

## **Rewiring Neural States in Couples Therapy: Advances from Affective Neuroscience**

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*Many clinical approaches assume that the development of new stories or narratives is at the heart of therapeutic change. But why is it often so difficult for clients to modify the stories that organize their lives? Why do new insights gained in therapy fade so quickly when clients return to their daily living? Provocative new neurological research suggests that self-defeating narratives may persist because they are woven into the fabric of internal states which are automatically activated in daily living, often without conscious awareness. New brain studies suggest that, for changes acquired in therapy to last, they must be integrated into brain states that become active when upsetting situations occur. This paper introduces methods for helping clients identify internal states which perpetuate outmoded thoughts, attitudes, and interactions, "re-wire" these states for more flexibility, and activate alternate states which support new avenues for thought and action.*

In the 15 years we've been closely following developments in neuroscience, the single most compelling clinical lesson we've drawn from the new brain science is also one likely to rub many therapists the wrong way. There is now an overwhelming body of research that suggests that psychotherapists place too much confidence in the value of insight and understanding while underestimating the necessity of repetitive practice in promoting lasting change (Atkinson, 2004, 2005a). Most of us got into the business of psychotherapy in the first place because we loved the drama of transformative moments when defenses crumble and deep emotions emerge. The sessions we remember are the ones in which our clients experience dramatic breakthroughs, understanding things that previously eluded them, or experiencing emotions that had been blocked off. But those of us who have been in the business for a while know how short-lived even the most heart-felt changes can be. As we pat ourselves on the back for the brilliant work we've done with our clients, they show up for the next session as miserable as ever. Worst yet, they often don't even remember the profound new insights or experiences that we felt sure were going to change the way they look at their relationships. Why does this happen?

### **Neural Operating Systems**

New brain studies suggest that new insights and behaviors learned in therapy may not last because they don't get sufficiently integrated into the brain states that "run the show" during the ups and downs of ordinary life (Atkinson, 2005a, Cozolino, 2002, Siegel, 1999). Neuroscientists have discovered that our ordinary lives are largely driven by special operating systems in the brain that automatically instigate thinking and actions that help us effortlessly navigate the demands of life (Atkinson, 2005a). Dubbed

"executive operating systems" by neuroscientists (Panksepp, 1998), these specialized brain states automatically direct our attention to important things, inspire certain types of thinking, and provide motivation to accomplish certain tasks. These neural programs are pre-programmed so that when triggered, they carry out their agenda's semi-automatically. When one of these brain states is activated, some ways of thinking and acting come naturally, and it's nearly impossible to engage in other thoughts and behaviors unless a switch in circuits takes place (Atkinson, 2002).

Early indications of the brain's executive operating systems emerged from studies dating back to the 1950's involving electrical stimulation of the brain. By implanting electrodes deep within specific regions of patients' brains, then applying electrical pulses, researchers were stunned to see the moods, desires and concerns of patients change dramatically. Brain scientists already knew that stimulation of certain areas of the brain produced various isolated perceptions or motor activity. But these reactions were different. Researchers discovered that, when specific areas of the brain were stimulated, it was as if different parts of the patients' personalities became active. For example, upon stimulation, a patient in a study conducted by Robert Heath of Tulane University School of Medicine flew into a rage and felt suddenly offended, and threatened to kill the physician who was closest to him at the time (Heath, 1992). Patients in such studies are often surprised and confused by their own actions. When stimulation ceased, one patient remarked, "Why does it make me do this? I couldn't help it. I didn't have any control. I wanted to slap your face" (King, 1961). Even though they know ahead of time that the electrical stimulation might trigger anger, when the self-protective states in their brains are activated, they trust the feeling that they've actually been offended.

Although the brain's fight/flight systems were among the first to be discovered, numerous others have been found. Neural operating systems can be activated as reliably in animals as in humans, and much of what we know about the brain mechanisms involved in such brain systems has come through painstaking animal research. Executive operating systems are distinguished from other brain systems in that they meet each of the following criteria:

1. The underlying circuits are generically predetermined and designed to respond unconditionally to stimuli arising from major life-challenging circumstances.
2. The circuits organize diverse behaviors by activating or inhibiting motor subroutines and concurrent autonomic-hormonal changes that have proved adaptive in the face of such life-challenging circumstances during the evolutionary history of the species.
3. Emotive circuits change the sensitivities of sensory systems that are relevant for the behavioral sequences that have been aroused.
4. Neural activity of emotive systems outlasts the precipitating circumstances.
5. Emotive circuits can come under the conditional control of emotionally neutral stimuli.

6. Emotive circuits have reciprocal interactions with the brain mechanisms that elaborate higher decision-making processes and consciousness."  
(Panksepp, 1998, pp. 48-49)

Presently, neuroscientists have mapped out the circuitry for seven distinct neural systems which meet the above criteria (Panksepp, 1998). One neural program activates an aggressive instinct to defend against threats, a second activates the instinct to avoid danger, and a third provides curiosity and eager anticipation that fuel the desire to learn. Four additional neural states motivate social bonding (Atkinson, 2002). One creates a longing for emotional closeness and contact, a second produces feelings of tenderness and the urge to care for others, a third produces the urges for spontaneous and playful social contact, and a fourth activates sexual desire.

While all of us are born with the same seven neural response programs, they are wired up uniquely in each of us, based upon the emotionally significant experiences we've had across our lives.<sup>1</sup> There's evidence that experiences that happen early in life, when our neural circuits are getting wired for the first time, are particularly influential in the conditioning process (Siegel, 1999).

For the most part, we don't volunteer for these mood states, we simply find ourselves under their influence, and when any one of them is activated, we may lose the freedom to choose our thoughts and actions freely. It's as if, at that moment, someone else is in charge. Neuroscientist Joseph LeDoux (LeDoux, 1996) has identified the neural mechanisms that explain how this happens. Using a variety of methods for locating how information travels throughout the brain, LeDoux discovered that emotion has a privileged position of influence. Emotional centers get first crack at incoming information, and have the connections to influence the entire brain, including its centers for thought (LeDoux, 1996). In a sense, emotional centers can hijack the rest of the brain, influencing cognition and behavior dramatically (Atkinson, 1999). Goleman (1995) explains that a particular structure in the "emotional" brain, the amygdala, acts like an emotional sentinal, constantly alert and scanning every experience for signs of trouble: Is this bad? Could it hurt me? If the information registers as dangerous enough, the amygdala broadcasts a distress signal to the entire brain, which in turn, triggers a cascade of physiological responses—from a speeded-up heart rate to accelerated blood pressure to mobilized muscles to the release of the "fight or flight" hormones, adrenaline and noradrenaline. Indeed, the amygdala's extensive web of neural connections allows it to capture and drive much of the rest of the brain -- including its centers for thought (Goleman, 1995). Within milliseconds, we may explode with rage or freeze in fear, well before our conscious mind can even grasp what is happening, much less persuade us to take a few deep breaths and maintain our cool. This cranial takeover can occur because neuroanatomically speaking, our thinking brain is simply out-matched by the competition. By the time the neocortex gets into the act, the damage has been done—you have already called your late-to-dinner partner an inconsiderate jerk, shrieked at your smart-mouthed child, snapped at your critical colleague or simply shut down, shaking inside, in the face of someone else's rage. To make matters worse, by this time, amygdala-triggered emotional information has invaded the neocortex itself, overwhelming its centers for logic and judgement. As a result, your emotion-flooded

thoughts about the situation are apt to feel entirely accurate and justifiable at the moment.

## **Addressing Neural States in Couples Therapy**

The discovery of the brain's neural response systems explains why people often hurt those they love, and why others allow themselves to be hurt by people they know they should avoid. In fact, these brain findings provide an explanation for why people persist in all kinds of self-defeating behaviors, even when they know they should stop. People often fail to think and act in needed ways because they find that they're not in the mood. They can't sustain needed attitudes or actions because the juice that fuels these attitudes and actions isn't there. The wrong brain state shows up, and they find themselves with attitudes and urges that take them in the wrong direction. Precisely at the moments when they need to think or act differently, they don't feel like it. They can try to override the mood state and act in ways that aren't supported by it, but this is a bit like trying to accelerate from 0 to 60 miles per hour while driving in fourth gear. A person might be doing all the right things (letting the clutch out slowly while giving it some gas), but he won't be able to get where he wants to go unless he shifts into first gear before accelerating. All of the effort in the world won't keep the car from stalling out unless this person shifts gears.

When we first encountered this information in the early 90's, it changed the way we practice couples therapy. Up to this point, our goals had been to help partners develop new narratives, trade in their problem-saturated stories for new, empowering ones, drop their critical and defensive attitudes and adopt tolerance and understanding for each other. But we came to realize that problem narratives, critical and defensive attitudes, intolerance and lack of understanding were driven by powerful brain states that our clients didn't volunteer to have. Rather than trying to help clients think and act differently, we started trying to help clients shift the automatically activated mood states that blocked new thinking and interaction from flowing naturally. We discovered new ways to influence our clients' mood states, and our therapy sessions became much more powerful, but we continued to be frustrated by the fact that between sessions, clients often returned to their old, pre-programmed emotional habits. Week after week, we helped them shift out of attack and defense modes, only to see them revert as soon as they left our clinic. This didn't make sense to us. Why would clients return to ways of interacting that were clearly less productive when they had experienced something better? It seemed completely irrational.

## **Neurons that Fire Together Wire Together**

This problem is not new to psychotherapists. Theorists have postulated dozens of explanations for why clients persist in self-defeating or irrational thoughts and behaviors, including unconscious defense mechanisms, unresolved emotional injuries, insecure attachments, oppressive cultural narratives, family homeostasis and intergenerational transmission processes. But what if the problem is much simpler than this? What if clients persist in self-defeating or irrational thoughts and actions because

they've developed some bad emotional habits in the same way that a tennis player's serve continues to be hampered by bad habits learned earlier in her life? We began looking at what brain scientists have to say about habits. Nearly all neuroscience researchers agree on one thing: the mechanism through which the brain acquires new habits is repetition. In fact, one of the most enduring concepts in the field of neuroscience is Hebb's Law (Hebb, 1949), which states that brain processes that occur together over and over again tend to become grafted together, so that they are more likely to occur in conjunction in the future. For new ways of interacting to last, they must be repeated over and over again.

We all know that to improve at serving a tennis ball, one must know the exact moves that are needed, then practice them over and over. Is the development of emotional skill fundamentally different than the development of athletic skill? Would the acquisition of new emotional habits require the same process? Part of the problem with the project of developing new emotional habits is that defining needed emotional moves is undoubtedly more difficult than defining needed behavioral skills. But are they impossible to define? We realized that we had never tried to define such moves for our clients, and never helped them set up practices to acquire them, either. We began wondering what these practices might look like, and began trying to think like neuroscientists. It seemed to us that when clients were caught in the neural operating programs that propelled their self-defeating habits, it was as if part of their brains shut off. When they were calm, they often knew very well how irrationally they thought and behaved when they became upset. But when they became upset, the part of their brains that knew this shut off. The neural networks involved when they were thinking were rarely active when the neural processes that generated their self-defeating habits were active. We reasoned that successful therapy sessions were probably effective because we helped clients activate the neural processes involved in clear thinking precisely when their old neural response programs were up and running. In these moments, clients changed because they were able to use more of their brains. But when we weren't there to help them, they reverted back to their old neural habits. The task became clear: How could clients learn to think clearly when they were in the grips of emotional states that seemed to preclude clear thinking? As we pondered Hebb's law, we realized that our clients would need to practice new ways of thinking while they were upset, over and over again. If the neural networks involved in new thinking were active when the old neural response programs that drove their ineffective reactions were activated, and this happened enough times, eventually these two distinct neural processes would bond, so that whenever the old neural response programs became active, new thinking would arise automatically.

### **Practicing Under Game Conditions**

We threw ourselves into the task of coming up with practices that would allow this kind of neural bonding to occur. Clients would need some way to practice thinking differently at the moments when they were actually upset. Practicing new thinking alone would not do the trick. Learning the dance moves is of little value unless they are practiced when the music was playing. Clients would need to practice new thinking under "game

conditions," that is, when they were actually upset, and least able to apply new ways of thinking. But how could they do this? When they got upset, they seemed completely unable to think differently unless we were there to help them. Then, an idea hit us which has completely transformed the way we work with couples: Maybe we could go home with them so that we could remind them to think differently when they became upset. Of course, this idea is absurd. It would be impossible to actually go home with our clients. However, maybe our voices could go home with them. We began making audiotapes for our clients to listen to at home whenever they became upset. Clients didn't need to remember new ways of thinking when they were upset, they just needed to remember to turn on the tape recorder, and our voices directed them through a new thinking process. We reasoned that it might not matter that it was our voices that prompted clear thinking rather than theirs. What mattered is that the neural networks involved in new thinking were activated at the same time as the "emotional takeover" neural networks were active, and that this happened over and over again.

Our first chance to test this method came when Maria and Tony wandered unsuspectingly into Brent Atkinson's office one evening for their fourth therapy session (Atkinson will be referred to as BA). In this session, Maria came in so upset that she refused to speak with Tony. When BA talked with her individually, he learned that Maria had been in the hospital for several days during the previous week, and had become very upset with Tony when he left her alone to go home and get some sleep one day. Maria thought Tony was incredibly selfish for thinking of himself in a situation where she was in so much distress. Clearly, Maria was in the grips of an emotional takeover, and couldn't see that her attack was preventing Tony from being able to respond to her in a sympathetic way. Rather than trying to reason with Maria, BA met with her individually for a few moments, and talked to her tenderly, sympathizing with her feelings, and telling her that he wouldn't be satisfied until Tony really understood how badly she felt, alone in the hospital. Maria relaxed visibly, signaling to BA that she had shifted internal states. BA went on to talk to Maria about how terrified she had felt alone in the hospital. Tears stung Maria's eyes. When BA was confident that Maria felt understood and supported by him, he helped Maria consider that Tony hadn't done anything that was intrinsically wrong. Rather, his actions were just radically different than what she'd wanted. Anticipating Maria's protest, BA went on to assure her unequivocally that he didn't think there was anything wrong with her expectations, either. He suggested to Maria that both she and Tony's expectations seemed normal – it was just one of those situations in which people have legitimately different wants or needs. BA helped Maria see that she had the right to ask that Tony care about how she felt, and be willing to make some changes in his usual tendencies in situations like this one-- not because his tendencies were wrong or selfish, but rather because Maria had different ones. If he loved her, he'd care about what she wanted, too, and work with her toward establishing ways of handling situations like this one that honored both of their needs. BA helped Maria realize that her attitude (that Tony was wrong) made it almost impossible for Tony to care about her feelings. Few people can respond in caring ways when they feel attacked. Maria recognized the truth in BA's statement, and when Tony joined them, she spoke from a different place inside, apologizing to Tony for accusing him of being a bad husband, and explaining that she had just really needed him more than he probably

realized.

Tony responded instantly with a heartfelt apology. BA wasn't surprised. We've spent many years witnessing the profound rewards partners like Maria and Tony reap once they've adjusted their attitudes toward each other. The way our brains are wired, the most effective way to solicit understanding and cooperation is not by attempting to prove oneself right at the other's expense. It's by exposing vulnerability (Atkinson, 1998).<sup>2</sup> This is a difficult adjustment for anyone to make when feeling threatened, but in relationships where an emotional bond exists, evidence suggests that the brains of those involved are set up to respond to vulnerability with empathy (Panksepp, 1998).

So far, so good. BA had reduced Maria's feeling of threat while she was in the grips of an emotional takeover, and she'd been able to shift internal states, allowing her to show vulnerability to Tony. The bigger question was, "Could she develop the ability to do this on her own?" BA made an audiotape that essentially repeated the words that had helped Maria shift during this session, and asked her to listen to it each time she became upset with Tony during the following week. Her first chance to use the tape came the very next day, when she got off work early. She pulled in the driveway, and was surprised to see her children playing at the neighbor's house, because Tony had agreed to a general rule that he wouldn't let the kids go out to play after school until they'd finished their homework. Maria felt a surge of anger, but as she reached for the door knob, she remembered that she had the audiotape BA had made in her purse. She paused for a split second, torn between the urge to vent her anger at Tony and the desire to avoid going down the same old path. Reluctantly, she plugged in the tape and listened to BA's voice.

*"OK Maria, if you're listening to this tape right now, Tony has done something that really upsets you, right? The first thing I want to say is that I know your feelings are valid, Maria, and I want Tony to care about how you feel. Remember that he won't be able to do this if he feels attacked by you. And this isn't because Tony is weird or anything. Nobody can respond in a caring way when they feel judged. We've got to figure out how you can stay calm, at least for the time being, and approach Tony with an open mind. Try assuming for the moment that there may be a reason for what Tony did or said that you don't understand yet. Give him a chance. If he doesn't respect your feelings, you'll need to stand up for yourself later, but if you start out judging him, you'll join the company of people who almost never get the understanding and cooperation they want from their partners."*

The tape went on, and as Maria listened to BA's words, she realized that she was in no frame of mind to talk to Tony. She decided to take a walk around the block. While walking, she shifted her attitude, and by the time she finally talked to Tony, she was able to keep an open mind and ask him why the kids were playing, rather than accuse him of breaking their agreement.

What happened during Maria's walk around the block? Frankly, we don't know. In fact, we don't really know how anybody actually shifts an internal state. Presumably, clients like Maria shift due to the activation of the prefrontal cortex, the part of the brain responsible for self-awareness and the regulation of shifting operating modes (Siegel,

1999).<sup>3</sup> Clients often can't describe how they get shifts to happen. The theme seems to be some sort of "letting go" of control, and a momentary surrender to the fact you can't make life go exactly according to your wishes. It usually is accompanied by a kind of physical relaxation, and a release from obsessive thinking about what isn't going according to plan. The client returns to the present moment, and is able to respond based on what actually happens rather than on their fear of what is going to happen. Our experience with clients is that when they decide they want to make an attitude shift, they are usually able to do it. It might take a while, but the most important ingredient is desire. The problem of normal life is that, when emotional takeovers occur, clients simply forget that they want to shift attitudes. The tapes serve as reminders at the precise moments when the reminders are needed.

It was only after we began making these tapes that we realized that clients had actually been asking for them for years. Clients have often said things to us like, "I wish we could remember the things you were saying in our last session," or "The way you said that was so good. It really got me thinking, but we lost it as the week went on," or "I wish you could have been there to tap me on the shoulder and remind me to keep my cool." Once we started making these tapes, some clients reported that just carrying the tapes with them made a difference. Once they'd listened to the tapes a few times, simply glancing at them often activated a reflective process that resulted in an attitude shift.

Clients report that shifting brain states has something in common with many repetitive religious practices – from praying "Thy will be done" to practicing mindfulness, kissing a St. Christopher medal before going up to bat, or making a list each night of things one is grateful for. All of these approaches help people create enough of a pause to free them from the grip of intense rage or fear and to generate states of generosity, acceptance, and trust. Like them, our audiotapes allow the body and brain to calm down, and they serve as timely reminders that it's in the client's best interest to try to shift.

Maria, for instance, used her tape as regularly as some people light candles at mass. She told BA that she often could feel an attitude change beginning as soon as she heard his calm, confident tone. It reminded us of what attachment researchers speak of when securely attached children evoke images of their caregivers to soothe themselves. In her third week of using the tapes, Maria told BA that she began to spontaneously hear his voice inside her head every time she got upset. When BA heard these words, he knew that Hebb's Law had taken effect, and a new neural integration had occurred in Maria's head. The neurons activated by his voice had been paired with the neurons active when Maria got upset enough times so that they were now automatically activated when Maria became upset.

Since BA's experience with Maria, we have developed several other ways for clients to practice new thinking when they are upset (Atkinson, 2004, 2005a, 2005c). While Maria was involved with her "reminder tapes," BA met with Tony and helped him practice paying attention to his automatic internal reactions while listening to complaints recorded by Maria on audiotape ahead of time. With BA's help, Tony listened to Maria's complaints until he felt his usual defensive attitude rising inside of him, then practiced

attitude-shifting thoughts. The beauty of this procedure is that it allowed Tony to practice shifting states many times during one therapy session. Tony and BA would turn on the tape, hear Maria complaining, and Tony would begin feeling defensive. Then BA would stop the tape and Tony would focus on paying attention to the feel of his defensive attitude and practice shifting. Then Tony and BA would do it again with another of Maria's complaints (Maria had no trouble coming up with enough complaints to put on the tape!).

We've employed a similar procedure by meeting with partners and reviewing arguments videotaped in previous therapy sessions. As they watch the videotapes, they usually begin feeling the same upset feelings that they had during the actual sessions. As this happens, we stop the videotapes, and help clients practice attitude-shifting thoughts. Yet another method involves helping clients practice state-shifting by helping them revisit recent arguments via audio-guided recall. With this method, we make audiotapes that prompt clients to travel back through time and see themselves in an upsetting situation. We help them recall the exact moments when they began getting upset and picture it vividly enough so that they can actually feel upset again. In their minds' eye, they watch the scene unfolding and picture themselves beginning to react as they did in the situation. However, as the scenario unfolds, the clients picture themselves becoming aware that they are reacting ineffectively and picture themselves relaxing and practicing attitude-shifting thoughts.

## **Conclusion**

Frankly, these practice methods have been much more effective than even we had originally anticipated, and they've changed the way we think about therapy.<sup>4</sup> Before, we assumed that clients who continued acting in irrational or self-defeating ways even when they knew better lacked ego strength, had unresolved trauma, were secretly afraid of success, or were receiving unconscious payoffs of some sort. Now, we think these people just have some bad emotional habits. But bad emotional habits can rob people of what's most important to them in life – nourishing intimate relationships. Many people develop bad emotional habits when they are very young, and go through their whole lives crippled by these habits. A person who is overly-defensive or aggressive at age 18 may still be overly-defensive or aggressive at age 48. These habits have torn this person's life and relationships apart, but still they persist. Surely, we often assume, there must be some deep-seated reason why people act this way. But once we understand how the brain works, we realize that the key to changing emotional habits may be right under our noses, overlooked because it's so simple. Donald Hebb found the key for us back in 1949 summing it up with the phrase, "Neurons that fire together, wire together." Repetition is the key to lasting change. Old emotional habits may persist in spite of penetrating insights into the emotional injuries that have created them, reprocessing of these emotional injuries, an understanding of their destructiveness, and transformative experiences in therapy when they experience moments of release from the tyranny of these habits. But the same emotional habits may yield in a matter of weeks when we adopt the brain's central mechanism for change.<sup>5</sup> Our method for working with couples, Pragmatic/Experiential Therapy for Couples (Atkinson, 1998,

2005a, 2005b) assumes that repetitive practice is a necessity for lasting change.

For many therapists, the idea of repetitive practice conjures up images of thought-stopping or communication skills training in which client's practice stopping irrational thoughts or making "I statements." The problem is that we all know that these methods can promote changes that are less than heart-felt. We've watched clients trying to make "I feel sad" statements while inside, they're thinking "You're a jerk!" and we're uncomfortable with the "fake it til you make it," philosophy behind the cognitive/behavioral rehearsal approach. But let's not throw out the baby with the bathwater. Isn't it possible to practice changing the condition of one's heart? Sacred traditions have always understood the necessity of repetition and ritual in cultivating attitudes of the heart. Devotees often get together week after week to soften their hearts by reminding themselves of what they have to be grateful for, acknowledging their shortcomings, asking for forgiveness, and seeking the attitudes of love and compassion. As clients progress through therapy and release judgmental attitudes over and over again, they experience transformations of the heart that seem similar to those that have been experienced by spiritual pilgrims throughout the ages who have sought to be released from the hatred, bitterness, resentment and contempt they found in their hearts. It is perhaps ironic that the most advanced scientific discoveries about the brain may end up supporting the concepts of routine and ritual, largely ignored by modern psychotherapists, but intuitively known and practiced by our spiritual traditions since the beginning of time.

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## Endnotes

<sup>1</sup>There is abundant evidence that the same basic neural operating systems are present

in all varieties of human species. In fact, they are present in all mammals (Panksepp, 1998). However, there's also evidence that the maturation of these neural systems is experience-dependent (Schoore, 1994; Seigel, 1999). That is, the way these brain systems mature and function can be impacted by one's social milieu. The strongest evidence for this assertion comes from studies examining the impact of parent–child interaction on the child's developing brain (Seigel, 1999). These studies indirectly suggest the possibility that other social and cultural influences can have a significant impact on the developing brain as well. There may be systematic ways in which various cultures impact brain development and functioning, although existing research is insufficient to provide answers to such questions at the present time.

<sup>2</sup>Feelings of vulnerability emanate from a neural operating system called "PANIC" by neuroscientists. When this state is active, subjects experience feelings such as loneliness or insecurity, and seek emotional contact with others. PANIC circuits course through the periaqueductal gray of the midbrain. The neuropeptide CRF (corticotrophin releasing factor) plays a prominent role in activating this brain system, and the system is calmed by the release of oxytocin, prolactin, and internal opioids such as B-endorphin (Panksepp, 1998).

<sup>3</sup>University of Wisconsin psychologist Richard Davidson along with a host of others, found that the left prefrontal cortex, which is located just behind the forehead, plays a critical role in moderating emotional reactivity and shifting operating modes (Davidson, 2001a, 2001b, 2003; Davidson, Putnam, & Larson 2000; Fox, 1994; Goleman, 1995; Hariri, Bookheimer, & Mazziotta 2000; Morgan, Romanski, & LeDoux 1993; Raine et al., 1998; Siegel, 1999). The prefrontal lobe lies at the crossroads between the cognitive and limbic brains, and appears to be the part of the brain that is able to reduce the longevity and intensity of emotional states and thereby to limit the fallout. This part of the brain contributes heavily to a person's ability to be aware of his or her internal states. The prefrontal cortex acts as an emotional "clutch" that disengages the sympathetic nervous system and engages parasympathetic "brakes" (Siegel, 1999). As a client increases awareness of his or her internal states, the prefrontal lobes become more active, and able to modulate emotional intensity.

<sup>4</sup>While we have found these methods to be very effective, we are making no claims about their universal effectiveness. As qualitative researchers, we consider our job to be the development of methods that seem useful to us, then share them as vividly as possible, so that others can try them out for themselves (Atkinson, Heath, & Chenail, 1991). We are white, middle class therapists working with clients who are similar to us in many ways, and the question of the applicability of these methods to diverse populations is an open question. We've gone to considerable lengths to describe our methods in detail (see Atkinson, 2005a, 2005b), in the hope that others can try them out in diverse contexts, then generate dialogue about their usefulness or lack thereof. We assume that legitimization of knowledge is a communal process that involves dialogue among all relevant stakeholders (Atkinson, Heath, & Chenail, 1991).

<sup>5</sup>We realize that we're making some bold statements here which depart from

established assumptions about the change process. We want to assure readers that we certainly don't believe we're in any kind of privileged position to be making such claims (we don't consider ourselves to be any more intelligent, intuitive or enlightened than those who take opposing views). We're just doing our best to make sense of things, just like everyone else. In exploring new developments in brain science, we've stumbled onto some findings that have inspired us to re-evaluate some of our assumptions, and try some new things. We have the highest respect for those whose ideas we are now questioning, and welcome critical dialogue.