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# A Family Therapist's Look Into Interpersonal Neurobiology and the Adolescent Brain: An Interview With Dr Daniel Siegel

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Advances in brain research are increasingly having an impact on clinical interventions in all fields of psychotherapy. For adolescent family therapists it is important not only to understand the developing adolescent brain, but also how brain research can influence interventions aimed at interrupting problematic familial interactions. Interpersonal neurobiology and the ideas of Dr Daniel Siegel synthesise the interpersonal with the scientific, offering practical clinical methods of incorporating the research into everyday practice. This article incorporates a verbatim interview with Dr Siegel about the adolescent brain, interpersonal neurobiology and attachment with an outline of key concepts from interpersonal neurobiology including the hand model of the brain, nine functions of the prefrontal cortex, the triangle of wellbeing and eight domains of integration. Clinical applications are suggested using a common presenting problem of escalating conflict between teenagers and their parents.

**Keywords:** family therapy, adolescent brain, attachment, interpersonal neurobiology

I was first introduced to Dr Daniel Siegel's ideas in June 2009, when a colleague doing her Masters attended a seminar he gave in Sydney. We had just been to a workshop on the developing mind and trauma with the Australian Childhood Foundation and had been stimulated into thinking how our practices could be informed by new research on the teenage brain, the developing mind and neuroplasticity in general.

In the last few years there has been a huge growth in articles, television programs and information about new brain research. Dr Siegel, a Harvard-trained child

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psychiatrist and attachment researcher, Clinical Professor of Psychiatry at the UCLA School of Medicine, director of the Mindsight Institute, founding editor of the Norton series on interpersonal neurobiology, and author of the books *The Developing Mind*, *Parenting from the Inside Out*, *The Mindful Brain* and, more recently, *Mindsight* and *The Mindful Therapist*, is at the forefront of this, working at many levels of society to educate people about what science is discovering.

By the time a family with adolescents comes into therapy, there have often been years of difficulties; perhaps traumas, mental health issues or familial difficulties have had an influence on their relationship, creating rigidity or chaos in their interactions. But just as often, it is the transitional time of adolescence and the changing roles that families need to adapt to when difficulties surface.

How do we use the new understandings of the brain to help interrupt negative cycles and improve relationships between parents and teenagers? How do we understand what might be happening from a scientific point of view to understand how to assist? How might neuroscience, interpersonal neurobiology, and the ideas of Siegel be applied in family therapy?

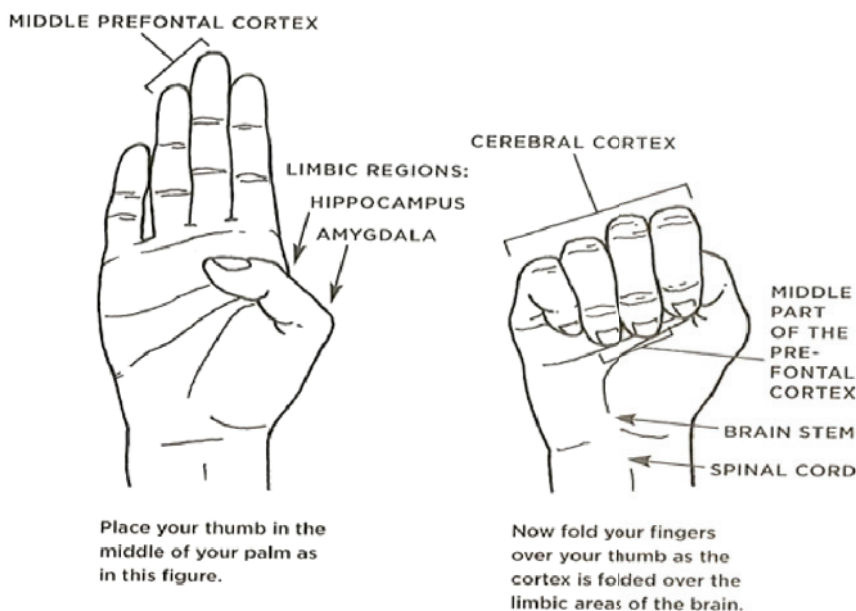
This article identifies some of the changes occurring in the adolescent brain, key ideas and theory from interpersonal neurobiology, and how these ideas can have practical application with adolescents and their families in the clinical setting. Dr Siegel's explanations during an interview at the Evolution of Psychotherapy Conference in Anaheim, December 2009 are interspersed with my own commentary and attempts to understand these ideas and integrate them with adolescent family therapy.

### **Introducing Interpersonal Neurobiology**

Interpersonal neurobiology brings together more than a dozen different disciplines in an attempt to unite the worlds of objective science and subjective human knowing. It began in the 1990s when Siegel was at UCLA and invited anthropologists, physicists, neuroscientists, sociologists, linguistic experts, geneticists, psychiatrists and others to join a study group. Early on, the group was in danger of disbanding because the various academics could not agree on a working definition of the mind, until Siegel proposed that the mind is 'an embodied and relational process that regulates the flow of energy and information' (Siegel, 1999). It is a definition key to understanding his theories of how relationships impact the brain and brain development, and how recursively, the mind, brain and relationships interact to alter each other. Created by Siegel, interpersonal neurobiology is a theoretical and practical synthesis of the scientific, the subjective and the interpersonal.

Siegel's hand model of the brain (see Figure 1) was my entry point into beginning to navigate his ideas. The simplicity and clarity with which the most useful parts of the brain are explained seemed to allow both access and confidence to explore further complexity.

The brain stem, also known as the reptilian brain, is responsible for keeping us alive by regulating heart rate and breathing, alerting us when we are hungry or tired, and mediating the autonomic nervous systems — the sympathetic (the accel-

**FIGURE 1**

Siegel's hand model of the brain.

Source: Diagram from Siegel (2009). Reprinted with permission from Scribe Publications.

erator) and parasympathetic (the brakes) nervous systems. It is also the home of the fight/flight/freeze responses.

The limbic region mediates emotion and motivation, and is believed to be an important area in attachment and also in evaluating experiences. It mediates the stress response through release of the hormone cortisol, which is adaptive short term, but neuro-toxic longer term — trauma elevates levels of cortisol, making it more challenging to control emotional responses. The amygdala mediates the fear response, and absorbs and processes information faster than conscious awareness, working with the brain stem to activate the fight/flight/freeze response. This 'fast track' automatic response enables survival, but can also lead to regrettable actions. The amygdala is also associated with implicit memories, a form of non-declarative memory which does not require focal attention for encoding and, when remembered, is not experienced as recall of a memory; for example, mental models. The hippocampus is associated with explicit, declarative memory, such as facts and autobiographical recollections, and only begins to develop around 18 months of age.

The prefrontal cortex, in particular the middle prefrontal region, is responsible for the higher functions, such as our ability to reason and think, to plan ahead, and consider abstract and multiple thoughts. This key middle prefrontal region, including the orbitofrontal, medial and ventrolateral areas, is believed to be involved with regulation of the autonomic–nervous system, as well as functions such as social cognition,

morality and self-awareness. Through the integration of other distributed neural circuits via this prefrontal region, a person soothes and regulates the limbic region.

In the interview with Dr Siegel, my intention was to utilise interpersonal neurobiology as a potential lens in family therapy with adolescents. I began with the adolescent brain.

### The Adolescent Transition

**Rebecca:** Thank you for your time today Dr Siegel. I wanted to ask you first about the teenage brain. You've referred to it as a reconstruction zone and there is much happening during the teenage years. Can you describe some of the developmental changes during this time?

**Siegel:** The brain develops in infancy, growing new connections and then like a sponge it absorbs all sorts of experiences during the first 10 years of life. Around 10 to 12 years or so, some people say there's resurgence in the growth of new connections based on genes pushing for these connections to be set up so you can learn even more things. Some people don't believe that. What people do agree with is that once adolescents hit around 12 to 13 years of age, the parts of the brain behind the forehead, the prefrontal areas, get remodelled (at least in westerners — this has only been studied in the west). They don't work as well as they did before and certainly as they will afterward: so the period between say 12 to 25, is a reconstruction zone.

If in a culture kids are treated as adults when they're 15–16, they may have perfectly well-developed prefrontal areas. In the old days when people died when they were 30, did we have mature brains at 12–13 years old? We don't know. The culture really does shape how the brain develops. In Western kids we can say it looks like a reconstruction zone.

**Rebecca:** How might the changes happening in the teenage brain have an impact on parent and teenage relationships?

**Siegel:** Research shows the adolescent is using the parts of the brain below the evaluative cortex, below the prefrontal area — because it's being remodelled — and they respond more directly with the subcortical areas like the limbic amygdala. So they can interpret neutral faces as being hostile, where an adult would interpret it as, 'well maybe that person is just not that interested'; or 'maybe that person is thinking about something and is distracted'. Those evaluations that an adult brain makes are prefrontal evaluations, where you think: 'huh, this face that's neutral could be any number of things', whereas a kid would jump to a very suspicious concern. They're very reactive. And they could take that interpretation and respond from a more impulsive, reactive, physical response — so they'll have an emotional response that is more amygdala-driven, but then they could have a more physical consequence like slugging someone or swearing.

It helps when you have teenagers at home to know this, because when they start acting in this wild and wacky way, you can at least interpret it as

‘Okay, their amygdala’s responding to what I’m doing, they don’t mean to be acting this way’. It’s not a problem with their personality, it’s a stage of their development.

What this means for an adolescent is that as their brain matures, it is actually helping them to calm down. Teenager’s reactivity and poor self-regulation can be understood with this science: as the prefrontal cortex matures, it grows fibres down to the amygdala (GABA [gamma-aminobutyric acid] or glutamate fibres), which inhibit and regulate automatic responses — literally soothing the amygdala, and enabling greater response flexibility.

Siegel highlights research (Hariri et al., 2000) that suggests the ability to name a painful feeling actually alleviates the experience of it, and could be an example of what helps inhibitory fibres grow. ‘Name it to tame it,’ he offers.

**Rebecca:** And mirror neurons, how might they influence interactions?

**Siegel:** Mirror neurons allow you to see an intentional act in someone else and then create that act in you, so your perception is mirrored also by your action — that’s where they get the mirror part. It also allows you to simulate internally what you see someone else feeling — I think the words ‘sponge neuron’ may have been a better term because you really soak in what you see, you don’t become the other person like a mirror, you soak in the other person, like a sponge. So this soaking-up process allows you to feel another person’s inner life.

**Rebecca:** So, for example, when teenagers come home and their parents are in a bad mood, they could soak that up and you could get an interactive cycle?

**Siegel:** Oh totally, and that’s a beautiful way of saying it — it’s an interactive cycle, mirror neuron to mirror neuron to mirror neuron, and if someone doesn’t stand up and pull themselves out of that cycle it can become a catastrophe.

A mirror neuron example could be indicated by a common interactional description in adolescent family therapy: escalating conflict. Via mirror neurons, a 15-year-old teenager (Peter) picks up on the split-second angry look on his father’s (John’s) face and begins to feel angry himself. (This occurs beneath his conscious awareness.) John asks Peter why he is so angry — which begets more anger. (Perhaps Peter doesn’t know why he is angry and being less able to mediate his anger, operates from the limbic region.) John responds authoritatively to reign in Peter’s anger, wanting respect and manners from John, and the situation becomes vulnerable to further escalation.

If parents react to everything from a teenager, Siegel warns, it can lead to a perpetual battle zone at home, and risks not only toxic attachment ruptures and unhappiness, but more devastatingly elevated cortisol in the limbic region — neurotoxic cortisol — which can kill neurons and can accelerate the pruning process.

Siegel suggests it is this pruning process which explains teenager’s latent vulnerabilities to mental health disorders and constant battle zones at home. Stressful situations can increase the levels of neurotoxic cortisol in teenagers’ brains and can make them even more vulnerable to mental illness.

**Rebecca:** You mentioned before that sometimes there are genetic components to behavioural problems. Can you talk a little about the teenage years being a time of latent vulnerabilities?

**Siegel:** I think bipolar disorder is a great example. Studies now suggest the inhibitory fibres coming out from the area of the brain just behind your forehead downward to the deeper limbic structures such as the amygdala, ones that have a more direct impact on emotions, are too few in number in people with bipolar disorder. So if you imagine it this way — if you're 8 years old and you have 900 fibres going down to your amygdala to calm it down, and let's say you need 600 to make it work well. So, with 900 you are fine. But let's say during the pruning process of adolescence, you are going to cut out half of them. And you started with 900 which was fine, and you cut out 450, you're left with 450, but you need 600 to do well — you're now below the minimum you need and you start getting mood swings.

If you're a kid who is not vulnerable to bipolar disorder, instead of having 900, you start with 1600. You can't tell the difference before adolescence, but then when you cut them in half in adolescence, you go from 1600 to 800 and you're still fine because you're above the limit.

So this is a way to think about why the adolescent period is such a vulnerable period, it's not just hormones. We now believe it's this reconstructing and this parcelation called pruning (intentional destruction, stress-increased but probably genetically induced) which restructures the brain at that time so you're intentionally getting rid of neurons that you don't need.

**Rebecca:** When there's the exuberance period, is there not a chance where more can be created ...

**Siegel:** Well, that would be great if when you had exuberance you could get more growth of the ones you are low on and that's why some people think — and actually this is a very controversial point, if you start medications before adolescence hits in kids you know are going to be vulnerable, some people believe those medications actually increase neuroplasticity and may increase the growth of those neurons. It's just a theory. It would be reason to try. That's why I try to teach meditation to kids who I think might have bipolar disorder before they get deeply into adolescence if I can, or certainly if they are up for it at anytime. Meditation of the mindful type may help grow regions of the brain that help regulate attention and emotion.

So what does all this mean in understanding teenagers' behaviours? They respond more from the 'fast track' amygdala than the prefrontal cortex, can have trouble reading other people's faces accurately and react accordingly, and can be influenced in their behaviours by mirror neurons. They are vulnerable to mental health problems because of pruning, and battle zones between parents and teenagers can speed up this process.

And what did this mean for working with families? When parents did understandably take offence to their child swearing and punching walls, and had responded in ways intended to help their child change their behaviours and grow to be responsible

adults; actions that had backfired and somehow developed into destructive interactional cycles and landed them in therapy. What did this brain research mean in terms of taking blame out of the cycle and relationships, understanding it from a neurological point of view, and building hope and motivation in the families to try something different? At first, it sounded like an excuse to hand over to the teenagers a 'get-out-of-jail-free' card for their behaviours: their prefrontal wasn't developed, they had difficulty controlling their behaviour, hence their reactions. That wasn't helpful, even when many of the teenagers had experienced traumas or ruptured attachments with their parents over time. But how could teenagers learn to modify their reactivity and how could parents help rather than hinder?

### Interpersonal Neurobiology and Attachment

Of course, not every teenager encounters mental health concerns or behavioural problems, although most parents would point to the teenage years as being a roller-coaster of some sort. It's a time of many changes — brain, body, hormonal; changing social roles and increasing educational demands; a time when teenagers want more freedom and time with their peers; a time when parents' roles are changing. Limits, boundaries and consequences are still important, but increasingly parents take a role more around influencing rather than controlling; more negotiating than dictating; and the locus of responsibility centres more in the teenager. It is also a time when a secure base is just as important as earlier years. Although peers take on a greater importance to the teenager, a secure attachment with their parents or a significant adult is the best protective factor and predictor of a teenager who navigates the changes well.

Originally an attachment researcher, Siegel's ideas seemed even more relevant to a family therapist — improving a teenager's relationship with and attachment to their parent(s) are key factors influencing interventions.

**Rebecca:** How does a parent's own attachment come in here?

**Siegel:** Well your own history as a child and how you've made sense of it — research shows — is the best predictor of how well you do in terms of providing your child with a secure base, a secure attachment. If you haven't made sense of your life, you can be thrown in all sorts of ways by emotions out of control, or shutting down and not being available. The presence of the parent to stay there with a child, especially with difficult emotions can be really compromised if they're not able to work through some of the ... I call it integration, the ways the brain has not become integrated by experience — it's disintegrated, it's not linking separate stuff together.

For me the model of integration is not only extremely interesting and helpful, but essential to trace attachment experiences that are not secure through certain impacts on the nervous system — the brain — which are impairing integration. This is basically a way of interpreting all forms of insecurity — as examples of impaired integration. Then you can see what that would mean when the person comes to parenting with a non-integrated nervous system and they're engaged in these mirror neuron

type interactions, they're not accessible to be present, which is a hugely integrated state — for me to be present to you and say 'Tell me what you are feeling, tell me what's going on', I have to be fully present.

**Rebecca:** If parents have experienced traumas in their childhood — for example, a parent who has been sexually abused — how might that impact their parenting?

**Siegel:** The inability of a parent to stay present with a feeling because of their own trauma, which gives a signal very directly that feeling in the child is not acceptable because they can't tolerate it. That has a huge effect, narrowing what I call the window of tolerance. They can't name it to tame it. So that's a problem, the kids pick up this is just a taboo feeling, and that's one of the many ways cross-generational trauma comes out in family functioning.

The other way is epigenetic changes — the ways the regulatory molecules that control gene expression can actually be changed by stress. So there may be actual alterations in genes involved in the stress response, or axis called the HPA (hypothalamic pituitary adrenal axis), which controls stress hormone release.

So you can show being stressful not only affects a child in the moment, but also their ability to handle stress. Parents who haven't resolved their own trauma may have continued stress response problems themselves. They haven't made sense of their life so then in the course of raising a child, that's stressful, and they can have more stress than they need to in their own inner life because they induce more stress in their child. Hence the cross-generational challenge of handling stress well.

If a parent previously had a mental model of anxious attachment with their parents, making sense of their lives can create a new form of neural integration, linking the prefrontal cortex with an overactive hypervigilant amygdala, soothing the limbic firing reactivity and enabling a secure attachment with their own children. Siegel believes the process of therapy itself facilitates this integration and possible growth of GABA fibres in soothing and containing the emotional centres.

But why is knowledge about the prefrontal cortex so important in therapy? During his work with a family with a mute 7-year-old girl, Siegel made some astonishing discoveries.

**Rebecca:** And there was a family you worked with that was quite important in your understanding of the prefrontal cortex and the functions of it, can you talk a little about that?

**Siegel:** This was an unfortunate situation of a family where a mum had this very area of her brain damaged after she was in a car accident, and she went from being a very tuned in, connected and present person to losing all of those qualities. This motivated me to go to the library and look into what had gone wrong with her, to understand why this family was becoming dysfunctional. This taught me the importance of learning brain anatomy and function combined with the way it influences relationships, and for me this was an immersion in bringing the neurobiological and the interpersonal into one perspective.



Siegel's discoveries led to him identifying nine functions of the middle areas prefrontal cortex:

- bodily regulation — regulating the sympathetic and parasympathetic nervous systems
- attuned communication — 'feeling felt' and resonating with another
- emotional balance
- response flexibility — ability to pause before responding
- fear modulation — inhibiting the fear response
- empathy — to understand the internal state of another
- insight — ability to perceive our own mind
- moral awareness — behaviours for the social good
- intuition — the wisdom of the body.

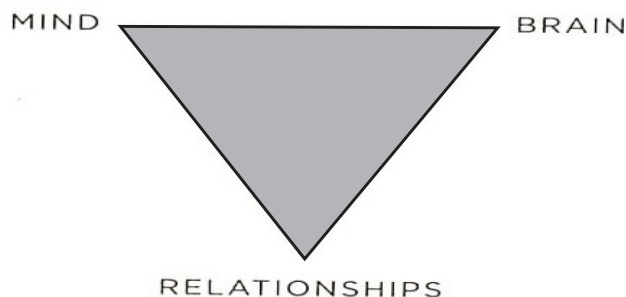
As he talked with colleagues Siegel discovered that eight of these nine functions were also proven outcomes of secure attachment.

'How parents communicate with children, we believe, shapes the development of the prefrontal cortex ... [it] requires attuned communication, where parents can sense the inner feelings of the child and soothe them' (Siegel, 2009b). In addition, Trevarthen's 'still-face' and 'double television' experiments highlight the fact that attuned communication is collaborative and contingent — responses not only convey an understanding of information, but also of the full emotional experience, verbally and nonverbally (Siegel, 2004). Siegel suggests when parents have leftover or unresolved issues they can project this onto interactions with their child, interrupting contingent communication.

Here I had to grapple for some time with another of Siegel's key ideas (see Figure 2).

Consider again Siegel's definition of the mind: 'an embodied and relational process that regulates the flow of energy and information'.

**Rebecca:** And the brain–mind–relationship triangle, how does that triangle work?



**FIGURE 2**

The triangle of wellbeing.

Source: Diagram from Siegel (2009). Reprinted with permission from Scribe Publications.

**Siegel:** If you look at the way energy and information travels between people — communication — like what's happening between me and you right now — then that flow also happens between neurons ... the mechanism of the flow in your nervous system is what we are going to call the brain, the sharing is the relationship and the regulatory process that is both relational and embodied is the mind. It's a way of defining the mind — which usually doesn't happen, but once you say it's regulatory you can teach people to see more deeply into what it is and then shape it in a different direction.

In defining the mind as a regulatory process it becomes a verb — an emergent process, able to both monitor and modify. Through using the emergent mind to monitor and modify states — behaviour, cognition, affect — neural firing and brain structure changes and intrapsychic and interpersonal experiences can be altered. For effective psychotherapy, Siegel believes brain structure must change. Even more importantly, the triangle of wellbeing gives therapists a map for health — emotional, mental and interpersonal health — through promoting integration.

Siegel believes this makes sense to systemic thinkers. Family therapists don't focus on determining who caused a problem, but in how interactions maintain the problem — 'how emergent properties come out of the interactions of the system' (Siegel, 2009) and how they can change to create new possibilities.

To understand this triangle, consider the concepts of differentiation and linkage, and that for Siegel the meaning of the words 'emotion' and 'integration' are synonymous. Integration occurs 'when two opposing processes ... are allowed to specialise in their function and become linked together' (Siegel, 2006, p. 249); and is like a river that flows between two banks of disintegration; one bank is chaos, where events threaten to overwhelm individuals/families; the other side is rigidity, where people are stuck.

Siegel has identified eight domains of potential integration (Siegel, 2007):

1. integration of consciousness
2. vertical integration
3. horizontal integration
4. memory integration
5. narrative integration
6. state integration
7. interpersonal integration
8. temporal integration.

The previous example of integrating the prefrontal cortex with the limbic region (linking differentiated parts of the brain), which enables a parent to manage their reactivity to teenage behaviour and respond in an empathic, attuned, response flexible way (prefrontal cortex functions), is considered vertical integration. Making sense of your life and processing implicit memories with hippocampal encoding through episodic and autobiographical narratives is considered memory integration.

Contingent communication — the sending, receiving and feedback that a message is understood verbally and nonverbally — is an example of interpersonal

integration. Siegel (2006) highlights six important nonverbal aspects to contingent communication: (1) eye contact, (2) facial expression, (3) tone of voice, (4) posture, (5) gestures, and (6) timing and intensity of response.

The concepts of differentiation and linkage can also be useful in understanding families: if members are allowed to be different and also connected to others, there is family wellbeing. If, however, there is either not enough or too much differentiation and/or linkage, there will be chaos or rigidity.

How could we utilise this information in behavioural contracting with families in rebuilding ruptured attachments, in getting teenagers back to school and stopping self-violence, such as cutting and suicidality, or violence directed at others?

### Clinical Applications

Consider John and Peter, who experienced the negative interactional cycle described earlier. Imagine what started as an initial interaction has become a pattern involving escalating disrespect and verbal abuse, until a violent incident occurs which leads to them being in therapy. John, his wife Diane, and their children Peter (16) and Sarah (15) are invited for the first session. Diane called to make the appointment and is contrite and shy, reluctant to say what brings them there. John talks about wanting respect, Peter mumbles he doesn't want to be there, and Sarah talks about her father and brother's most recent argument as the reason they are there: 'Dad finally lost it and they hit each other,' she says. Although she is not fearful for herself or her mother, she does worry about her father and brother hurting each other.

John and Peter are frustrated, and feel misunderstood and distant from each other; they blame each other and feel stuck in how to move past this interaction. They may feel guilty, unable to understand their anger or know how to change, it all seeming so sudden and overwhelming, the amygdala's emotional 'fast track' response beating the rational prefrontal cortex. Peter is more vulnerable to responding from his limbic system because of his reconstructing prefrontal cortex, but John sometimes loses integration with his prefrontal functions also.

Interventions using the ideas of interpersonal neurobiology might be:

1. Use the hand model to educate clients about the brain, to minimise blame and guilt and repair attachment ruptures. Explain visually about vulnerable emotionally reactive states, through the teenager's reconstructing prefrontal cortex and the effects on parents such as stress, tiredness and hunger, with the effect being detrimental noncontingent communication. 'When a child doesn't feel understood, little things can become big issues' (Siegel, 2004, p. 82). Siegel differentiates between parents being on the 'high road' (integration, access to the nine functions) and the 'low road' — when they 'flip their lid'.

Siegel uses the hand model as an example: close your fingers over your thumb in the middle of the finger as shown in Figure 1. Consider this as a state of integration, where the prefrontal cortex touches and connects with the amygdala and the brain stem. In states of disintegration the fingers are flipped upwards — 'flipping the lid'. They are no longer connected and not able to create functions — body regulation, empathy, reasoning — and both parents and teenagers can

- find themselves saying things they later regret. In the example, John has possibly 'flipped his lid', leading to the toxic rupture between himself and Peter.
2. Attuned contingent communication cannot occur in reactive states, hence Siegel advocates teaching clients to monitor when they are in reactive or receptive states and modify when in a reactive state. At seminars he demonstrates a simple in-session intervention to highlight the difference between reactivity and receptivity to families. By repeating two words — 'No' and then 'Yes' — and having John and Peter pay attention to the effects each word has in making them receptive or reactive, they can begin to use this knowledge to monitor and modify other states outside the therapy room. Use of this intervention during behavioural contracting would further exemplify reasons to eliminate the word 'no' from the parent's vocabulary as much as possible and open space for more 'yes' — receptivity, positive interaction and secure attachment. This is an artful way of creating structure while maintaining a mutually receptive state.
  3. Educating John and Peter about the six important nonverbal aspects to contingent communication, slowing down their communication and paying attention to the signals in each other as a way towards more effective attuned communication and interpersonal integration.
  4. Using Mary Main's adult attachment interview (AAI) as an interventive tool in understanding John (and Diane's) attachment style, and how this relates to both John and Diane's potential parenting cohesiveness and the family's interactional patterns.

Other tools could be incorporating techniques for integrating one of the eight domains described earlier and psychoeducation with John about how implicit memories affect his ability for contingent communication and vulnerability to 'flipping his lid' if he lacks awareness of unresolved issues (potential implicit memories) in his own life.

**Rebecca:** When people have implicit memories, you talk about how they won't even know or register that it's a memory; it will feel like something in the here and now, as an experience, and that can really complicate a parent and teen's relationship. If you have a history of these toxic ruptures, throughout a parent and teen's life, what might this mean for the relationship, if parents aren't even aware of it?

**Siegel:** Triggered implicit memories will be vulnerable moments when a parent would be very challenged to stay present with the child, and so they would enter their own low road states — they'd actually fall apart, they'd become rigid, they'd do things that would be confusing for a child. That model of the hand is one of the most useful things for parents, so they can understand that they themselves can flip their lid, not just their child. So when the prefrontal cortex, which links everything together — which is what integration is — when it's linking everything together, stuff works well, when it isn't things become chaotic and rigid. Then you're able to notice as a parent or a clinician when you need to do an intervention to provide a more integrated focus.

An implicit memory in this case could have been Peter's disrespect towards John triggering a memory of John's father disrespecting and humiliating him in his childhood. In being experienced as a 'here and now' response, not as the recall of a

memory, it could seem to John as though it is Peter causing the reaction, not the memory of his father's behaviour.

But what if John resisted the relational aspect to the presenting problem and perceived it as within Peter — an 'anger management problem', or biological, such as ADHD; or agreed it was relational, but pertaining to now, not to John's childhood experiences, and was reluctant to discuss his life experiences or see how 'making sense of his life' could make a difference?

**Rebecca:** It has been incredibly useful talking not only about teenagers, but also about parents, flipping their lid. What would you say — some parents won't want to go back and look at their life, sometimes we have parents coming in with ... here's my child, she's a problem, she's not going to school; or he's being a problem in the home, make him better ... and you suspect it's the interaction between the parent and the teen ...

**Siegel:** Yeah, it's really tough, because when you try to teach people about the attachment stuff, parents do say 'no it's a genetic thing, it's a biological thing' — and sometimes it is indeed. I've had people get very angry with me, from the National Alliance for the Mentally Ill — a group in the US standing up, very importantly, for mental illness in part being a 'biological disease' — which it certainly can be. Parents can do the best job on the planet and a child can still do very poorly with dysregulation, all sorts of difficulties — bipolar, depression, obsessive compulsive disorder, attention deficit disorder, on and on.

So it's important to say some illnesses are caused by other factors, genetic factors which have nothing to do with what the parents did, that's for sure. Even in saying that, it's still helpful for parents to know their own internal world so they can be present even in the face of a genetic illness. It's never a problem to say to a parent you may not have caused your child's problem, but dealing with your child's problem is going to be made better for you, less stressful for you, better for your child, if you make sense of your life. And that's been shown even with foster parents, not just genetically related kids.

People always said, 'Well, even if it is due to what you did, it's probably genetic', and that's just not true. The evidence is very clear, the attachment experiences that parents provide are very important for helping children to develop their regulatory capacities. That's why we wrote *Parenting From the Inside Out*. People told us it would never go anywhere because what American parents (I don't know what it's like in Australia) would want you to tell them is to look at their own inner world, when you should just tell them what to do, tell them what to say with their kids, like it's an instruction manual. It's like learning something new that you do on a regular basis. It's not time-consuming, it takes an initial effort and intentionality, but that's it. So the bottom line is it's really important for parents to make sense of their lives.

And what about Siegel's response to interventions with John and Peter's relationship, where the conflict escalates and frustration, blame and distance ensues?

**Rebecca:** If you had a family come in and there had been behavioural problems in a teenager for years and the parents are worn down, how might you use Mindsight techniques with the family in the room?

**Siegel:** I would teach them to do some basic relaxation techniques first of all, to get them to lower their state, lower their blood pressure, to get them less reactive. Teach them the wheel of awareness, so they would have that experience of being in the hub and having that experience as being separate from the rim. That would be a very helpful one, which people find very useful. If they are really exhausted, I would try to find some way to try to honour the need to try to take a break from their hostile interactions, because the nervous system needs some time to calm down and just relax. I would try to find space in the house for them to relax and have a private sanctuary where they could go away rather than being in each other's faces all the time, and talk about a family time out.

Then once you've got that stuff set up, I'd slowly introduce them to the reflective dialogues I talk about in *Parenting From the Inside Out*, in giving people the opportunity to say what their experience was, listen to the other person's experience and find an understanding through that. And that's harder to do without a therapist if it's really intense. But just finding a way to separate from the intensity of it all would be an important first aid thing. And even teaching about the hand model of the brain and flipping their lid.

If I had my way I would teach kids in schools, and teach parents, the basics for how the brain, the mind and relationships interact with each other. I would teach them the hand model of the brain, and I would teach them the importance of empathy and kindness for physiological health, and I would teach them about checking in with their own mental experiences, by letting them know that they don't need to be on automatic pilot. I think a lot of people don't have this awareness, it's certainly why I wrote this book *Mindsight*. They can get their brain to fire in a certain way, they don't have to be a slave to the way their brain is.

Siegel's book *Mindsight* discusses his use of interpersonal neurobiology techniques in a clinical setting and includes interventions demonstrating each domain of integration. Two adolescent case examples illustrate — using various techniques such as a guided imagery wheel of awareness, mindfulness and the hand model — relevance to adolescent and family therapy.

## Summary

Interpersonal neurobiology brings a scientific lens to many of the ideas currently being used with families and adolescents, encouraging attuned communication, reducing reactivity and understanding and managing affect regulation. And its value lies precisely herein.

Families, fathers in particular, are interested in the practical science that can be explained visually — for example, the hand model of the brain — and how this can bring understanding to communication and emotional processes in the family.

Using the idea with parents of how they can ‘flip their lid’, be reactive and the cyclical effect of this, both through mirror neurons and a teenage brain’s greater subcortical functioning, appears to make parents less defensive and more curious.

A most interesting element is that through the interest families show in these concepts and the focal attention it brings to their interactions with each other, they begin to alter their brain structure and move towards integration through the science of mindfulness.

The ‘take home message’ (an oft-heard Siegel quote) is the therapeutic possibility of

... looking deeply into the mind — what I call *mindsight*: looking deeply into this energy and information flow and then intentionally altering it toward integration as a pathway to wellbeing, compassion and kindness.

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