, and hearts.

His classroom was always filled with the kind of noise you hear at a birthday party with children playing, laughing, moving, and touching everything around them. He created a learning environment that activated both explicit and implicit memory systems by blending history, art, music, literature, and math into fun, tactile, and emotionally engaging activities. Mr. Cullum was always in the middle of the fun. Never quite getting over being an actor, he would teach about the geography of Canada and Alaska while wearing a bear costume—his lessons were never dull or passive experiences. When they weren't swimming down the Mississippi River they created out of construction paper that flowed through the classroom, they were competing in the math Olympics, geography races or art shows.

Cullum assumed that a sense of safety and belonging were essential elements of successful education. He endeavored to communicate love, compassion, and respect to his students, that he saw carried into their relationships with one another. The bonds established transcended age, race, and status. As the sole African American student in one of his class stated at a reunion decades later, "I felt as though my classmates loved me. I felt as though my teacher loved me." As an expression of his caring he established a democratic classroom environment to maximize a sense of investment and pride in being a member of the group.

Into his senior years, Mr. Cullum retained the rare ability to see the world through the eyes of a child. As a professor of aspiring teachers at Boston University later in his career, he engaged his students in ways that helped to remind them of the world of children. He believed that in order to become a good teacher, one had to rediscover this ability in oneself. In order to transform what he described as a "cancer of mediocrity" that he saw undermining his profession, Cullum believed that teacher training should include guided self-development. Much of Cullum's success lay in his ability to give voice to the perspective of children, his sense of accountability for his student's education, and his revolutionary curricula and teaching methods. By becoming fully engaged in the way

children learn —through movement, emotions, activities, and play—he felt that teachers can open the floodgates to learning.

Louis Cozolino, PhD, is a GAINS Advisory Board Member and an Interpersonal Neurobiology Pioneer whose writing combines his brilliant and integrative intellect with his wise and kind storytelling, so that reading is playful learning. A psychology professor at Pepperdine University, Lou also maintains a private practice in Los Angeles. This chapter is from his 2013 book *The Social Neuroscience of Education*. A gifted writer and speaker, his other books include *The Neuroscience of Psychotherapy*, *The Neuroscience of Human Relationships*, *The Healthy Aging Brain*, *The Making of a Therapist*, and his most recent, *Attachment-Based Teaching*. GAINS thanks Lou Cozolino and WWNorton—especially Deborah Malmud, and Elizabeth Clementson, for this reprint. Click this box to learn more about these books and Lou at <http://books.wwnorton.com/books/Louis-Cozolino/>.

Click to Hear IPNB info and stories from Lou in an hour interview, available online thanks to the IAFNR



*Play...*

*so that you may be serious.*

*Anacharsis*





\*Jaak Panksepp, *Affective Neuroscience*

## CHAPTER 36

# Exploring the Neuroscience of Healing Play at Every Age

Bonnie Badenoch  
Theresa Kestly

The image of 5-year-old Julia<sup>1</sup> peeking out from behind her mother's skirt fit perfectly with the way her parents described her when we met a week earlier to talk about their highly anxious daughter. Mrs. McKeen was worried that something was terribly wrong with Julia, and she felt guilty because she believed that somehow her own serious bout with cancer had affected her daughter. In addition to being concerned about his daughter, Mr. McKeen felt that Julia's anxious and clinging behaviors were adding an unbearable burden to his wife's fragile recovery. They both made it clear to me that they would do whatever was necessary to help Julia change her behavior. They had already pursued a number of avenues, including parenting classes and educating themselves on child development, but they felt stuck. The father said, "Nothing seems to work. We need some professional expertise, and we came to you because a close friend told us that play therapy might help."

When Julia came with her mother for her first play therapy session, we talked for a few minutes in the consultation room until I (Kestly) could sense that Julia might be

willing to go with me to see the playroom. When I asked her if she wanted to see it, she glanced at me, and then quickly looked away. As we entered the playroom, however, I could see her body relax slightly, and then stiffen again when I said, "This is a place where you and I can spend some special time together. Is there anything here that looks interesting to you?" She looked at me again, a little longer this time, and I could feel her searching my face for presence, as if to say, "Will you stay with me? Do you notice that I am scared and hurting?"

Having Julia look deeply at my face that way, and sensing her parents' urgent need for her to feel more secure so that she could move out into the world with confidence and joy, I was aware of a slight tension arising in my body. I really wanted to get this right. I took a slightly longer breath and reminded myself that I could count on several principles that we are beginning to understand from the field of relational neuroscience. Julia's SEEKING and PLAY circuits<sup>2</sup> (two of the seven emotional-motivational circuits identified by neuroscientist Jaak Panksepp [Panksepp & Biven, 2012]) were already present within her system, and they would



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be available for healing purposes if I could provide the safe presence of CARE, another emotional system identified by Panksepp, that allows us to connect deeply with one another. With the natural interweaving of these subcortical systems at Julia's growing edge, I believed that my support in our relational play could help her express and then coregulate her painful implicit memories of the early sense of abandonment she experienced due to her mother's illness, in collaboration with her brain's natural push toward wholeness (Siegel, 2012). These relationally supported changes would gradually make room for a more permanent shift in her behavior, whereas simply addressing the behaviors would leave these underlying implicit memories in place to arise in times of stress. As I settled into this perspective, my body relaxed, an easy smile came to my face, and with her next glance, Julia's body was able to follow mine in forming an initial connection between us.

#### Why Study Neuroscience?

It might seem like the rigors of learning about relational neuroscience and the free-flowing joy of play therapy have little to do with each other. However, as we begin to understand that in the midst of play, neurotransmitters move toward balance, belly brains relax, heart brains learn something wonderful about relationships, autonomic nervous systems find easy access to the branch that allows us to connect with one another, and old memories of trauma and loss can surface and be reworked, then we can begin to confidently settle into supporting people of all ages in this most joyous of all manifestations of mental health. Cultivating a felt sense of the neurobiology that underlies play can give us the confidence to talk with parents and teachers about the value of play therapy as an optimal means for children to find their way back to a healthy developmental path, even when there has been trauma or other forms

of challenge. A secure foundation here can also help us recognize and support the emergence of playfulness in our work with clients of every age. It may even be possible that these discoveries about how our brains and minds are continually being modified in our connection to one another in play can become a solid scientific base for including this way of being together in all areas of our therapeutic work.

With these intentions in the background, let's explore some of the main strands of relational neuroscience that illuminate play therapy. We're going to begin with some basic principles and then look at how play makes the most of what we know about how the developing brain heals. We consider how the growing awareness of the following areas can support our playful work with children and adults: (1) the brain as a system that is always moving toward greater integration; (2) the nature of implicit memory and how it can change; (3) how presence itself is the foundation on which all else rests; (4) the role of the autonomic nervous system in providing safety; and (5) the neural circuitry of play itself, buried deep in the roots of our brains.

#### Relational Foundations of Healing Play

Let's begin with the first few moments with Julia. When she glanced up at me, looked away, and then looked back for a little longer, what might she have been seeking? Most likely, her nervous system was rapidly assessing whether this could be a safe place or not. For we humans, safety is supported when we can connect with someone who is present without judgments or expectations, someone who can receive us just as we are. We can check this out for ourselves by running quickly through our last several encounters with others and sensing what happened in our bodies. We might notice that when we felt the other person had an agenda, our bodies—perhaps beginning

with our bellies—began to tighten and withdraw from vulnerability. When we felt open curiosity and warm acceptance, relaxation may have begun to move through our system and we more easily stepped into our own vulnerability within the shelter of safe relatedness. Since Julia was not familiar with me, it was especially important for her to feel my welcoming and warm presence. As part of our flexible and adaptive natures, all of us are continually seeking the warmest attachments we can imagine (based on both our previous experiences and our genetically based propensity to move toward safe proximity with each other), so in a way, Julia's system was both primed to be cautious *and* available for connection at the same time. These bonds begin with a very rapid conversation below the level of conscious awareness between my state of being and hers.

Two states of mind can help create the foundation for offering this kind of presence: a felt sense that, regardless of current behaviors, everyone is adapting as best they can, given their neurobiological makeup and the kind of support they are receiving; and that letting go of an agenda for change actually creates space for change to happen. Even coming from a paradigm that is often identified with goals and treatment plans, Semple, Lee, Williams, and Teasdale, authors of *Mindfulness-Based Cognitive Therapy for Anxious Children* (2011), write, "The most difficult component of MBCT-C (Mindfulness-Based Cognitive Therapy for Children) for a conventionally trained therapist may be to abandon the desire for change. Letting go of the desire to change may in itself catalyze significant changes" (p. 3). Our systems know how to find their way when they are given space, time, and abundant support, and often tighten down when there is a sense that the other person needs us to be a certain way. This is one reason that therapy centering on behavior change rather than relationship can have mixed long-term results.

### ***Complex Systems and Constraints***

What would relational neuroscience have to say about these two foundational states of mind? It tells us that our brains are complex systems that are self-organizing, always on the move toward greater integration and coherence within the limits of whatever constraints are on the system (Siegel, 2012). This integrating process is something we can trust. *Constraints* are encoded prior experiences that guide our perceptions and expectations in a particular direction. If we have had a warm, secure entry into this life, these constraints will guide us toward continuing to find similar relational experiences as we move down our developmental path. On the other hand, if our early days were marked by various kinds of pain and fear within our relationships, those constraints will color our current experiences with a similar felt sense, will likely leave us hypersensitive to anything that resembles our embodied memories, and will guide our behaviors in response to these engrained patterns. As we develop greater trust that the complex brains of our clients of all ages will integrate as these constraints change—with the support of a safe, accepting relationship—it can become easier to release our agendas to make room for each person's system to unfold with the guidance of its own wisdom.

Julia's earliest life was marked by her mother's continuing illness, which meant long separations and care by many others, who, although meaning well, were not able to focus on her legitimate emotional need for continuity, proximity, understanding, and reassurance. These continually shifting connections frightened her in the midst of dealing with the grief of separation from her beloved mother. Now her system was constrained in such a way that she was continually on the lookout for the next relational loss, leading to clinging, crying, and sometimes anger at home. As she looked toward me, she needed to sense that I could

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accept her in this moment just as she is. If she saw in my face any need for her to be different or any sense that she is broken or defective, our connection would lack the nurturing soil it needed to begin to take root. If instead she could see welcome and openness to who she is *right now*, she might begin to hope that this could be different. Given the magnitude of her earlier experience, it might take some time for her system to begin to *expect* that this relationship could be stable and consistent; however, if she encountered the same receptivity visit after visit, deep within her most core implicit structure, shifts would be possible.

In addition to awareness of these constraints, I could also feel her parents' urgent need for Julia to feel more secure and less clingy, springing from their love for her, but knew if I embodied that same urgency in our play therapy, Julia would feel it, perhaps below the level of conscious awareness, and would begin to tighten in protection. We have more to say about this autonomic nervous system process later on, but for the moment, we can likely each feel our embodied response to urgency within our own systems. Another's anxious need for us to change communicates that something is wrong, and that felt sense activates our nervous system. If instead we sense that the other person understands the protective wisdom in the way our systems have adapted to circumstance, our bodies have room to relax into greater openness. With Julia, it was easy for me to feel the appropriateness of her anxious expectation of loss, so, trusting her system's ability to find its way, I could let go of urgency. Within our growing connection, her constraints could shift at their own pace, and her brain and body could begin to find a way toward greater integration. I was confident that as this implicit foundation changed, her behaviors would start to change as well to align with her greater sense of security. When we feel connected and safe, the need to cling recedes (Panksepp & Biven, 2012).

### Implicit Memory and the Core Process of Change

Our understanding of how we shape one another's brains and minds from before birth until our last breath is the focus of *interpersonal* neurobiology (IPNB; Schore, 2012; Siegel, 2012), a scientifically-grounded paradigm of how change is possible within secure relationships. This paradigm focuses on what unfolds in the space between people, and lets us know about the power of being present, while our clients of any age follow the guidance of their naturally integrating brains toward health, well-being, and the emerging capacity for warm relationships. In the micro-second interactions between us, there is the possibility that our systems will come into resonance with our clients' in a way that they will feel seen and heard at a depth that allows their embodied memories of pain and fear to come into the room—one essential step on the way to transformation (Schore, 2012). At that point, if we meet them with what they needed, but didn't receive, at the time of the original experience, the circuitry holding that old implicit memory can open to receive new energy and information, changing the felt sense of that memory, even though the explicit memory doesn't change (Ecker, Ticic, Hulley, & Neimeyer, 2012).

### The Relationship between Implicit Memory and Behavior

Let's explore this core pattern of change more fully. Our first question might concern what actually needs to shift within our play therapy clients for them to move into new patterns of experiencing and behavior. The struggles that manifest themselves as ways of behaving (clinging and anger, in Julia's case) are rooted in the implicit patterns that accumulate as we move through our lives. Implicit memory is embodied memory, made up of the *bodily sensations, emotional surges, behavioral impulses, percep-*

tions, and *sensory fragments* that are encoded as part of all our experiences (Badenoch, 2011). When our brains are newly in this world, the neurons in the limbic region and neocortex are largely undifferentiated. This means that they are not connected to each other; the experience of our earliest relationships is needed to create these connections and the patterns they will hold. We certainly arrive here with genetic and epigenetic predispositions and temperament, which then encounter the relational world. For the first 12–18 months of life, the only kind of memories we make are implicit ones (Siegel, 2012), anchored in the limbic region, and receiving input from the belly and heart brains, as well as the subcortical regions that hold our primary emotions (Panksepp & Biven, 2012). These embodied implicit memories, when repeated often enough, become what we might call *embodied anticipations* about how life will unfold for us (Badenoch, 2013).

For Julia, the pattern of “my mother’s here—my mother’s gone” was repeated many times in her first 3 years, often with a sense of emergency because her mother was so ill. Because everyone was legitimately caught up in this stressful situation, Julia’s frightening and grief-filled experiences were not met with sustained acknowledgment, understanding, and comfort. Trauma arises not from what happens to us, but from no one being truly present with us to help us integrate the experience (Dobbs, 2012). As a result, Julia’s implicit memory of these repeated losses became wired in as an embodied anticipation that all relationships are dangerous and painful sometimes, but also wonderful and nurturing at other times, and that loss can happen unexpectedly at any moment. We can each perhaps sense anxiety in the form of hypervigilance in our own bodies as we feel into her experience.

Unlike explicit memory (our narrative recall that something happened in the past and has a beginning, middle, and end), implicit memory, when it is reawakened, is

never experienced as being in the past. Instead, it comes up in our bodies as though it were happening right this minute. We can test this right now by taking a few moments to remember something pleasant that happened in the last couple of weeks. If we sit with this memory for a few moments, we may notice that we *know* this event happened a while ago, and that *our bodies* are having the same sensations as though it were happening now. For Julia, any sense that her mother (or anyone) is turning away might activate her implicit memory stream and feel to her as if loss were imminent. Simple daily activities, such as her mother leaving her room at bedtime or dropping her off at school, could invoke the fear and grief that had accumulated in her implicit memories over the course of her early life. Crying and clinging are our natural, healthy responses to fear of loss, as we shall see from Panksepp’s work (Panksepp & Biven, 2012).

All of us are continually making new implicit memories with every experience. Unlike explicit memory, which requires conscious attention to encode, implicit memories are neurally engrained without our attention, likely meaning that we are always making more implicit memories than explicit ones, just by being alive within the environment. Also, even if our child or adult clients had fairly secure beginnings, trauma and other challenges later in life can still create implicit streams that can be touched and reawakened by daily events.

### ***What Needs to Change—and How Change Happens***

Given all of this, it would seem that what most needs to change is the *embodied subjective sense within the implicit memory*, since that is what continues to come into the present, bringing perceptions, feelings, and behaviors with it. Until recently, we didn’t have the science to understand how this kind of change can happen; however, work on memory reconsolidation is providing us with some clues (for a review of the

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research, see Ecker et al., 2012). It appears that the neural nets holding implicit memory open to new information when two conditions are met: The implicit memory is alive in the body and it is met with what is called a *disconfirming experience*. That is, the implicit memory is met with an embodied experience of what was missing and needed at the time of the original event. If we are frightened, we need safety and protection; if we feel humiliated, we long for acceptance; if we are grief-stricken, our systems yearn for comfort.

In the context of a play therapy relationship that is intent on being alive to the present moment, it is possible for these disconfirming experiences to unfold in the moment-to-moment relational interchange surrounding the arising of these implicit memories. Even in the first moment of meeting with Julia, her glances told me her implicit world was coming alive as I saw both fear and the need for reassurance in her eyes. If I could be a consistent presence for her, both acknowledging the validity of her fear and providing a calm, safe, consistent space, the upwelling of the earlier implicit experiences could be met, over and over, by disconfirmation until they began to settle into a new pattern of security. New neural pathways between her limbic region and prefrontal cortex, particularly in the right hemisphere, would hold this new pattern. As these connections strengthened, a number of capacities would begin to appear in Julia: the ability to pause long enough to choose between possible responses; greater regulation of both her autonomic nervous system and her emotions; a decrease in her felt sense of fear because of the increasing flow of the soothing neurotransmitter gamma-aminobutyric acid (GABA); and a greater capacity to “read” the reassuring messages in the faces of others (Siegel, 2012).

We could ask why this wasn’t happening at home since her mother’s illness had resolved by the time Julia was 4 years old. I spent time with her parents before and dur-

ing the time I was seeing Julia on her own, and they shared how guilty and sad they both felt that she’d had such a rough start. They both felt so anxious for her to feel safe now, even though they were both still feeling some understandable fear about the possible return of mother’s illness. Part of the struggle was that this ongoing fear was alive in the family system and so continuing to touch everyone, even though it wasn’t verbalized in Julia’s presence. We have such powerful resonance systems that whatever is unfolding in the nervous system of parents is experienced also by the children—and the less it is talked about, the more children inherit the felt sense patterns without being able to understand them.

In addition, daily life often brought the need for Julia and her mother to come together and part—going to school and even going to bed—so the conditions for the activation of her implicit memories were alive in the environment every day and with the very people with whom the original memories had formed. Without an understanding of how implicit memories work, her parents then became upset by Julia’s realistic upset—she really couldn’t know if her mom would be there in the morning. As a result, they weren’t able to provide the calmness and ongoing, repeated reassurance that her system needed to rewire a sense of security.

In our parent meetings, we not only talked about implicit memory, but we also worked with their continuing activation around Mrs. McKeen’s illness, so they developed a strong felt sense about how tender these areas of memory continued to be for everyone in the family. I taught them some mindfulness practices for staying in the moment rather than running into the feared future—something our minds tend to do adaptively to prepare us for what may come, but since we can’t know the future, may actually undermine our ability to stay present to life now. We also did some sandtray work that allowed both parents to express and release some of the intensity



they were still carrying in their bodies, out of conscious awareness, from those 4 years of life-or-death struggle. Mr. and Mrs. McKeen took to the sand and miniatures with ease once they understood that so much of what is encoded in our implicit memories can't be expressed in words. As they placed their hands in the sand, they felt some of the anxiety release into this soothing medium. Choosing the objects by their felt resonance, the themes of these most difficult years gradually unfolded so they could be silently held by the three of us. Sometimes a story in words would also emerge; sometimes the processing was mainly through the free flow of emotions. As the painful experiences became more integrated and settled, their capacity for calmness was restored. Their ability to hold one another soon expanded to their beloved daughter, and we gradually became a supportive team on Julia's behalf.

### Healing Play as an Optimal Means for Supporting Change

If the subjective sense of implicit, embodied memories is what needs to change in order for us to have more settled and fulfilling lives, how might play offer optimal conditions for this to happen? Because these memories come up mostly without words, in the present moment, as bodily sensations, emotions, behaviors, and perceptions, what better way for them to come alive than turning a child or adult loose with sand and miniatures or toys of every kind so their systems can have the opportunity to bring the painful and frightening experiences into the play therapy room in a living way—within the embrace of a safe, accepting relationship, which is the essential support. Just catching sight of the resources for play begins to touch the parts of our brain, mostly in the right hemisphere, that hold our unresolved painful or frightening experiences: times when we had big or small traumatic events and no one was

available to see what was happening and to provide witness and comfort.

With the support provided in a secure relationship, children and adults will move naturally toward expressing what is awakening within, using their bodies and whatever play resources are available to share the unseen and heretofore unknown story. Since implicit memories are embodied, mostly below the level of conscious awareness, and without words, the possibility of moving toward them is greatest when the environment provides ways for those memories to “speak” through symbols and actions. Let's turn to an exploration of the neural circuitry of safety and play to broaden our foundation for understanding how play therapy can facilitate these changes.

### *The Primary Foundation: Safety*

As we have already seen, Julia's first need was to find out whether I was going to be a safe companion for her. The work of Stephen Porges (2011) (building on the legacy of Paul MacLean, 1990) illuminates the tripartite autonomic nervous system (ANS) and its role in the experience of safety. Traditionally, the ANS was thought to be composed of two branches: the sympathetic branch, as the accelerator, and the parasympathetic branch, as the brakes. From this perspective, the goal was to keep the two in balance. Instead, Porges's research tells us that the ANS has three branches that are hierarchically arranged so that with increasing “neuroception” of danger, one branch goes offline in favor of the next to ensure our survival. The word *neuroception* was coined by Stephen Porges (2003) to talk about how our ANS, along with several other circuits, can detect danger and safety without our conscious awareness. Before we perceive safe/not safe, a conscious state, our system can “neuroceive” the signal and act on it. The ANS does not operate alone, but works in conjunction with circuits that recognize faces, assess intention, rapidly assess threat, and carry emotionally relevant

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information from the body to the limbic region—in short, those circuits that alert us to how safe we are with others and the environment (Adolphs, 2002; Critchley, 2005; Morris, Ohman, & Dolan, 1999; Winston, Strange, O'Doherty, & Dolan, 2002).

#### *The Social Engagement System*

For we human beings, our nervous system's preferred way of finding and maintaining safety is via connection with others (Beckes & Coan, 2011). Porges (2011) tells us that the first and most preferred system in the ANS hierarchy is the *ventral vagal parasympathetic*, or the social engagement system, a circuit that allows us to settle into relationship with one another—a central requirement for both secure attachment and implicit memory change. This circuit slows the heart (the vagal brake), decreases our fight-flight-freeze response, and reduces cortisol, a stress hormone (Porges, 2011). In short, it prevents the sympathetic branch from taking over. Interestingly, this circuit also reduces inflammation and puts us in a state of growth and restoration.

One person in this state can support regulation for another, even in stressful situations, largely because in the course of mammalian evolution, the ventral vagus became integrated with the circuits that control the muscles of the face and head. These neural pathways regulate eye gaze, prosody, ability to listen, and facial expression—many of the nonverbal ways through which we communicate our connection with each other (Porges, 2011). A calmly beating heart and relaxed yet animated face signals our readiness to engage. Julia's initial glances at my face and eyes were her adaptive way of finding out if this new relationship could possibly provide the safety she needed to allow her inner world to open. She wouldn't consciously have that thought, but if we remember that our complex systems are always seeking greater integration, which is neurobiology's way of understanding healing, we can imagine how her system was look-

ing for the conditions that would make it possible for her earlier traumas to join the stream of integration.

#### *The Neuroception of Danger and Sympathetic Arousal*

Julia's life experiences had left her with tenuous access to this state of security and connection. Instead, her nervous system easily moved to a neuroception of danger any time her mother or anyone else left her view. At those moments, her body reflected this shift to activation of the *sympathetic nervous system* with her heart rate increasing, the chemicals needed for protection coming into her system, and the behaviors of crying and clinging appearing as signals of relational distress and calls for help (Panksepp & Biven, 2012; Porges, 2011). In the interests of survival, her rising fear caused the circuits that connected her to her parents to go offline so that she could focus on the perceived threat, and, at the same time, her capacity to take in new information was dramatically reduced. This meant that any attempt by her parents to explain to her that she was safe now could literally not be heard and taken in. Since their nervous systems were similarly activated, it was not be possible for Julia to find a safe haven to return to a ventral vagal state that allows soothing connection to emerge.

As her parents and I worked together, they began to see her legitimate cries for help as her implicit memories coming alive rather than as a manifestation of irrational fear, and they became much more able to provide the wordless comfort and connection that her system was seeking for as long as she needed. As they comforted her whenever her fears arose, they found that she could become calm and connected more quickly and easily as time passed and her brain registered the repeated support of disconfirming experiences. In this way, Julia could integrate the old fears, allowing her to begin to have the embodied experience that life is different now.

*Helplessness and Dorsal Vagal Collapse*

The ANS has a third branch as well. Under dire circumstances, as our neuroception shifts from safety or danger to a felt sense of all-out life threat, brought on by feelings of helplessness, the sympathetic circuit turns off in favor of the second branch of the parasympathetic: the *dorsal vagal*. This branch dramatically reduces heart rate and shuts down other metabolic systems to move into death-feigning behavior—a collapsed state that may be marked by dissociation or a movement into stillness (Porges, 2011). Julia's parents told me that on rare occasions she would move from crying to screaming, and then suddenly fall silent and become what they called "distant." This behavior had bewildered and frightened them, so that they weren't able to use their own ventral vagal state to help her come back into connection. Together, we recognized that at these moments, she moved into a dorsal state as a form of protection from the intolerable anguish of the implicit memories of being separated from her mother—memories that were likely encoded when she was quite small. With this new understanding, they were able to intervene in her distress long before this dissociated collapse became an adaptive necessity for her.

***Supporting Connection through Play:  
Widening the Window of Tolerance***

In the playroom, Julia and I had the opportunity to coregulate each other, with my ventral vagal state acting as anchor for our experiences together. One way to picture her ongoing struggle is to say that her earlier life experiences had left her with a narrow *window of tolerance* (Siegel, 2012) for strong emotions, meaning that what might seem like small nudges—her mother turning her back to cook at the stove—could lead to a cascade of large physical and emotional responses. Our window's size reflects the degree of integration between the limbic

region of the brain, where our sensitivity to potentially fearful situations is centered, and areas of our prefrontal cortex, particularly the orbitofrontal cortex, that help with calming fear.

By genetic design, these two parts of the brain begin to integrate at about 24 months; however, even in the first few months of life, the foundations for this integration take place in the relationship between a baby and her mothering person. If the mother's brain is well integrated—meaning that she is able to be warmly attuned and responsive to her little one much of the time and to repair ruptures when they inevitably occur—the baby's prefrontal circuitry begins to be prewired for a smooth integration experience toward the end of the second year of life. Because of numerous caregivers she experienced and an ongoing sense of emergency in the home, this didn't happen for Julia, so the connections between these two key brain areas were tenuous and easily ruptured by reminders of loss and abandonment in her current experience. Here in the playroom, we had the opportunity to strengthen those connections just by the way we played together—attuned, responsive, coregulated, leading to an expanding window of tolerance.

***"Just Playing" and the Seven  
Emotional–Motivational Systems***

The beauty of "just playing" is that it makes room to recruit the energies of the sympathetic nervous system without leaving the ventral vagal state of safety in connection. Instead of her regular movement into fear and sympathetic arousal, Julia's experience of repeated abandonment could emerge in play and be held within our connected relationship until it found its way to resolution. By our third session, her play was centering around themes of parting. The teddy bear mother left her cub in the snow, or all the hunters on the sandtray shelves took the mother lion and buried her in the sand. I

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could sense agitation rising in her body, and as I quietly tracked her experience and reflected her play to her, the anxious wave would calm enough to stay within our joined windows of tolerance, so the implicit experience could be met and held within our ventral vagal connection. Through the influence of our resonance circuitry, Julia could use my ANS to calm her own and continue her healing play. She would frequently look up at me as though to say, “We’re just playing, right?” She could see my agreement—“Yes, we are just playing”—in my face and eyes, as well as hear it in the sound of my voice, those all-important non-verbal ways we communicate safety to one another (Porges, 2011; Schore, 2012).

Because we were staying in connection, the circuitry of play could remain online and serve as a means to be with these implicit memories in a different way than when Julia was triggered and pulled into sympathetic arousal because of fear. To explore the neural circuitry of play, we can turn to the work of Jaak Panksepp (Panksepp & Biven, 2012), which has illuminated seven primary emotional-motivational systems buried deep in the evolutionary history of the midbrain: SEEKING, CARE/BONDING, PLAY, LUST (arising in adolescence), RAGE, FEAR, and PANIC/GRIEF/SEPARATION DISTRESS. When we feel disconnected from those around us, we will likely feel distress, which generates a need to cling until we feel connected again—a wise adaptive strategy to try to keep the one we need from leaving us. Our SEEKING system uses its resources to find a way back to a safe haven through signaling our pain. If our grief-filled face doesn’t bring someone to us, then our fear escalates, and if this isn’t enough to draw in the help we need, the frustration of SEEKING with no result generates RAGE. When parents can begin to see these signals—grief and clinging, fear, and rage—as cries for help rather than as bad behavior, they can begin to come toward their children in these moments and provide the all-important disconfirming ex-

periences for which their children’s systems are yearning.

Many of the parents who bring their children for play therapy are encountering these signals on a daily basis and want the behavior to change so the suffering will stop. If we begin with correcting the behavior instead of addressing the underlying need for connection, the improvement is likely to be temporary, lasting only until the stresses of disconnection build again and their child’s system adaptively calls out for help once more. This expanded perspective can be life-altering information for families.

#### *Connection, Safety, and Play*

In the playroom we immediately have the resource of ourselves to begin to meet an upset child’s need for connection. Once that relational experience is established, the SEEKING system no longer has to devote its resources to finding a safe haven and can begin to explore what matters most in that child’s world at that moment. Once in a felt sense of relationship, the inborn PLAY system comes online to help these little ones (and adults as well) in that creative exploration. If we play therapists have developed some trust that the brain is always moving toward integration, we may be able to relax and be responsive to this person’s emerging experience in the certainty that he or she knows just what to do—with support. In working with families from different cultural backgrounds, we may find that the outward norms for playing and relating in general may be different, while also knowing that the underlying systems for play and attachment are similar in all people. Respecting and moving with the outer differences while holding the overall foundational picture can honor both aspects of our systems.

For Julia, repeated experiences of entering these embodied implicit memories within safety and play, and being met with sustained presence and reflection, built

those all-important connections between the limbic region and prefrontal cortex that were gradually expanding her window of tolerance, as reflected in her greater capacity for self-regulation. At the same time, she was accumulating a storehouse of disconfirming experiences as my embodied capacity to stay present when she felt abandoned provided what she had needed at the time of the original experience. Because we internalize one another (Badenoch, 2011; Iacoboni, 2009), she was also taking me in as an ongoing inner companion who could help her return to calmness when the old fears might arise. At home, she could count on her parents' support when her implicit memories came to the surface, too. As Julia's implicit fears were gradually transforming, allowing security to emerge, her natural playfulness and cooperative nature began to appear where it counted most: with her family.

### Speaking for the Value of Play at Every Age

Many of us may have found that it is difficult to justify the use of play, particularly child-guided play, as a means of healing and learning. A society that is often restricting or removing recess from the school day doesn't have ears to easily hear the value of play. In spite of evidence that recess improves focus, cognition, retention, and relational capacity in our children, our fear of academic failure and the mandated need to provide certain test scores drives us toward the very decisions that undermine these most desired outcomes (Pellegrini & Bohn, 2005; Ramstetter, Murray, & Garner, 2010; Ridgway, Northrup, Pellegrin, LaRue, & Hightsoe, 2003; Sibley & Etnier, 2003). Similarly, the emphasis on using evidence-based approaches and treatment planning in the therapeutic community can lead us away from what neuroscience suggests about child-guided play: that an accepting relationship that follows the child's impulse

opens the royal road to changing the behaviors that arise out of implicit pain and fear (Wipfler, 2006).

If it is difficult to "sell" play for children, how much more challenging might it be to bring play into our work with adults? Yet our play circuitry remains central to who we are throughout our lives. Although most play scholars agree that play is necessary in the neurobiological development of children, Brown (Brown & Vaughn, 2009) draws from research and clinical observations to suggest that play is equally important for the well-being of adults. Theresa Kestly (2014) cites recent corroborating research:

Similarly, in a formal study of adult development conducted at Harvard Medical School, Vaillant (2002) concluded that playfulness and creativity were among some of the important factors that determine a retiree's sense of well-being and happiness. Knowing how to play, which often overlaps with being creative, made all the difference, according to the Harvard study, in whether retirees ended up in a sad-sick or a happy-well category.

With this research in mind, we may want to explore ways of bringing playfulness into our work with adult clients.

Actually, the playfulness is already potentially present since the circuitry is inborn. However, these neural pathways begin to be shaped by experience very early in life, and if play was not encouraged then, we may protect ourselves from the pain of feeling that loss of an essential aspect of childhood by thinking of play as silly, a waste of time, or not serious enough for the struggles of adult life. The nature of our current society and our immersion in its need for success can also undermine the possibility of play being seen as profitable. Providing serious left-hemisphere explanations for the value of certain kinds of play may loosen the constraints a bit and begin to enlist the protective parts of our adults into the cause. If play can be understood as a powerful way into the inner world, then perhaps it might be all right to experiment a bit.



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*Preparing a Space for Adults to Play*

I (Badenoch) provide enticements for my adult clients in the form of shelves of miniatures, delicious kinds of sand, and abundant art supplies, along with a few stuffed animals and an exceptionally soft blanket.<sup>3</sup> This is bait for the right hemisphere's need to express itself in the nonverbal and embodied way that is its natural medium, as well as an offer of potential experiences of comfort for tattered attachment systems. While their senses begin to get engaged with miniatures and crayons and fur, we talk about how we store painful and frightening experiences in our bodies in the form of implicit memories that are mostly out of conscious awareness but that nonetheless provide the templates that guide our lives—and especially our relationships. With whatever degree of detail seems to fit the particular person, we explore the neural circuitry of accessing and healing these memories and the relational and behavioral changes that can follow from this healing. Rather than use the word *play*, I talk about having experiences together that can modify the felt sense that is so troubling for them. This is usually enough to open the possibility of drawing or doing a tray, just to see what might emerge. What unfolds from there is often so deep and so startlingly accurate that further engagement in this way becomes easy.

*Marshall*

Some people adapt to the play environment right away, and others take more time to find their way in. Pacing and patience often win the day. Marshall, a stockbroker, entered my office for the first time, glanced around, and commented that he felt like he was in his grandmother's house because of all the knickknacks on my shelves. This impression was mildly annoying for him, but he was particularly appalled by the large black teddy bear sitting on the couch. He sat as far away from it as possible. He

shared a history of poverty and abuse, and his ongoing pursuit of financial security at all costs. What brought him to me was the sense that whenever he wasn't busy, there was an encroaching sense of meaninglessness that made him think about dying. He drank to drive it away and then found himself in an altered state on his motorcycle in the middle of the night. After he had a nightmare of killing a child on one of these drunken drives, he knew he needed help. He had come to me because he heard I was familiar with the new neuroscience, so he thought I would provide intelligent advice. Imagine his shock and discomfort as he walked into what he later called my "toy store." To his credit, he stayed put long enough for me to hear his history and for us to begin to explore ways to alleviate his loss of meaning.

I knew better than to jump right in with encouragement to play. Instead, I listened without judgment to his bewilderment about why his very good life was so unfulfilling. He pushed me to give advice, and I asked what it would be like for him that I wasn't going to do that. When he asked why not, the door was open to begin to explore the neuroscience of change, of implicit memories, of disconfirming experiences. This talk helped his left hemisphere make sense of our process and likely allowed his intellect to calm a bit, it seemed, because he began to drift toward more contact with his earlier life experiences.

One day, as he shared his mother's fear of his father and how alone he felt in the chaos, his hand drifted toward the black teddy bear and began to caress the soft fur. I breathed a little deeper to calm my excitement, to not disturb what I believed was his child's hand seeking comfort. After about 30 seconds of this contact, he glanced over at his hand and yanked it back onto his thigh, saying, "What the hell am I doing?" He was clearly frightened and somewhat disgusted by this emerging gesture. I wondered with him when he learned he was not allowed to seek comfort—and that began



our descent into the implicit depths. The safety of our relationship and the invitation offered by the environment to express these deeper needs had gotten the attention of his integrating brain, making room for the quiet appearance of this small child.

Marshall began to notice these impulses to touch the bear or the blanket, and as we began to more consciously encounter the child inside who had been utterly bereft of such comforts, his history of play started to emerge. He had engaged in structured play—baseball and other sports, learning chess at a young age because his father would do that with him, but had not had many opportunities to just romp around in free play or explore creatively with no particular purpose in mind. Now, watching children run around in the local park near his home made him acutely uncomfortable. Supported again by my sharing neuroscience information about the importance of play, he was able to grieve with and for the small boy inside him. This releasing process seemed to open a door to the sand and miniatures. Over a 2-year period, he did 38 trays, sharing a saga of chaos and terror without words, and gradually finding the joy inside the playing. As we moved into our second year together, we laughed more, told dumb jokes, and had some verbal sparring matches with the sparkling eyes that characterize adults with their play circuitry flourishing. Near the end of our time together, he told me that the turning point had been his hand moving, without his knowledge or permission, toward Montgomery Big Bear (with whom he was now on a first-name basis). He shared a most tender story of how his father removed both his teddy bear and his blanket the day he went to preschool. He said something had broken inside him that day that we had now repaired.

### ***Play Will Find a Way***

Marshall's reluctance to play was an adaptive protection against all the losses he had

suffered, and I have found this to be the case with most of my adult clients. Play is natural at every stage in life, so it takes considerable relational wounding to blunt this circuitry. Once we can establish an environment that is rich in safety, opportunity, curiosity, and acceptance, play will find a way—if we are comfortable with playing ourselves. If we aren't, then our hesitation will resonate with whatever reluctance our adult clients may bring and make it difficult for us to truly hold the door open while they find their path toward healing. Exploring our own history with play, with support, can help us gain a felt sense of how our early lives shaped our circuitry, and open those neural pathways to joyous expression and engagement now.

We have personally found it worthwhile to spend the time and energy to learn enough about interpersonal neurobiology and the science of play to offer bits and pieces of this wisdom at the right empathic moments to young ones, teens, adults, parents, teachers, and anyone else who will listen. Our society has grown so inhospitable to free, interpersonally engaged play that it needs wise voices to continue to create a potential space for this essential activity to flourish. One additional benefit may be the creation of a perspective and foundation that support our ability to be more present with our clients of all ages because we have a deepening sense of what is unfolding inside them. Although neuroscience is in its infancy, dedicated scientists such as Jaak Panksepp and Stephen Porges and seminal theoreticians such as Daniel Siegel and Allan Schore have devoted decades to uncovering the pathways of safety and play as well as building systems of understanding from the science. They have opened windows to help us appreciate why play offers such an optimal environment for change. As we are able to picture these pathways of healing more clearly, our systems can relax into presence, openness, and care—the essential relational supports for the people who come to us.

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*Kevin*

Let's finish as we began—with a story. Scott, one of our colleagues, told us about Kevin, a 16-year-old young man who had been setting fires for the last 2 years, being dragged into his playroom by the boy's terrified mother. She had selected Scott as the counselor because he had a reputation for being unfazed by resistant teens. Kevin was not much interested in talking about what he had done or anything else, but he became seriously intrigued when Scott began to share his understanding of what is happening in the dynamic and sometimes challenging adolescent brain. Kevin, who had also been in trouble for his colorful and profane graffiti creations, grabbed the large paper and markers to begin drawing his own embodied brain. Interestingly enough, most of the drawings included flames—some in the region near his limbic system, some emerging from his hands and feet, and some jetting out in front of him toward an unknown target. He rarely spoke more than a few words, but filled the hours with the wordless narrative of his art, the expressions on his face, the movements of his body, and the increasingly full space between him and Scott—who watched, reflected, and held the process with respect for this young man whom he saw working so hard.

Kevin occasionally looked at the sandtray figures, something Scott noted but didn't speak to. Then one day, Kevin said, "You know, it's really stupid to have these toys in here." Having declared his adversarial position, he got up and took a single figure, a man made entirely of flames, from the shelf and placed it in the sand. They contemplated his creation in silence together for a full 5 minutes. Then Kevin retrieved the fire extinguisher and placed it next to the fiery man. He sat down, saying, "Really stupid, man." He never set a fire again. Even in the face of apparent resistance, play can often find a way. Scott and Kevin continued together for 2 more years, moving, often

wordlessly, through his early history with a violent, abusive father and terrified, impotent mother. Throughout their process, Kevin's words maintained his sarcastic, protective stance, while his body found a way to express and heal the pain and fear. Such is the power of play.

## NOTES

1. Julia is a composite case drawn from several young ones cared for by Theresa Kestly.
2. Jaak Panksepp capitalizes these words to indicate that they have a special meaning in regard to the emotional-motivational circuitry of the brain in both mammals and that special subclass, humans.
3. In this section, Bonnie Badenoch talks about her work with adults, combining several people she has seen in therapy in her stories.

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GAINS 2015 Special: The Power of Play

Our society has grown so inhospitable to free, interpersonally engaged play that it needs wise voices to continue to create a potential space for this essential activity to flourish.

Badenoch & Kestly



Thanks to the authors, books editors Anne Stewart and David Crenshaw, and Guilford Press for permission to reprint this chapter. Check out the entire book [here](#).

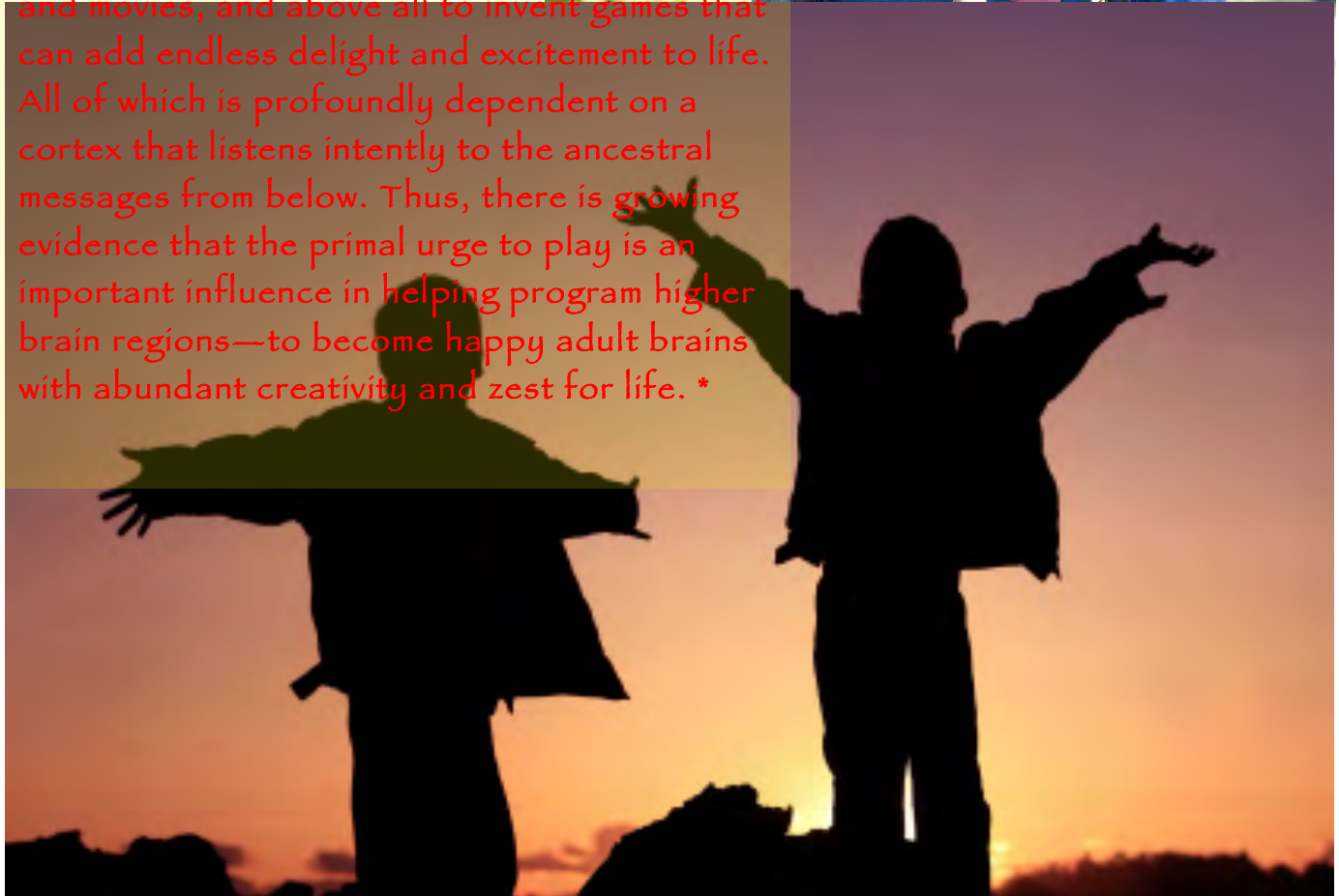
**Bonnie Badenoch, PhD** is one of the founders of GAINS, serving as President and Vice-President and launching and Co-Editing the unique publications. She is now on the GAINS Advisory Board. Her heart-filled focus on relationship, resonance, and the implicit brings IPNB from the inside out to the readers of her books, *The Brain-wise Therapist*, and *The Brain-Savvy Therapist's Workbook*. Bonnie also co-edited (with Susan Gantt) *The Interpersonal Neurobiology of Group Psychotherapy and Group Processes* and has guided many authors along the path to publication. She is the co-founder of [Nurturing the Heart with the Brain in Mind](#), through which she provides consultation and trainings, including immersion programs in the Pacific Northwest, in her powerful blending of IPNB, sand tray, and inner community work.

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Although our understanding of the neuroanatomy of PLAY circuitry remains in its infancy, we can be sure that this primary-process emotion is organized at subcortical levels of mammalian brains. This does not mean that higher brain regions have no function in play. Of course they do, most especially in the symbolic play that leads many of us to love to play musical instruments, to act in theatrical productions and movies, and above all to invent games that can add endless delight and excitement to life. All of which is profoundly dependent on a cortex that listens intently to the ancestral messages from below. Thus, there is growing evidence that the primal urge to play is an important influence in helping program higher brain regions—to become happy adult brains with abundant creativity and zest for life. \*



\*Jaak Panksepp and Lucy Biven, (2012). *The archaeology of mind: Neuroevolutionary origins of human emotions*. (p. 365)

## Philosophical Reflections

reprinted from GAINS Quarterly, Winter 2008, pp. 25-33

### Locating the Fractal Self through Play

Terry Marks-Tarlow, PhD

Reflecting on the value of play for children, one theme emerges out of my interest in and attention to fractals. Perhaps unstructured, imaginative play is a means by which our genetic inheritance and relational influences are woven into an integrated fractal whole. While there is no direct scientific evidence about this, we can draw hints from the stories and experiences below.

Between the ages of 6 and 12, when W.H. Auden was a little boy, he had the run of the Pennine Moors in North England. He constructed a game

for his own amusement, returning to it again and again. Auden would build a miniature, private and very sacred world within the surrounding limestone and lead mines. One day Auden faced a “crisis” point, when he was forced to make a moral choice between two types of machines—one more beautiful, the other more efficient. Auden “did his duty” by choosing the efficient machine, while forcing himself to resist his aesthetic preference. This event, although minor, stuck in Auden’s mind, because it highlighted the following lifelong lessons:



W. H. Auden

Firstly, that the construction of any secondary world is gratuitous, not a utile act, something one does, not because one must, but because it is fun. One is free to write a poem or refuse to write one. However, any secondary world we may imaginatively construct, by necessity, draws its raw materials from the Primary World in which we all live. One cannot, like God, create ex nihilo...Lastly, any secondary world is, like the Primary World, a world governed by

laws. These may be very different from the laws of the Primary World, and may vary from one secondary world to another, but for each there are laws. (Bruner, Jolly & Sylva, 1976, pp. 584-585)

In the conclusions he drew, Auden emphasized the freedom inherent in self-expression, the positive emotions that surround intrinsic motivation, and the importance of a set of rules for any imaginary world. All were building blocks for his later passion as a poet. In the same passage



Auden stated that “a psychologist might, no doubt, be able to explain why, in my childhood, limestone and lead-mining so enchanted me; I only know that, in fact, they did.” In a previous article (Marks-Tarlow, 1989), as a psychologist jumping fields into education, I did indeed offer the following explanation:

It appears that in childhood, Auden constructed at a concrete, symbolic level an entire universe he was later to capture linguistically in his poems. Surprisingly, he missed the very concrete connections between lead mining and the lead pencils with which he later mined his ideas. (Marks, 1989, p. 209)

Auden’s unstructured play clearly set the foundation for his later preoccupation as a

poet, where he went on to create miniature worlds through language.

A second case of the centrality of childhood play to later genius, also cited by Bruner et al. (1976), is that of Simone de Beauvoir. With a childhood largely devoid of toys, de Beauvoir’s sister served as her playmate and “accomplice,” joining her in secret performances. In the most secret of all, de Beauvoir was cast as victim and martyr in the role of Jeanne de Arc. The supporting role of torturer was relegated to her sister who would use sugar tongs, little sticks and other means to inflict pain. De Beauvoir’s passion and fervor for women’s rights appear to have emerged partly out of her suffering for them, albeit it in make-believe play.



Simone de Beauvoir

Although I was unaware of fractals then, it was nonetheless the fractal aspect of these two cases (Marks-Tarlow, 1996) that caught my attention. It turns out that when we study the autobiographies of many famous artists and scientists, we can often

detect within childhood play the seeds of later creative flowerings.

Fractal geometry was discovered/invented in 1977 by Benoit Mandelbrot and is the subject of my



Romanesco cauliflower with a 3D fibonacci spiral

current preoccupation with applying nonlinear science to psychology. A fractal is an object in which the pattern of the whole may be detected in the parts. Fractals abound in nature, like a piece of cauliflower (pictured below), whose small florets carry the same overall design.

Fractals are powerful in nature, because they provide a holistic means by which growth occurs. Consider the growth of a snail shell, which, like the cauliflower above, carries the shape of a logarithmic spiral. The power of the shape is in its unity. No matter how you look at the shell, whether at the tiny scale of its beginnings or the largest scale of its terminating point, the parts bear the same relationship to other parts which form the larger whole. In *Psyche's Veil: Psychotherapy, Fractals and Complexity* (Marks-Tarlow, 2008), I extend this geometry of nature to human nature, partly by asserting that the true self, or soul, is fractal as well. Like Hillman's "Acorn Theory," put forth in *The Soul's Code* (1996) and based on ancient Kabbalistic thought, this would mean that the dynamic unfolding of the core self at different times of life reflects the pattern of the whole.

But unlike the acorn or snail shell, in the case of the human, the principles of interpersonal neurobiology assert that the shape of the self, as reflected in unique mind/body/brain patterns, unfolds as an experience-dependent product of our early interactions. We bring our genetic

inheritance, including temperament, to the exchange, and this always remains one foundation for the unfolding fractal self. Another foundation could be the circumstances of our conception.

Take me, for example. I was a "mistake," conceived 15 years after my sister, 12 years after my brother at a "wild" holiday party. Apparently, I hovered "on the edge" for a while, as my mother considered aborting me. Eventually, after careful thought and consultation, my parents decided to keep me and revitalize the family with a new baby. I am convinced that my lifelong proclivity to hang out "on the edge"—whether physically, through rock climbing, near extreme skiing or on pointe shoes; or intellectually through fringe interests, like creativity and nonlinear dynamics, with concepts like "edge of chaos"—can be traced back to these early beginnings. An interesting aspect of the fractal stamp of identity in nature, broadly speaking, is that self-similar patterns are both immanent and transcendent. That is, the fractals are immanent in pervading multiple size and/or time scales; and they are transcendent (or archetypal), in having no characteristic scale and therefore sitting outside of time.

Along with these genetic and prenatal foundations, the fractal self is also an interpersonal self, with open boundaries that allow the continual exchange of energy and information between inside and outside. Early interactional patterns shape our brains, minds, and bodies, and are internalized to

form working models which in turn shape our later interactions in self-similar fashion. Also contributing to the stew of complexity, historical and socioeconomic influences, among others, become interwoven in the individual as well. There is a holism by which the entire relational

context shapes the parts of its constituent individuals. Fractal growth patterns fit with interpersonal neurobiology's focus on individuals emerging out of the larger relationship context through the quality of their attachment and other interpersonal dynamics.



In people, the fractal pattern as a product of our genetic inheritance, intertwined with intersubjective experiences, is well captured by the drawing above, where the layers correspond to nested patterns of emotions, whose sequence and intensity is determined by the enfolding of interactional patterns with critical attachment figures.

Just as the acorn emerges out of the oak tree, in turn to beget yet another oak tree, so too do self-similar trends get passed down from generation to generation. In this way, we extend the fractal self to include expanses of space/time that are beyond the boundaries of our usual view of the individual self. Interactional patterns with primary attachment figures tune the neurology of young brains, which in turn affects later interactional patterns, including relations with our own children. Unfortunately, we see this all too readily

in the case of trauma and the early right-hemisphere deficits that carry on through life. Trauma in one generation often begets trauma in the next through the internal transmission of implicit patterns, even in the absence of similar environmental conditions.

Lou Cozolini (2006) tells a poignant clinical case of a fearful man who sought psychotherapy. Given this man's calm and successful home life, it was a puzzle at first why he was perpetually so internally aroused. Lou encouraged the man to ask some

questions of his relatives. Bingo! The man had been unaware that his family had emigrated from war-torn conditions. The family had benevolently kept this information from him in hopes of protecting him. In one of those paradoxes that I believe are foundational to every psyche, the man perceived the world as a dangerous place anyway. Ironically, the plan may have backfired precisely because this man didn't know why he was so fearful. A recent article written by Noah Hass-

Cohen for the in the *GAINS Quarterly* (Spring 2008) addressed the issue of intergenerational trauma in a very creative fashion by covering the art exhibit of Kara Walker in the Hammer Museum of Los Angeles. Walker is an African-American artist who reveals how the ghosts of slavery still haunt the collective American psyche. Inspired by the article, I made my own fractal drawing.



The title of this piece, *Hunger and Regression*, is drawn from a book called *Ego, Hunger and Regression* by Fritz Perls. What I love about Walker's work, which is often in silhouette form, is how an image can appear beautiful at first, but turns out horrifying, if not grotesque, when looked at closely.

Fortunately, it is not just trauma that gets passed on from generation to generation. The good stuff gets passed along as well, such as a passion and talent for music. Consider how many generations of Bach musicians there are. Within this family, we see the inextricable interweaving of genetics and interpersonal patterning. When it comes to highly creative individuals, the conscious beginning of the pattern often can be traced back to a "crystallizing experience," a concept first used

by David Feldman (1971) to indicate a critical moment in the life of a youngster when the mind becomes organized and focused toward a known purpose. The concept, initially referring to integration of cognitive structures, has been broadened to include the sudden, emotional selection of a domain, plus the motivation and sense of purpose that goes along with discovering direction in life (Sternberg, 1998). This expansion allows us to see these

moments as more of a whole-brained process. Given that crystallizing experiences are usually inspired by important mentors and role models, we can easily identify this pattern as beginning in the context of a highly charged attachment experience. It appears that resonance with an admired other tunes the reward circuits along with frontal lobe development necessary for discipline and persistence, setting the core self for life.

I have been using the words “core self” to describe the experience of a central essence and motivation within an individual. Core self is an interesting idea because neurobiology tells us that, strictly speaking, there isn’t a core self, but instead a series of constantly emerging states of mind that may be more or less coherent with each other. When reinforced over and over again, a state of mind gains greater probability of recurring, giving us a sense of continuity. So the subjective sense

of self may lie in an integrated set of neural nets that combine genetic inheritance with powerful interpersonal impacts of all sorts to create states of mind. When states of mind have gained sufficient strength that they become traits, they guide self-expression, and we may experience these traits as ourselves. The debate over whether the self forms a unity or is a hopeless tangle of multiplicity has been raging in psychoanalysis for years. Craig Piers (1995) first proposed that nonlinear dynamics resolves the controversy by suggesting both are true at once. We know that the brain is constantly pushing toward greater complexity, once the constraints blocking the way are resolved. We might picture the increasingly integrated and coherent brain as the place where both multiplicity (differentiation) and unity (the linkage of integration) are present at the same time (Siegel, 1999).



In Greek mythology, Mentor was the teacher and guide of Telemachus, the son of Odysseus, “Mentor” actually was Athena, the goddess of wisdom, in disguise. The archetype of a mentor, then, is one of benevolent, guiding wisdom.

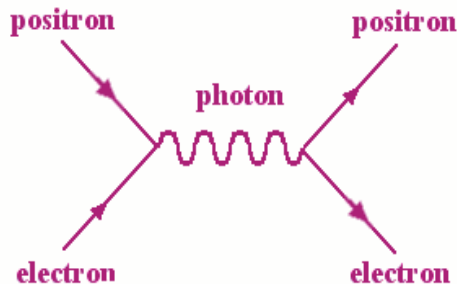
The autobiographies of famous people abound with memories of early playful interaction with

important attachment figures setting the stage for future development. The Nobel prize winning



physicist Richard Feynman (Feynman, Leighton, & Hutchings, 1997) recalls when his father placed a set of colored blocks on the tray of his highchair, encouraging him to find different patterns, perhaps triggering the curiosity and capacity for pattern

recognition so characteristic throughout the rest of his life. Dick's father also challenged his son to reason out the laws of physics that lay behind ordinary observations, such as why a ball rolls from one end to the other of a moving toy wagon.



Here is a classic Feynman diagram of electron-positron annihilation. Time normally runs from left to right. But there is another way to interpret this diagram that includes the hypothetical possibility of retrocausality. Then the electron is not destroyed, but instead becomes a positron, where it is moving backward in time – a very unique perspective.

Dick internalized his father's message—the importance of deep knowledge through coming up with one's own system for understanding—so thoroughly as to later reinvent, in fact turn upside down, the way college physics is taught. His system started with material previously considered the most advanced, working its way back to the beginning. We see here how early mentors and role models provide key early crystallizing experiences that translate into positively charged emotion, passion, focus, and motivation throughout life.

We might also wonder about crystallizing experiences that interweave negative attachment experiences with creative drive, shaping the trajectory of expression in sometimes tragic patterns. Considering artists or writers like Sylvia

Plath, we can only wonder what negative attachment experiences may have combined with her talent and her possibly genetically-driven depression leading to the creation of a terrible beauty while setting the stage for her suicide. To understand the fractal unfolding of the self from the seeds of childhood play within a framework of interpersonal neurobiology allows greater complexity than merely positive inspiration from early role models and mentors. Early seeds of later life choices often reflect negative attachment experiences as well.

Consider my own clinical experience with a patient named Ralph, whose early Shoot 'Em Up play became the fractal seed for his later professional flowering into a dedicated FBI agent. As a young boy, Ralph recalls incessantly playing



imagination games with a large group of boys from the neighborhood, all nearly the same age. Sometimes it was Cops and Robbers. Other times they would play Army. Another favorite was Cowboys and Indians. Whichever team he was on, Ralph was always highly involved in the game and usually the kid to get shot and killed.

Flash back to Ralph's family life. Whereas his younger brother was adopted, Ralph was the biological child of his parents. Compared to the calm before his brother's arrival, all chaos broke loose afterwards. Clearly suffering prenatal damage from his drug-addicted mother, Ralph's brother's frontal lobes never did develop properly. The boy was hyperactive, aggressive, and

impulsive from the start. He later hardened into a criminal in and out of detention halls and then jail for most of his early adult life. Although Ralph's mother did everything she could to address the problems, trotting the boy from one professional to another, nothing seemed to help. The entire family was centered around this drama, the stress of which appeared to trigger manic-depressive episodes in Ralph's father. Meanwhile Ralph's mother developed ovarian cancer and died at an early age. Ralph admired his self-sacrificing mother, while holding contempt for his ineffectual father. Early on, Ralph learned to emulate his mother, being "good" by being highly compliant, turning off any feelings or needs that might drain the meager family resources.



Especially in the 1960s, Cowboys and Indians was a classic childhood game modeled after a host of Western programs that appeared on television.

We can see how Ralph's childhood games expressed the whole of his family life. They provided a safe, titrated way to partake in and master the violence that was tearing his family apart. They enabled him to experience both sides of the law, themes played out to this day in his role

As an undercover agent in his professional life.

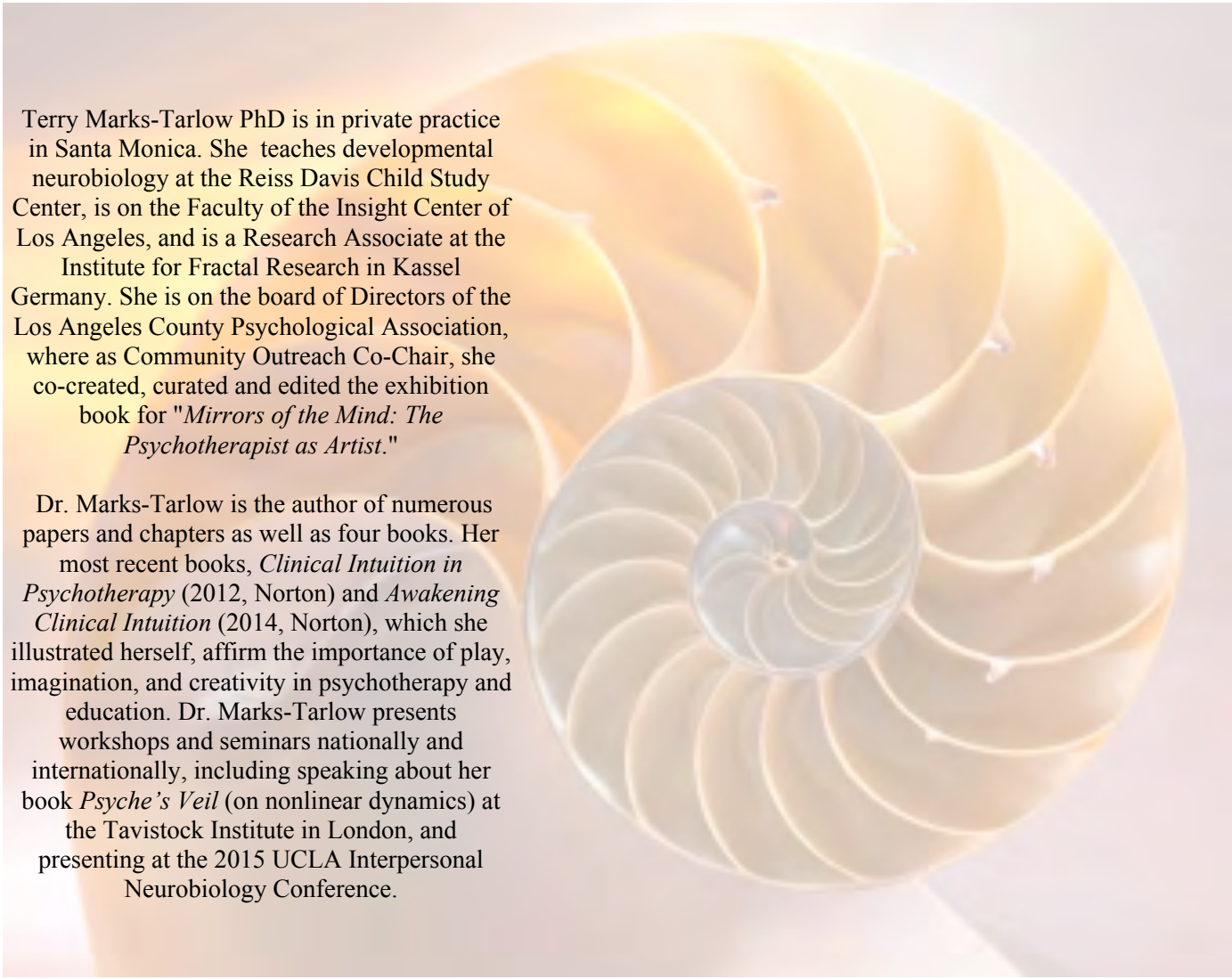
Ralph has a highly nuanced view of his work, partly because he is able to use his early attachment and empathy for his brother to infiltrate and remain compassionate with the

criminal mind. Meanwhile, just like his early socialization with the neighborhood boys, Ralph is

still a team player among the other agents, driven by passion for the work and compassion for others. Although still a bit too willing able to sacrifice his individual needs for the good of the group, we're still working on that...

Both in cases of extraordinary genius or ordinary dedication, positive and negative early relational experiences are instrumental to forming a fractal self that continues to unfold throughout life. Through unstructured explorations in play space, we all gain the capacity to weave our genetic inheritance with the intersubjective threads of our

lives into an integrated fractal whole. This view suggests that unstructured, imaginative play may be central in coloring the necessary passions, intrinsic motivation, focused attention and drive states critical to defining later professional development as well as self-expression. To my knowledge, there is no direct neurobiological research to this effect. But if unstructured, imaginative play truly does allow children to orient themselves in social space, then we must beware! Parents who place their children in highly structured and supervised environments may be inadvertently robbing them of the early conditions necessary for the unfettered emergence and unfolding of the fractal self from the inside out.



Terry Marks-Tarlow PhD is in private practice in Santa Monica. She teaches developmental neurobiology at the Reiss Davis Child Study Center, is on the Faculty of the Insight Center of Los Angeles, and is a Research Associate at the Institute for Fractal Research in Kassel Germany. She is on the board of Directors of the Los Angeles County Psychological Association, where as Community Outreach Co-Chair, she co-created, curated and edited the exhibition book for "*Mirrors of the Mind: The Psychotherapist as Artist.*"

Dr. Marks-Tarlow is the author of numerous papers and chapters as well as four books. Her most recent books, *Clinical Intuition in Psychotherapy* (2012, Norton) and *Awakening Clinical Intuition* (2014, Norton), which she illustrated herself, affirm the importance of play, imagination, and creativity in psychotherapy and education. Dr. Marks-Tarlow presents workshops and seminars nationally and internationally, including speaking about her book *Psyche's Veil* (on nonlinear dynamics) at the Tavistock Institute in London, and presenting at the 2015 UCLA Interpersonal Neurobiology Conference.



### Did you know...

that we're all born with a Play System, a built-in drive to run, climb, and otherwise exercise our bodies? When children don't get enough physical play, that impulse will come out anyway, often through disruptive play to release the built-up energy. Research is showing that when schools want to curtail or eliminate recess and PE, they are writing a prescription for an increase in ADHD.\*

\*Margot Sunderland  
*Science of Parenting*



# Curiosity for Possibility: a playful potential

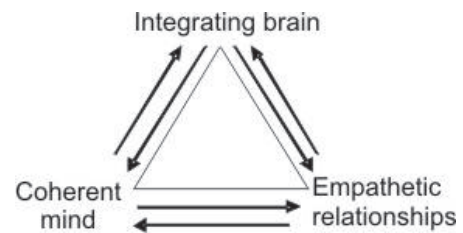
Richard Hill, MA, MEd, MBMSc, DPC

Jaak Panksepp introduced the idea that play and playfulness were pleasurable activities that even rats would enjoy (Panksepp & Burgdorf, 2003), leading to his nickname as the ‘rat tickler’. His investigations of the nature and effects of play—unregulated, self-organizing activity—opened doorways to investigation in numerous areas. Positive psychology and particularly the work of Barbara Fredrickson and her Broaden and Build theory (Fredrickson, 2001) were particularly important in the development of our investigation of positive aspects of mental and emotional experience. So much of the literature was focused on the negative and diminishing emotions. As Fredrickson points out, negative emotions have more specific outcomes, whereas positive emotions are harder to pin down to a predictable response. This makes it more difficult to work within limiting scientific parameters.

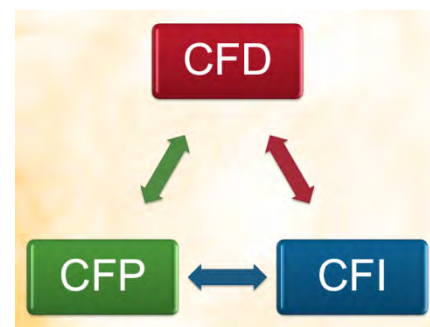
Great minds have emerged from playful people, Einstein, for one, and my mentors Ernest and Kathryn Rossi to name others. Being playful did not restrict their capacity to be serious and productive and, in many ways, their serious work was enhanced by utilizing playfulness in the development of their theoretical work. Einstein is reputed to have said, “Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand.” This quote seems to offer something more than just the moment of playful mental imagining. It says to me that knowledge is a limited set of something that is much more complex and important. It suggests that knowledge comes from investigation of what is not known. One must imagine something that is beyond what is known and that stimulates my curiosity. Having said that, I realize that I don’t really know much about curiosity. I wonder how curiosity might be connected to play, to investigation, to seeking and to possibility?

Curiosity seems, at first glance, to be quite simple—we are curious about what we don’t

know—but looking deeper shows more complexity. In a similar style of analysis as done in IPNB to differentiate the fundamental components of well being into three irreducible elements of mind, brain, and relationship (Siegel, 2010);



I suggest that curiosity can also be best described as an interactive and integrated triangle of elements that can be differentiated, but not reduced. Two of the elements are well known in the literature and so I will use the established descriptions: *curiosity for deficit* (CFD) and *curiosity for interest* (CFI) (Lowenstein, 1994; Litman & Jimerson, 2004; Litman, 2005). In concert with these is the important, and necessary, *curiosity for possibility* (CFP) (Hill, 2014).



- CFD is the application of curiosity to a something specific. This is curiosity for what is not known, to fill a lack of knowledge, of understanding, of experience or of perception. Curiosity, though not dependent on the cortex, can be generated in response to top-down thinking. Determining what to be curious “about” can begin as a cognitive, rational process. This is the context of Curiosity for Deficit (CFD). Dr Aubrey de

Grey describes it as curiosity in relation to a specific and pre-determined goal.

- CFI is a wonder, an interest, a fascination in whatever is happening now. This is a pleasurable and playful curiosity that is often seen in children, but also in adults when the weight of responsibility for past or future is lost in the pleasure of playful exploration. CFI is the type of curiosity seen in children as they engage with the world in a moment by moment way – “What’s that... what’s that... what’s that... why... how... where?” These are the 1000 questions of the curious child who moves on almost immediately from the answers to the next wondering.
- CFP is also wonder, with an interest and fascination in *what else is possible* because of whatever is happening now. This utilises our natural creative capacities for metaphor and representation; for our search for meaning and self-reference; for what else might be; and what might be created. CFP is an expansive process that is future oriented and linked to the emotional drives of seeking, care and play. In as much as CFD is a top-down process, CFP is more of a bottom-up process.

As we know with the triangle of well being, if you limit the attention and activity of one or more of the elements there can be an imbalance of well being due to a disruption of integration and interaction. I believe it is reasonable to describe our society as being overly focused on CFD.

Our education system is very much based on what we don’t know and it is too easy to get stuck in the system of what is known or not known, at the expense of enjoying play or seeking growth. I believe this leaves us in a

precarious situation for developing health and well being.

It has become too easy to forget that knowing is not always about growing. Knowing is certainly about filling in gaps, the missing bits, and it can certainly feel satisfying and even exciting. Play is mostly about the timeframe of the playful experience. Possibility, however, is always about growing. It is the element of curiosity that is beyond the finite satisfaction of finding out what you don’t know, or the ‘in the moment’ pleasure of spontaneous play. Possibility opens the doorway to transformational growth and progress. Without doubt, the process of seeking knowledge and the openness of play stimulates curiosity for possibility, but what distinguished CFP is that growth is predominantly about the future. Growth is change—and change happens to what exists now to create something different in the future.

Here lies our first barrier or disruption of curiosity for possibility—too many people are fearful of the future. This generalized, chronic fearfulness of future is a major contributor to anxiety and depression. We fear the future because we do not and cannot know it. The future is not predictable—and many would like it to be. It is a deficit in our knowledge, often experienced

as a stressful deficit. We are not curious about an unpredictable future, we are afraid. This makes us feel unsafe. Many people can only feel safe when the future is known, but, of course, the future is unknowable: Catch-22. The simplest, and I suggest the best,

way to alleviate our fearfulness of the future and our hesitancy for growth, is to open the window of curiosity for possibility. The curious mindset stimulates changes in the biochemical milieu of the brain and neural activity that turns on our natural process of creating the substance of our



future from the ingredients of our present. We must open ourselves to the future when we grow because growing is about becoming something more. Curiosity switches a fear of the future into positive expectation of the future.

Unfortunately, the negative effect of future fearfulness is used against us in a host of socio-economic situations. If I wish to contain and control you, I simply need to disconnect you from believing that you can safely generate your future and convince you that something else will give you a predictably safer future. Think about the way we are marketed to, sold education, drawn to various external ideas and beliefs: “If you buy this product/belief/instruction today, your future will be okay, it will be better”. That is not personal growth. That is taking a gamble that the future will be okay because of the product or belief or instruction being supplied. Personal engagement is sacrificed for security and predictability. If the product or belief or instruction doesn’t work, then the outcome is failure, loss, disappointment and a host of other negative emotions that only act to turn curiosity off. When you create the future from the frame of your own possibilities, the future is no longer your enemy to be feared, it is an exciting place of outcome for the growing you.

In my studies, I spent some time in the field of education and the similarities and parallels with psychotherapy always fascinated me. CFP is something that has been practiced by teachers and therapists alike for generations. Curiosity is usually something that teachers try to stimulate toward a particular subject, which is usually determined by the curriculum, but it is often strictly framed in CFD. This is also the case in therapy when we are too constricted by the method and the manual. Milton Erickson was famous for encouraging therapists to act responsively to the client and to utilize what was helpful in that moment. You have to be pretty curious about your client to be that attentive and responsive. So, it is not just the client that benefits from curiosity. In fact, it is best as a shared experience—the relational connection of the triangle of well being.

It is important to be clear that both CFD and CFI can and do act as stimulators for CFP. It is a

dynamic triad. It is, however, CFP that generates the discovery of meaning and purpose and the revelation of new possibilities. Therapeutic processes like sand-play and art therapy tend to begin in play and later expand into meaningful possibility. Milton Erickson was renowned for sending people on a quest of discovery, knowing that it would also enable deeper and transformative engagement with unknown possibilities.

In the teaching profession, there are examples of stimulating *learning* by utilizing curiosity as an *initial condition*. There is a plethora of useful, accessible data in film and video recordings of documentaries, docu-dramas and dramas depicting the educational experience. Turning students on to be curious about the wonder of learning can be very difficult, but example after example finds that the tables are turned when the students believe that there is possibility in their lives. It is very difficult in therapy to encourage a client to be curious about what is troubling them. How can we be curious about depression and anxiety, especially when those affective states are suppressors of curiosity? Einstein told us that it is very difficult to solve a problem from the same consciousness that created it. That is not to say that we do not work with the same memories, processes and mechanisms that are available, but we also change the state of consciousness to a curious state.

*Curiosity is the cure for boredom.*

*There is no cure for curiosity.*

Attributed to Dorothy Parker (1893-1967)

In the dramatic film production, *The Freedom Writers* (DeVito, 2007), we experience a situation that is concerned with both learning and therapy. This serves as a good example. The film begins in the childhood years of one of the students witnessing a drive-by shooting. Her voiceover tells us, “... and I saw the war for the first time.” The story follows the experiences of teacher, Erin Gruwell, in her struggles to teach at a school which brought in (bussed in) minority students from disadvantaged neighbourhoods. In a memorable scene, Gruwell draws a line on the floor and asks students who know someone who has been killed to step over the line. Every student steps across. As Gruwell increases the number of people who have been killed many

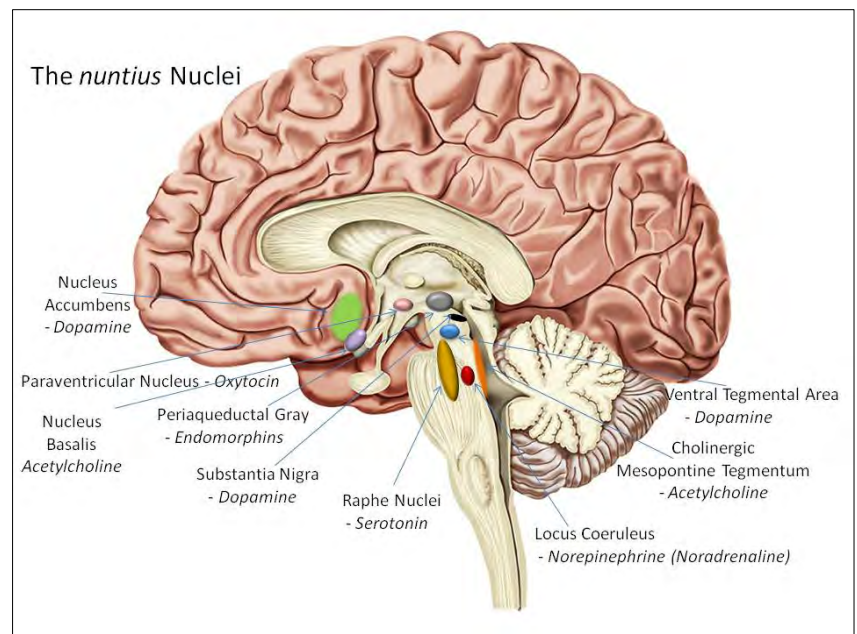


students stay put. Their pain and discomfort and their total lack of curiosity is obvious. Their lives are about survival, not adventure or exploration. Gruwell tries to reach out to the students and is finally successful when she takes them to the Jewish Holocaust Museum. For the first time the students' minds were opened to possibilities they had never contemplated. Gruwell took them to visit Holocaust survivors. Their curiosity about these people who had suffered beyond their own suffering was the big opening for change. Gruwell had asked them to write their stories, which they gradually did. The stories were eventually published as a book.

Gruwell shifted their mental state from one of stress, of chronic sympathetic nervous system activation, to a state of wonder and interest in something outside of themselves, something that gave their lives some meaning and especially some perspective. This allowed them to grow as people and also grow as students. They began to play and learn *and* grow.

It is not uncommon in therapy to spend a lot of time finding what's missing, what's wrong, what needs to be fixed, what we know and what we don't know (CFD). Each case is different and working out what we don't know can be important, but not at the expense of CFP. Ernest Rossi calls it "the symptom path to enlightenment" (Rossi, 1996), or as I simplify to, "what can we create with this?" (Hill, 2006). Curiosity promotes a "towards" state, so we become less fearful when curious. We are better able to investigate what we don't know in the curious mindset. What the story of the Freedom Writers embraces, similar to the growth and transformational processes of psychotherapy, is both the trauma and the question, "what can we do with that?", "where can we go with that?". Curiosity enables us to reduce fearfulness, which allows us to become more adventurous, exploratory, even playful, and creative. These qualities become possible because the brain's energy and information is flowing in a particular way that is very different from the flow when stressed, fearful and traumatized.

The neuroscience that lends some explanation to how this change occurs in the brain is both fascinating and perhaps too complex to address within the limitations of this article, but is based around the various nuclei and formations in the upper brain stem and lower midbrain that give rise to the neurotransmitters that determine brain activity. We can stimulate these regions and the curious mind with cognitive purpose—top-down—and we can stimulate curiosity from the bottom-up, to frame cognitive processes in the parameters of positive anticipation and growth. This brain image shows the names and location of the regions involved in producing the neurotransmitters involved in curiosity, which I have named the *nuntius* nuclei from the Latin word for messenger.

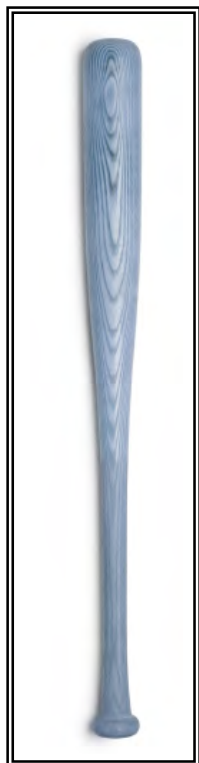
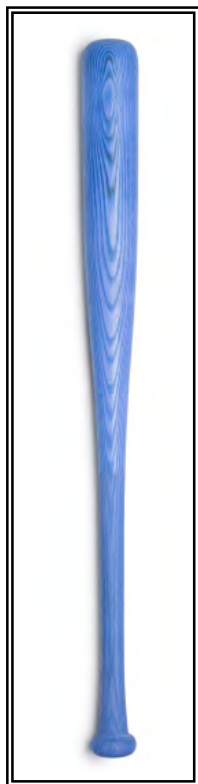
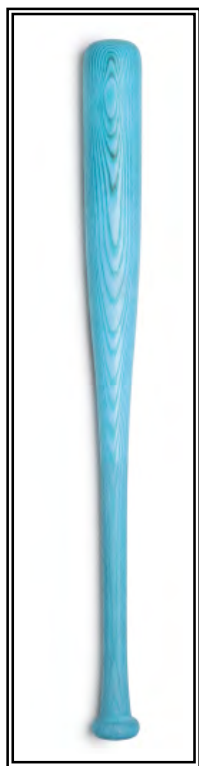


Certainly, through play, we are able to stimulate curiosity, as can be done with wondering about what we don't know, but, I suggest, these fall short without the equal, and even stronger, participation of curiosity for possibility. We use play to reduce the negative impacts of the future and the past. Play is such a present moment activity. This is not dissimilar to mindfulness, although very different mechanisms, but it is the growth that emerges from engaging in possibility that creates change and transformation. If we can begin therapy or teaching or relationships or problem solving or pretty much everything in a curious for possibility state of mind, then, perhaps everything and anything is possible. That seems like a good place to start.

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A classic syllogism goes: “Johnny has a bat. All bats are blue. What color is Johnny’s bat?” This is the kind of question that would

invoke panic in me. I reasoned like this: “Well, if all bats are blue, and Johnny has a shred of individuality, he’d want his bat to look different. Blue is traditionally the color of sadness, the Virgin Mary, the sky—maybe he’d prefer a color that better reflects his mood or goals. I’ve noticed that shadows really aren’t black, they’re blue. Would he want a bat the color of shadow? Blue is a color easily affected by changing light. Do blue bats appear lifeless at dawn, but jewel-like at high noon? Are all bats the same size? Are they crafted of different woods, whose grain might absorb the paint more deeply?

What sort of blue is it anyway—pearly, sapphire, luminescent?” I was altogether too strange to pass Logic.

Diane Ackerman  
*An Alchemy of Mind*



## Department of Education

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### How Teachers Gain Wisdom from Students

Kirke Olson, PsyD

Education in the United States is a vast undertaking, and arguably the only institution that directly affects all members of our society. If media reports and anecdotal evidence are correct, this institution is currently focused on measurable outcomes (i.e., test results) to assess its success, rather than more complex evaluations of overall student development. The focus on test results, along with education's longstanding bias that teachers pass learning down to students, creates a unidirectional focus, starting with the information dispensed from teachers and ending with student scores. This emphasis means we are not able to make full use of the positive power of the bidirectional nature of the teacher-student relationship in which student and teacher can both gain neurobiological and relational benefits. GAINS Advisory Board member Lou Cozolino has a lot to offer teachers with his cogent argument for the way children and caregivers of all sorts influence the development of each other's brains.

Lou's book, *The Healthy Aging Brain* (2008), begins: "From conception to death we impact and are impacted by the biology and behavior of those around us, and depend on the scaffolding of others for our survival and sustained well being. In essence human beings are social animals and the human brain is a social organ" (p. 13).

At the outset of his second chapter he goes on to state,

The neural circuits of the social brain are referred to as *experience-dependent*, because they are shaped by the child's interaction with caretakers. These same social brain networks remain plastic (i.e., flexible) throughout life and are the very ones that adults rely upon to nurture one another, be

good caretakers, and keep their brains alive. *Because of this, when we nurture our children, we not only build their brains but we rebuild our own as well. Playing together triggers neural plasticity and neurogenesis in both brains... we need children as much as they need us.* (p. 35, italics mine)

The positive power of the teacher-student relationship on student achievement, behavior, and emotions is clear from a wealth of educational research. Jeffery Cornelius-White's (2007) meta-analysis of over 1,000 articles summarizing 119 studies dating from 1948 to 2004 on the student-teacher relationship revealed two parallel views. The first is the classic view of the relationship from psychology and Carl Rogers (1969) who stated, "Certain attitudinal qualities which exist in the personal relationship between the facilitator and the learner yield significant learning" (p. 106). Back in 1969, Rogers hinted at the possibility of bidirectionality in the relationship when he stated, "Facilitation requires at least an initial genuine trust in learners by the facilitator, followed by the creation of an acceptant and empathic climate" (p. 109). However, even with Rogers' respect for the power of empathy, he doesn't talk directly about the impact on the teacher. In all fairness, until the discoveries of the new neuroscience helped us explore the impact on both brains in relationship, it would have been difficult to fully appreciate the magnitude of the mutual impact.

The second and more contemporary view from the field of education is the "learner-centered model," which combines a concern for the teacher's relationship with the student with a focus on learning itself. It is rooted in the American Psychological Association's (1997) 14 learner-centered principles. However, these studies remain

in the unidirectional tradition of education, so the Cornelius-White meta-analysis focuses on teacher relational variables and treats student and learning variables as merely outcomes. The relational practices include teachers honoring of students' voices, adapting to individual and cultural differences, encouraging learning and thinking, and having learner-centered beliefs. In other words, what is the outcome for the student when the teacher focuses on creating a positive teacher-student relationship? Quoting the conclusions:

Overall, learner-centered teacher variables have above-average associations with positive student outcomes. ...*Positive relationships, nondirectivity [student initiated and directed activities], empathy, warmth [unconditional positive regard], and encouraging thinking and learning [as opposed to memory-focused tasks]* are the specific teacher variables that are above average compared with other educational innovations. Correlations [with student] participation, critical thinking, satisfaction, math achievement, drop out prevention, self-esteem, verbal achievement, positive motivation, social connection, IQ, grades, reduction in disruptive behavior, attendance, and perceived achievement are all above average and are presented in decreasing order. (p. 134)

Let's look again at the list of teacher variables that this meta-analysis shows have a positive impact on student learning, and briefly consider these variables to see what IPNB and *The Healthy Aging Brain* might add from a bidirectional point of view.

Positive [student-teacher] relationships: In *The Healthy Aging Brain*, Lou describes the neurobiologically beneficial impact on the brains of both people in a positive relationship (i.e., a

relationship promoting secure attachment). This impact specifically affects the strength of synaptic connections in the orbitomedial prefrontal cortex (OMPFC) and between the OMPFC and the limbic regions of both the adult and the child. In other words, teachers as much as students benefit neurobiologically from a positive relationship.

Nondirectivity [student initiated and directed activities]: While it is not feasible for school to be completely nondirective, research on the benefits of play suggests that including elements of student-led exploration may improve learning and build brains that are tuned for self-regulation, sustained curiosity, and perseverance in pursuit of a goal (Sunderland, 2007). Lou talks about how parents and grandparents know that the most brain- and relationship-building kind of play is when the child directs the activity and the adult joins the child in his or her imaginary world, be it being a guest at a

tea party, or an assistant in the construction of a Lego castle. In the spirit of bidirectionality, we also know that child-directed play improves the functioning of the OMPFC in the adult while strengthening security of attachment between the two.



Empathy: Lou notes that complex processes like empathy activate many cortical and subcortical regions, including the anterior cingulate, insula, and the OMPFC, in conjunction with the temporal and frontal systems required for cognitive and semantic processing. His point is that complex activation, such as that required for empathy, leads to the development and integration of brain systems that allow for the possibility of wisdom in the older adult. (For a heart-warming explanation of empathy by way of a story, I refer the reader to *The Healthy Aging Brain*, pages 258 - 262.)

Warmth [unconditional positive regard]: Warmth and empathy go hand in hand, and create an environment conducive to contingent communication – one key ingredient in relationships that promote secure attachment. Lou



notes that to sustain a stance of unconditional positive regard, which involves the capacity to be aware of judgments without acting on them, the individual cannot simply react rashly to the primitive drives of the limbic region, nor can he or she ignore these drives. The teacher must attend to and organize them in order to attune to and resonate with the student. This involves integration of many circuits. The temporal lobes may contribute an analysis of the perceptual and functional aspects of the situation while the networks of the social brain (OMPFC, cingulate, amygdala, insula) become activated when the teacher maintains the capacity to observe judgments and then act in compassionate way. As Lou says, “To act wisely, we have to simultaneously be aware of our own biases, inhibit impulses that would make us act rashly, and be empathic and caring toward others, all the while applying our intellectual abilities to complex situations” (p. 172). So like empathy, warmth helps the teacher develop the brain circuits that can help maintain healthy cognitive and emotional functioning as he or she ages.

**Encouraging thinking and learning:** While this is important at any age, it is particularly salient when the students are teenagers. Lou notes that when an adolescent meets a new attractive idea, he or she tries it on and it often feels like the final and best idea. The adolescent then defends this new idea against all challenges. In their search for absolute truths, adolescents hold themselves and others (especially teachers and parents) to high standards based on their newest and best abstract ideal. Many

will use their identification with the ideal to remain free from blame, avoid disagreements, and place responsibility on others. A teacher who maintains a positive relationship with an adolescent student understands this normal developmental process and encourages it for learning and thinking. In addition, the brains of those teaching adolescents certainly get plenty of exercise in controlling internal primitive drives (i.e., using the OMPFC to calm the amygdala).



As we stand back and look at the big picture, we can see that all these bidirectional processes build and sustain the integrative circuitry of teacher and student brains. When the relationship between these regions of the brain is well developed, we experience increases in empathy, intuition,

attuned communication, regulation of the body and emotions, morality, flexible responses, self-awareness, and a decrease in fear (Siegel, 2007). On this last point, Steve Porges (2007) teaches us that in an atmosphere that we perceive to be safe, our nervous systems allow us to connect with others and we are available for new learning. The beauty of all this is that there is benefit for everyone – one hallmark of a brain-nurturing interpersonal system. As awareness of these neurobiological truths takes root in society, the culture of education may gradually be able to change to one where teachers see themselves as mentoring the development of their students' lifelong capacity for learning and relationships, side by side with sustaining their own brain health and capacity for nurturance and wisdom.

**Kirke Olson** is a New Hampshire licensed clinical and school psychologist, who sees himself as an "IPNB applicator" and has served on GAINS Executive Board for years. He applies neuroscience (IPNB) and positive psychology with his clients and in his school consultations. Kirke's first book, *The Invisible Classroom*, was awarded an honorable mention as a favorite book of 2014 by Greater Good and recommended by the Association of College and Research Libraries. With his wife, Sher Kamman, (also a licensed psychologist), he offers trainings for therapists and workshops to help people create a life they would love to live. For more information about Kirke, check out his website at [www.ThePositivityCompany.com](http://www.ThePositivityCompany.com).



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# Play, Laughter, and the Path to Real Connection

## Patty Wipfler

One of my more powerful experiences with play as a force for healing and connection occurred over the course of four years of work with a group of African-American children, ages three to ten, in which we were doing both homework support and *Playlistening*, my word for play that allows children to have the upper hand so that the usual power structure between them and the adults they are with is reversed, leading to laughter and glee. We did, of course, set limits when we needed to in this group, but we set limits by moving in to create a physical limit, rather than by announcing the limit, and then becoming upset when an off-track child couldn't respond to what we were saying. We set limits playfully when we could. Effectively, but playfully.

The other piece of background regarding this little saga was that the mothers of these children were all poor, half were jobless, and several were in poor health as well. One was disabled and in a wheelchair; another had diabetes, had lost all her teeth, had no dentures, and could not read. (How can a mother be left like this with no available resource in the United States in the 21st century?!) The mothers were all involved in a support group for the two hours our play group met. To make these two groups possible, the mothers and children had dinner together, provided by a local hotel, before their support group met each week. It was an intense effort that involved many volunteers and community good will to provide play, food, and emotional support for these families. Two out of ten of the mothers involved had a husband. Four had regular work of some kind; most of them were paid minimum wage. The rest were either single moms from the start, or had been raising their children on their own after a divorce.



Sam (not his real name) was the only son of the most highly educated of the mothers. He was seven when he first joined our group. His mother had suffered through abusive experiences as a young person, and hated to touch others, or to be touched. We never saw her touch Sam, or smile at him. When Sam first started with us, he would play with other children a little, hang out on his own often, and would not engage with any of our adult volunteers. He would keep moving to another part of the playroom inside, or the play yard outside, when one of us would approach. And he most emphatically did not want to be near me. When it was homework time, after an hour of play, he would seat himself against the far wall of the room, and keep his eye out for me. When I entered the room, he would scream at the top of his lungs. He didn't stop until I left.

After trying to come closer, and finding that this increased the intensity of what I figured was his fear signal, and didn't soften things between us at all, I kept my distance for awhile. I decided to allow him to be in charge of our relationship, but I didn't give up trying to make contact with him. I didn't stop going into the room if I had a reason to be there, and when he screamed, I made eye contact with Sam, nodded in a friendly way, said some kind of hello to Sam, then went about my business and left when it made sense. This continued for the whole first year he was in our program. Patty approaches, Sam screams, we all just hang with it. Patty leaves; Sam stops screaming and gets back to his homework, but keeps his eye out again. Needless to say, other volunteers did more homework support than I did that year!

The next year, I welcomed him warmly, and he changed his strategy. In this group, we did a lot of physical play—chasing, pillow fights, horseback

rides, goofing around, anything to get laughter going (anything, that is, except tickling). The kids choose how they wanted to play, and we paid warm attention and were delighted when they were up for the games that brought laughter. We made eye contact whenever we could. So this year, Sam began to playfully "bait" me. He would sneak up behind me in the play yard, and give me a little swat on the behind. I would turn and say, "I felt that! Was that you again, Sam?! OK, every swat earns you a big hug from me!" and chase after him. He would grin from ear to ear. He was usually faster than I was, but I gave him a good chase, one in which he could laugh at having "got" me, and then laugh again at my attempts to "get" him back with hugs. We were all over the yard for long periods of time. I would fail to catch him, stop to catch my breath, wait "innocently" until he could sneak up on me again, and keep our game going by running after him again. I would tally up hugs I owed him, and make a big deal about my plans to deliver them. Sometimes, I could manage to give him a big bear hug, which he would wriggle out of quickly. It was fun, and I was very happy that we'd gotten out of the "scream when Patty looks at me from across the room" stage. He was finally relaxing with us, and was setting himself up for lots of connection.

We did this game weekly for a good two years--pretty much the same game every time we met. I explored every nuance of being lightheartedly determined, exasperated, and dismayed at my inability to catch him.

Sam turned 12 in his fourth year with us. He was as tall as I was, and heavier. He chose to venture into pillow fighting with me. We had a few good contests, and wrestled a bit. Then one evening, he said he wanted to "*really* wrestle," and his tone was earnest and expectant. He threw himself into showing me how strong he was, and tussling up close. I put up as much resistance as I could, and made sure I "Oomphed" and "Aahhed" and "Yikesed" often, so he could tell he had the upper hand most of the time. I didn't have to pretend at all, because I was at a weight disadvantage, so when he sat on me and tried to pin me, I had to muster all my strength to put up enough resistance

to throw him off again, and make the wrestling match interesting and challenging. After about 40 minutes, we were both really sweaty, I was pinned to the floor, and at this point, could no longer throw him off. He was still at it, really loving the chance to "get" me, up close and personal. He was not mean. He didn't try to hurt me at all. He was one of the children who hadn't been touched by physical violence, so that wasn't his issue. Isolation was. Lack of affection was. But in this wrestling match, what I could see was that he just wanted to keep at it until he could win, and win he did!

Others in our group saw what was happening—we'd talked many times about Sam's standoffishness, noted how it was melting slowly, and I think all of them understood that engaging so closely in play for so long was some kind of a breakthrough for him, so no one interrupted our lengthy, playful contest.

Then, when I was at the end of my strength (who knows how much more he had!), he said, "Let's get some water." We did, and then he said he wanted to roll up a mat and make a little dark place inside it. We never let the kids do this with the mats, but I sensed that I should follow his lead, so I said, "OK, just this one time." He rolled it up and invited me to join him in the dark small space he had created.

There, he looked me straight in the eye, and began to tell me about school, his friends, and what he liked to do when he got home and his mom wasn't there (he was a latchkey kid). He talked and talked. This was totally and entirely different from any interaction we'd ever had before. And then, he asked me, very quietly, "Do you *like* me?" His heart was wide open. I told him I liked him very much, and that he was such good fun to be with. I gave him a few details. He was quiet for a moment, then chatted on again for another few moments, until it was time to clean up and go.

All four years of play and permission to lead in our relationship had brought us to the moment when he could finally ask for and receive validation for who he was. It was an extraordinary breakthrough with a lovely young man whose mom did her best, but

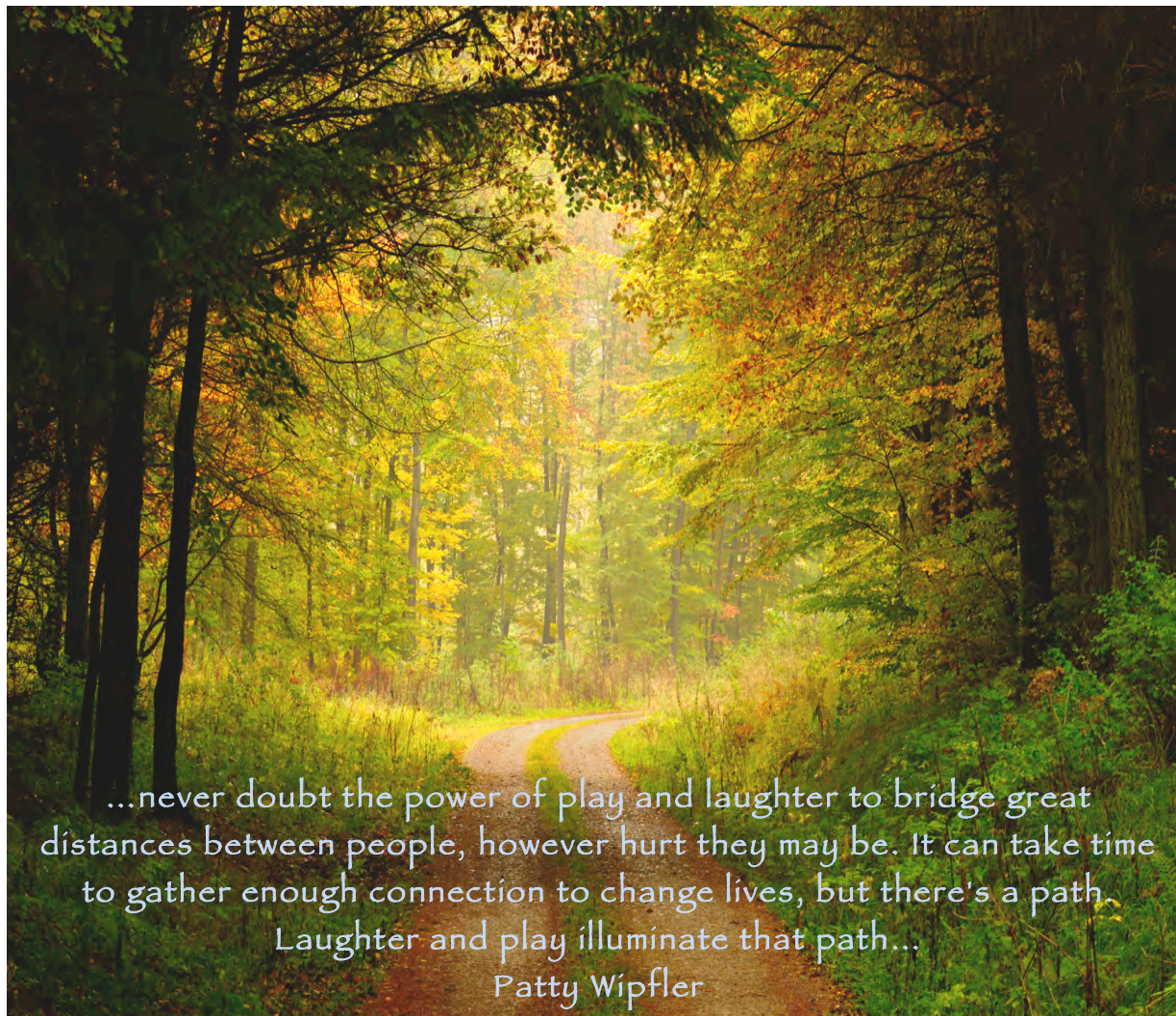


simply couldn't offer the affection he needed and deserved.

Sam has grown into a fine young man. I will remember him for the rest of my life. Our connection strengthened me as much as it did him, I am sure. I now never doubt the power of play and

laughter to bridge great distances between people, however hurt they may be.

It can take time to gather enough connection to change lives, but there's a path. Laughter and play illuminate that path, and a child will guide you till you're there.



**Patty Wipfler** is a GAINS Advisory Board Member, and is one of our amazing “applicators”. She has been helping children and parents since the 1970s, and is the founder and director of the non-profit Hand in Hand Parenting. This IPNB-informed organization provides resources, education, and support for parents and folks who help parents. Patty knows how to encourage authentic acceptance, presence, and respect in ways that enhance attachment and neural development. Her stories and methods are accessible and engaging. She has led workshops and spoken to audiences around the world, and has written numerous articles on parenting. The wonderful set of 14 booklets she wrote about Parenting with Connection (available through Hand in Hand) have sold over a half million copies in four languages. Further information available at <http://www.handinhandparenting.org/>.

## Surgery is Serious Business

Ross Ungerleider, MD

“Surgery is serious business, Ross. You can’t afford to take time for play—someone’s life might depend on how hard you work. Do you really want to let them down?”

It was my first year as a surgical resident, at one of the nation’s most prestigious surgical training programs, and I was having lunch with a very prominent surgeon who had agreed to come and meet with the surgical trainees. I was seated next to him (there had been a mad scramble for seats at the opposite end of the long table and true to my nature, I arrived late enough to earn the seat just to his left). I was simply trying to make conversation and had asked what he did for “fun.” Frankly, I felt intimidated and uncomfortable—exactly how I now realize he wanted me to feel.

“Fun” for him was attending a lunch with raptly attentive ears that would receive his opinions as fact and tremble at the notion that those facts could be questioned. He was undoubtedly a leader in our profession, and I couldn’t have felt more out of place.

It wasn’t like that on the wards, where my colleagues and I found joy in learning and in teaching each other. The neural reality of learning is that an open mind—a mind that is curious and courageously willing to admit ignorance—can be rewarded with abundance of creative ideas as answers generate more questions that spiral into a new alignment of facts resulting in innovation.

Fortunately, my childhood had been quite a playful one, and I couldn’t let go of that inherent piece of me that is imaginative and generally joyful. (In fact, I once had a cardiologist tell me that I tend to “see life through Ross colored glasses). My fondest memories of my training—a process I think I’m still engaged in—

have included the ones that have involved play. The opposite of play is not work; it is depression. And the consequence of play is creativity, empathy and joy.

I have now been in the profession of pediatric heart surgery for almost 30 years. Over that time, we have created and published on “The Seven Practices of Highly Resonant Teams” and “The Seven Practices of Highly Resonant Leaders.” This work is based not just on observation of what works, but is validated by extensive literature from business, sports, education, medicine, psychology and, more recently, interpersonal neurobiology.

Highly resonant teams have a practice that we describe as “Pushing the UP button,” and highly resonant leaders practice “Whole Brain Leadership”, which encourages the leadership activities that emanate from the right brain—activities like big picture thinking, relationship orientation, empathy, valuing stories as information, creativity (divergent thinking), and inviting possibilities. Pushing the UP button requires acknowledging the importance of work / life integration (referred to by some as work / life balance), playfulness and humor (not sarcastic, destructive humor, but joyful, inviting and connecting humor). We can actually measure the presence and degree of these traits in surgical teams and their leaders and it is no surprise that teams with the highest degree of joy (positivity) perform better over the long run, which includes retention of team members, creative contributions

*The opposite of play is not work, it is depression. And the consequence of play is creativity, empathy and joy.*

from all the members of the team, and enhanced patient safety. “Whole brain leaders” (one of our seven practices of highly resonant leaders) value play because it unlocks the potential of the right brain, and that frees members of the organization to feel safe and remain connected to their own unique



gifts that they can share with their team. Their stories are valuable and their hopes are importantly woven into the fabric of what makes each team unique.

Play, on a surgical service, can look like a lot of different things, but it should never look like sarcastic ridicule of other team members, nor should it enable careless inattentiveness—that is not the kind of play we advocate. For us, play is an expression of feeling safe and “free to connect with and share with others, one’s authentic self.” We have fostered a culture that invites “not knowing” and team members have permission (in fact, an expectation) to ask questions if they are not sure. As leaders make personal psychological safety a priority—everyone’s story and perspective is important and needs to be valued—team members begin to share more of who they are, and this can be manifested as suggestions, questions (that lead to new ways of thinking), or even getting together to share experiences outside the hospital—play. On a surgical team, play is manifested as unconditional permission to be oneself and know that it’s enough and in fact, it’s valuable.

I was a visiting professor recently to a large children’s hospital and suggested that in addition to introducing me with my title (which is all too serious), I wanted to show a slide of some of my other parts. We heard this recently described as a “slash / ID” and loved the idea. I’m not only a professor of surgery, chief of pediatric cardiac surgery and director of a children’s heart program who has way too many awards, publications and accolades....I’m also (see photo slide below)....

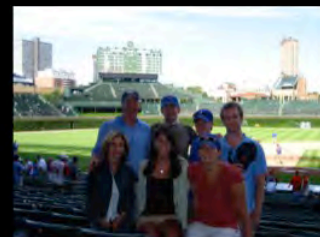
I could feel the rather large audience loosen up. Perhaps they, too, could have permission to be themselves (in the typically stilted and formal environment of academic medicine). And my message was different than that one I was told at that lunch so many decades ago. If you want to be really successful, and give yourself, your colleagues and your patients your very best, then embrace who you are and share that wonderful person who is called by your name with your colleagues and with your patients. It is, after all, the most precious part of you. Play dissipates borders (including the one inside of us that prevents us from being real) and brings us so much closer to creating and living the shared resonance that Dan Siegel has called the sense of M(we).

Ross Ungerleider, M.D., M.B.A., is known for his innovations and his expertise as a pediatric heart surgeon, changing many lives with his healing hands and compassionate manner. He has created nationally renowned pediatric cardiothoracic surgery programs, and is now doing so at Brenner Children’s Hospital at Wake Forest University Baptist Medical Center, as chief of the pediatric cardiovascular surgery team and director of the pediatric heart program.

Ross’s skills as a surgeon, leader, and educator have been recognized with numerous honors and awards, from professional peers and from patients. A GAINS Advisory Board member, he is widely respected as a thought leader in bringing a humane, relational focus into medical settings. In work that also involves his life partner, psychologist Jamie, he speaks at conferences and writes about leadership, teamwork, and work life balance for physicians.



Lifelong CUB Fan /  
Avid Muskie Fisherman /  
Golfer / Wine Collector /  
Writer / Educator /  
Best Friend and Husband of  
Jamie



# Playful Integration

Lauren Martín Culp, MFT

Engaging patients in “play” in my office is one of the cornerstones of my practice. Encouraging forms of play can loosen up the stuck patient, shift energy and perspective, and help access personal resources. Objects like my large bouncy birthing ball or my Nerf brains invite play spontaneously. A couple might toss the spongy brain back and forth releasing giggles, awakening the body, and allowing connection. Play therapy allows a patient to experience deeper moments of healthy attunement, such as a teen singing to her favorite Beyoncé song, playing Nerf basketball, or building forts with chairs and cushions. I also use an effective method of play called Walking-in-Your-Shoes® (WIYS), a body-mind-movement technique developed in the late 1980s and widely used by therapists throughout the world. WIYS helps shift perspective and can bring out a sense of play in a wide variety of patients. (For basic information, see *Walking-In-Your-Shoes*, Journal of Humanistic Psychology, 1993.) Utilizing the

Walking-in-Your-Shoes® technique, a patient “walks” (spontaneously embodies) a hero or helpful archetype, allowing the body to reach a new level of vertical integration while discovering a new way of being in the world. Using this play method, a couple in crisis can be encouraged to “walk” and witness each other’s points of view, which can help them feel seen, soothed, and heard at a level beyond only words.

My background has always allowed for play. As a child, play was very important to me especially during the stress of transitioning from New York to the Los Angeles, where I reveled in climbing hills of chaparral and drain pipes. The world of play was all around me. My closest neighbors were musicians, one a famous music producer, and their father had once worked as a clown. My mother used to join in running races with me and the neighborhood kids because she had been a varsity runner, and our pool with a slide was always a place of fun. As an adult I found ways to play through collaborations in theater and psychotherapy-centered groups, as a Walking-In-Your-Shoes® facilitator, and even as a doula—encouraging the waves of expansion for a birthing mother or supporting the rhythmic dance of a mother and infant. As a massage therapist I would help the body release tension, find pleasure and mobilization. As an actor, I was trained in the “art of make-believe” by using imagination, the given circumstances and physical improvisation to suspend disbelief—the very essence of play. When I worked as a school counselor at a Special Ed school we utilized many types of play to communicate with different style learners. In the last few years I have found personal play as an artist drawing cartoons. [Editor’s note: see one of Lauren’s cartoons elsewhere in this e-book.]

While play therapy is an excellent way to encourage integration, I always have a pulse on whether the transition to physical movement is



Sharing meaningful play in Walking-in-Your-Shoes®

appropriate. Even though I love therapeutic play, I remember a time in my own therapy when I wanted to talk to be heard and did not want to do the “Empty Chair” technique. The invitation to play has to be thoughtful. I am especially aware of seeking authentic permission for a play exercise, always mindful if a patient has a history of being forced to do things with his or her body against their will, or if the patient habitually says “yes” to please others before saying “no”. I see offering play in the office as something similar to offering a toddler a new food, sometimes you have to test and try. Finding the most helpful form of play for the specific patient is important to avoid backfire, such as the time I used a sand tray with a nonverbal autistic preteen—who joyously showered my office and computer with sand.

I find many of my successful adult patients have different styles of learning and finding their communication style is essential. Using play can help access and identify a patient’s optimal mode of communication. For many of my adult patients who might have splashes of ADHD, trauma, depression, anxiety, or feel burdened by stress, we don’t just talk about their “fight-flight-freeze-collapse” responses, we examine and explore the emotional triggers through play. This helps patients become more conscious of what affects them, and can be a helpful resource to change a response more quickly and see alternatives in life. Play is an essential part of opening minds and shifting perspectives and neural nets in psychotherapy.



**Lauren Martin Culp, MFT** is in private practice in Santa Monica, CA. She has been essential in the development of GAINS, beginning as a cofounder, serving as President, and currently, continuing on the Executive Board as Treasurer. She has experience as a teacher, actor, holistic health practitioner, and a founding researcher in the Walking-In-Your-Shoes® method of experiential, personal/relational growth. In her clinical practice, Lauren is a specialist in many areas including parenting, learning differences, and behavioral addictions such as Problem Gambling. She works with a range of patients, including many folks in the entertainment industry, as individuals and couples. She is also a writer, educator, artist, and parent. Active in educating and treating those affected by problem gambling, Lauren would like to note that March, the publication date of this e-book, coincides with Problem Gambling Awareness Month. More information about Lauren is available at her [site](#).





## Whole-Brain Strategy #11: Increase the Family Fun Factory

- 🎨 “Playful parenting” fits how brains learn and helps children see relationships as positive and desirable.
- 🎨 Even must-dos can be made fun.
- 🎨 Imagine those “dopamine squirts” creating neural support for finding play and interacting and relationship rewarding.
- 🎨 Play is a way to practice and grow receptivity, spontaneity, creativity, and connection. And of course, conflict and competition skills.
- 🎨 Playful parents can use humor and fun to help kids shift from a stuck emotional place (sometimes!).
- 🎨 How do you like to play? How do they? Share the fun!



These points are based on summarizing this strategy as presented in Daniel J. Siegel and Tina Payne Bryson (2011), *The Whole-Brain Child: 12 revolutionary strategies to nurture your child's developing mind*.

### *Author's Invitation: Play While You Read*

**Three Friends and An Elephant** is an interpersonal neurobiology version of the classic fable of the three blind men and the elephant. Originating in India, the teaching tale has morphed into different versions in various cultures and religions. A favorite of mine since I learned it studying systems perspectives in the seventies, the tale now speaks to me of many aspects of IPNB:

- ❖ the consilience of the scientific disciplines whose findings weave the IPNB framework;
- ❖ the deep understanding that each person's perspective is valid and valued;
- ❖ the multiple wisdom traditions whose definitions of 'wisdom' reflect a well-integrated PFC;
- ❖ the recognition that the whole will always be more than the sum of its parts, whether molecules or families, because the whole is all the parts and all their relationships;
- ❖ connection and collaboration bring us solutions and innovations.

**This version of the fable is also an IPNB adventure—a game in story form, a playful read.**

**The challenge: How many IPNB references can you spot in Three Friends and An Elephant?**

Woven into this retelling of the tale are numerous IPNB references, metaphors, and allusions. Many details (such as descriptive qualities, actions, dialogue) were chosen with IPNB in mind. Keep count while you read, or reread, and see what and how many you spot.

Here's a bit to get you started: **Adin** is the name of one of the characters, and you may spot ways that her personality and behavior reflect a particular attachment style. **BIG HINT:** Her name is a clue to her attachment style, avoidant/dismissive. Now, give your self a point for each time you recognize some of her language, action, etc. as reflecting that style in the story. Perhaps other character names also are attachment-related...And is an appearance made by seagulls? (score a point!)

**How many IPNB references, metaphors, and allusions did you find?**

(And however many it was, hope you enjoyed the read.)

- 1—10** You liked the feel of the story but missed many of the IPNB-laden details.  
Play with this: Read some articles and/or books about IPNB, and try again.
- 11-25** You know your IPNB basics, and you are starting to deepen your understanding.  
Reflect on left- and right-mode ways to do this.
- 26-39** The IPNB framework is an integrated part of your knowledge base (and perhaps worldview). Whatever you do, you can be IPNB-informed.
- 40-50** Not only do you know your IPNB, you read this story with care, curiosity, and creativity.





## Three Friends and An Elephant

A Retelling by Debra Pearce-McCall

One day, three lifelong friends were hiking in the countryside, trading tales about the year since their last meeting, when suddenly the sky began to darken. Looking up, they saw a shadow moving over the midday sun, light disappearing rapidly.

One began to fret aloud as she moved closer to her friends, "This isn't right, this is weird, it's getting dark fast and we're far from home, oh this is bad, Adin, know what I mean?"

Adin sighed and observed, in an even tone, "Silly April, we got too caught up in talking and we all just forgot that there's a solar eclipse happening today. Let's just find a place to wait it out. We can sit and eat lunch while we wait for light."

"Practical as always, aren't you," teased April, which helped her feel calmer. "Where should we go?"

"I think I remember the way to a spot right near here where I would take my lunch break when I used to spend the day hiking out here as a kid, looking for rocks for my collect...."

"I remember that place," interrupted April. "Oh I have lots of memories of writing and drawing there, it's an open bowl by a sheltering circle of trees, with a pond so we can watch the eclipse in reflection...it's a perfect place to wait. This way..., come on, Dunne, snap out of it and move!" The third friend was standing stiffly in the lengthening shadows, his eyes glazing over, but when April reached out and nervously took his hand, he followed along.

In a full solar eclipse, the sun disappears in minutes, so a blinding darkness soon surrounded the friends as they hurried down the path to their clearing. Suddenly, they came upon something huge and darker than the darkness, an obstacle blocking their way. Adin stood still and stretched her arms out until her fingertips touched something – hard and rough. *Not much here*, she thought as she began to slowly step to the side, looking for a way around it. Priding herself on being a logical, scientific sort, she decided to take another sampling, so she reached out again, hands contacting a solid, dry surface. For a moment, her darkness-enhanced sense of touch suggested a new sensation, almost alive, and worthy of further exploration, but she dismissed that quickly as illogical. "It's just a large wall. Someone must have built it since we were here," she called to her traveling companions in a sure and steady voice. "We can't get around this. Let's not go this way. We'll just go back the way we came, straight on the path and then to the left."

April had paced and worried for a bit before finding enough courage to reach out toward the unknown thing – and as she did, her hand brushed something long and skinny. She jumped back in alarm, tumbling over and rolling as she fell. Scolding herself for being so clumsy – always such a klutz! – she stood and reached again. Her mind asked, *Could it be a snake? No, probably just a rope hanging from a tree, left by some children playing a game.*

The long, skinny something that had startled her seemed to have changed and was longer, fatter, and stronger. Not just a snake – a giant snake! She could hear the stories folks in the town had told about dangerous snakes. She could almost imagine the pain of the bite. She could feel the snake moving...emotions rushed through her body, and she thought they just might all die out here in the dark, dark woods, and remembering that her friends were also in danger she was yelping out “Snakes, snakes, giant snakes, run, run!” so she couldn’t make out what her friend Adin was calling out – something about the way – did she say to the right?

In the darkness, Dunne was not really paying attention, because he was busy dealing with his fear of the dark – something he’d never told his friends about – and when he realized he had lost sight of his companions, he grew frantic. He started running, heart racing, fear escalating, and ran into something hard and solid, bruising his arm. Then he kind of bounced off into another just like it, then another, and another, whispering, “Ouch, just those dang trees,” as the pain and annoyance and explanation drained some of his terror. Still afraid he would get totally lost in the trees, and with no idea about which way to go, he leaned up against one of them, wondering, shoving his shaking fingers in his pockets, where he found almonds...one of the “just in case” supplies he always took on a hike. Soon his momentary terror was further eased by the sensations of sucking salt off and crunching up each nut. *Was that a voice?* he thought, unable to discern the sound over his own loud chewing.

At that moment, noise in the sky drew attention upward. Then the rhythmic whoosh of wings, cries and echoing cries. A flock of seagulls circling and spiraling, heard but not seen in the dark, orbiting the far edges of the clearing. The attunement and beauty of their birdsongs brought a centering pause for all three friends, who breathed deeply and listened to the unseen calls containing information and connection. Each reflected on other times when they’d heard sounds like these, strolling along the ocean shore, or signaling an unexpected sighting on the mainland. Remembering feeling part of nature, seeing and sensing the patterns that connect, each began to consider the birds’ perspective, and then they turned inward toward all they were feeling, hearing, and sensing. A sudden realization of multiple views and possibilities dawned in each of them. They begin asking the others what was happening for them, and finally calming enough to hear each other’s voices, they realized they were almost within arms’ reach of each other. The friends spoke and listened, considering all of their experiences in the dark, and what might be blocking their way. The space between them warmed with their sharing.

An image began to coalesce in their minds. Little rope snake, trees, a wall, a big snake, a new perspective! They joined hands, moving as far apart as they could while staying connected, and they moved to the left and to the right, listening, smelling, and sensing. They felt, high and low and in the middle. Suddenly, their experiences converged in consilience, and they perceived the obstacle as clearly as if the sun was shining. An elephant – with tree legs,

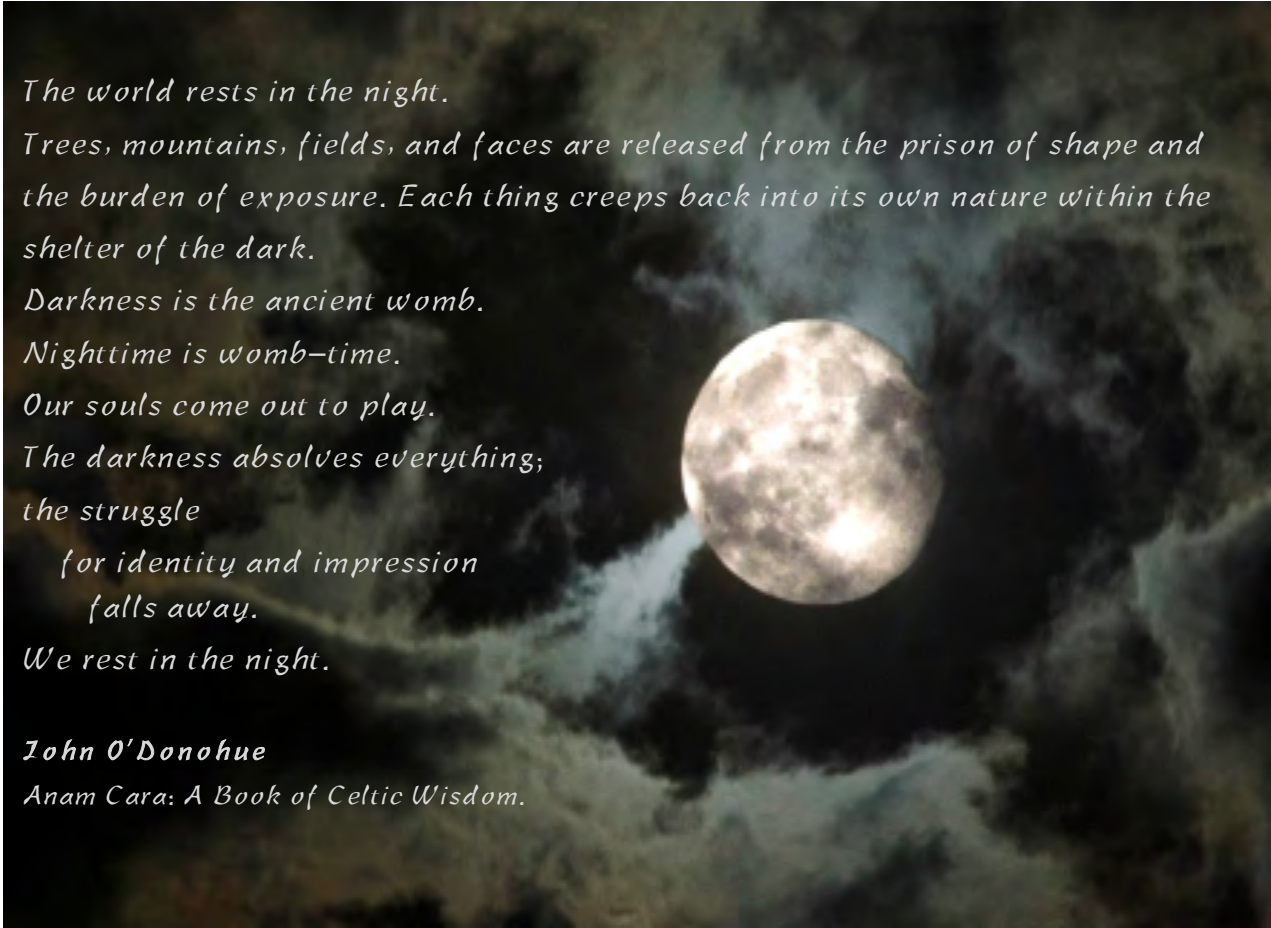
wall sides, and snake tail and trunk! The sense of being understood and of understanding, the mindsight they shared in that moment, stayed with the three friends for the rest of their lives. Laughing in amazement and relief, they found their way down a different trail, without disturbing the creature at rest in the darkness, just as the eclipse passed its zenith and the shadows began to retreat.

As the three reached another clearing, the sun fully emerged, and everything seemed visually enhanced, glowing with reflected light. They gazed at each other with wonder and delight. The first to find words and an explanation, Adin noted that the elephant must have wandered away from the wildlife park, so she called to get help for the wild creature. She also vowed to remember how all of this day had felt, and found that from that day on she almost always remembered to feel. April hummed a song she would write about this day, which she would later turn into a well-received children's book about balancing safety and adventure, as she was learning to do for herself. Dunne felt warmed to the core by having been so understood by his friends, and decided to take care of his fears, beginning what became a transforming, healing journey.

For the rest of their days, the friends would tell many others their stories about when they saw an elephant in an eclipse through the power of mindsight. Now and then, through their lives, they would meet and share the tales of their journeys, and talk about the gains they had harvested from that elephant sighting. Each, in his and her own way, would keep learning and teaching others about how to work with obstacles in their paths, through awareness and attention, through the power of friendships, welcoming the darkness and the light, being curious, open, accepting, and loving about themselves and others, discovering all their minds could be.



Debra Pearce-McCall, PhD, a clinician, educator, consultant, and writer, brings a compassionate and playful focus on our relating minds and brains into her work on adult well-being, leadership, and helping those who help others. A student of human systems since the seventies, she calls IPNB “systems 3.0” and delights in the integrative and interdisciplinary aspects of the framework. Debra has been helping GAINS grow, serving on the board and as Editor of GAINS publications for years; this year completes her term as President. She helped develop the IPNB certificate program at Portland State University, where she continues to teach the capstone Integrative Seminar and an IPNB-informed Ethics class. A licensed psychologist, licensed marriage and family therapist, and AAMFT approved supervisor, Debra maintains a private practice in Portland, Oregon, providing individual and relational psychotherapy and consultations for clinicians, coaches, and leaders (also available at distance). For more information, go to [www.debrapearcemccall.com](http://www.debrapearcemccall.com).



*The world rests in the night.  
Trees, mountains, fields, and faces are released from the prison of shape and  
the burden of exposure. Each thing creeps back into its own nature within the  
shelter of the dark.  
Darkness is the ancient womb.  
Nighttime is womb-time.  
Our souls come out to play.  
The darkness absolves everything;  
the struggle  
    for identity and impression  
    falls away.  
We rest in the night.*

**John O'Donohue**  
*Anam Cara: A Book of Celtic Wisdom.*

What do you like to do when your soul comes out to play?



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