

NEUROPLASTICITY

The Game-Changer for Stress, Shame, and Trauma

by Linda Graham, MFT

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Dealing effectively with the challenges and crises of life is the core of resilience and well-being. Helping clients develop flexible and adaptive strategies for coping with everyday disappointments and extraordinary disasters is the heart of the therapeutic process.

This learning and healing can happen because the brain's innate neuroplasticity—the human brain's capacities to grow new neurons and create new connections among those neurons, creating new neural pathways and circuits lifelong, thus creating new learning and new more skillful behaviors, lifelong—can be catalyzed and sustained through the therapeutic relationship.

The human brain has been learning and rewiring itself for eons, of course. That's how learning and growth happens, how human beings can learn to walk and talk and relate to others with empathy and intimacy. Many of us even create governments, write symphonies, and address issues of climate change.

When we clinicians know how the brain works—how to harness the mechanisms of brain change underlying all coping strategies and skills, all personality styles, and all diagnoses (unless there is organic impairment), that underlie all theoretical orientations and preferred therapeutic modalities—we can help clients use the tools that will rewire any strategies that are defensive, dysfunctional, and blocking of growth, even when they are seemingly “stuck” and intractable. We can then help them encode new, more flexible patterns of response for thriving and flourishing. Further, we can teach them tools and techniques of self-directed neuroplasticity, so that they can develop their own practices beyond the consulting room of changing their brains, thus changing their lives.

What we're learning from modern neuroscience is that the human brain learns from and is shaped by experience and that *every* experience changes brain structure and functioning. We may characterize disruptive experiences—toxic or abusive relationships, natural disasters, divorce, death of a loved one, loss of a job, or loss of health, or loss of hope—as stressful or traumatizing to the brain as well as to the sense of self. Internal responses to those events—habitual anger, anxiety, stress, shame, depression—change brain circuitry and functioning, too.

We may characterize more positive experiences—empathic, resonant relationships, nurturing social connections, rewarding accomplishments and achievements, the flow of kindness, compassion, gratitude, generosity, love, delight, and awe—as nourishing and healing. The findings of 25 years of modern behavioral science research and 25 years of modern neuroscience research are dovetailing to demonstrate that these positive experiences also change brain circuitry and functioning.

It's not just clinicians that benefit from knowing more about how neuroplasticity works. I've learned that clients also love to be clued in about how their brains work and how they can begin

to rewire them. Learning how to shift out of the negativity bias of the brain and out of the contractions of the lower brain's automatic survival responses into the openness and flexibility of a more plastic brain gives them a sense of mastery, competence, agency, and efficacy, and their progress in therapy reflects that.

To my clients, I often reference Paul Gilbert [1], a psychologist in the UK and the developer of Compassion Focused Therapy, who reminds us that:

Given the evolutionary development of the human brain over hundreds of millions of years, and . . .

Given the genetic templates all of us have inherited from generations of ancestors, and . . .

Given the conditioning of our attachment experiences in our family of origin, optimal or less-than-optimal, and . . .

Given the norms and expectations of our culture and our society . . .

Who we are...and how we cope...is not our fault.

This kernel of wisdom can be a tremendous relief to anyone who struggles with shame or guilt—or anxiety or depression because of the shame and guilt. There are so many forces that converge and shape who we have become as individual human beings. No matter how dysfunctional our behaviors or how stuck we feel in them, everything has a reason that is fundamentally understandable, and as we learn from experience, fundamentally workable.

Paul goes on to say:

Given neuroplasticity, and especially given the power of our choices of self-directed neuroplasticity . . .

Who we are . . . and how we cope . . . becomes our responsibility.

This wisdom is profoundly helpful in moving a client's perception of themselves from any kind of "poor me" victim stance to an empowered and responsible "I" stance of agency. They are not only the leading actor in their play; they are the author of the script of their own play.

This is the shift I describe in my own workshops as, "Shit happens. Shift happens, too."

(It's interesting to note that the mindfulness and compassion that Paul uses in his Compassion Focused Therapy have been shown by research in Richie Davidson's neuroimaging lab at the Center for Investigating Healthy Minds at the University of Wisconsin-Madison to be two of the most powerful agents of brain change known to science.

We are certainly also learning from modern neuroscience that the brain learns best—lifelong—from interactions with other brains—from experiences in relationships with other people.

In the last two decades, both behavioral scientists and neuroscientists have been validating the importance of positive resonant relationships to "rewire" the brain and develop skills of

emotional-social-relational intelligence and resilience. Therapy is one of these privileged relationships that creates the conditions for rewiring the brain moment by moment in our therapeutic sessions.

Within the therapeutic relationship, we can help clients shift how they cope. Clients can learn to reverse the impact of stress and trauma; regulate surges of emotions to come out of anxiety, depression, grief, loneliness, guilt, and shame; deepen the self-compassion and empathy that connect them to their inner resources; overcome resistance and strengthen the resonant relationships that foster resilience; and shift their perspectives through mindful awareness and reflection to discern options and make wise choices.

This article suggests ways to harness the client's neuroplasticity in the therapeutic relationship to safely, efficiently, and effectively rewire the brain for more resilience and well-being, then explores briefly some of the emerging research on the impact of digital technology, shame, and trauma on that neuroplasticity.

Moment-to-Moment Neuroplasticity in Therapeutic Sessions

I once heard a keynote speaker at a conference on Attachment and Psychotherapy say:

All this talk therapy is just an excuse to hang out long enough for the relationship to do the healing.

This quote from my mentor Diana Fosha, [2] founder of Accelerated Experiential Dynamic Psychotherapy, sums that up:

The roots of resilience are to be found in the felt sense of being held in the mind and heart of an empathic, attuned, and self-possessed other.

We want to provide that felt-sense kind of empathic listening that creates the conditions for those roots of resilience moment-by-moment:

*Ah, the comfort,
The inexpressible comfort
Of feeling safe with a person.
Having neither to weigh out thoughts
Nor words,
But pouring them all right out, just as they are,
Chaff and grain together;
Certain that a faithful hand
Will take them and sift them;
Keeping what is worth keeping and,
With the breath of kindness,
Blow the rest away.*

—Dinah Craik
A Life for a Life, 1859

The safety we provide our clients, moment by moment, through the deep listening we provide our clients moment by moment, creates a neural safety net in the brain that primes the brain's receptivity to new experiences and new learning, and activates the brain's neuroplasticity for change.

Neurophysiologist Dr. Stephen Porges [3] has updated our understanding of how to create neural safety in our sessions with our clients through his work on neuroception—the brain's completely below-the-level-of-awareness perception and processing of safety-danger-life threat in any situation, especially interpersonal interactions.

To create a context for applying Steve's research to our clinical sessions:

Human beings are born with a biological imperative to connect with people close to them—caregivers initially—for safety and protection, for comfort and soothing, and for regulating our nervous systems and emotions. Sixty years of attachment theory and research by John Bowlby in the UK and Mary Ainsworth and Mary Main in the US have demonstrated “beyond irrefutability” that interactions between caregivers and the developing child either *develop* an internal secure base within the child based on secure attachment with the parent (an inner base of safety and resilience) or *derail* the development of that internal secure base when the attachment style between child and parent is insecure anxious, insecure avoidant, or in the case of trauma and abuse, disorganized.

Twenty years of research and clinical experience from neuroscience-of-attachment pioneers like Allan Schore [4], Daniel Siegel [5], Louis Cozolino [6], and Bonnie Badenoch [7] inform us that early attachment conditioning also kindles and shapes the maturation of the child's developing brain, especially the pre-frontal cortex, our center of executive functioning. This develops the circuitry that helps the developing child learn to regulate their own nervous system, manage a broad range of emotions, and quell the fear response of the amygdala. The pre-frontal cortex integrates the brain's capacities for attunement (self and other), empathy (self and other), and awareness (self and other).

It is also the structure in the brain we rely on the most for response flexibility; I call it the CEO of resilience. Researchers have found that the secure attachment that promotes the full development of the pre-frontal cortex is the best buffer we have against stress, trauma, and later psychopathology.

When those early attachment experiences have gone awry, and the full development of the pre-frontal cortex has been derailed (what we see in our offices as presenting problems of emotional dysregulation and difficulties in all kinds of relationships), clinicians become the re-parenting, re-attachment figures for our clients. We re-ignite the development of the pre-frontal cortex to full maturation and functioning.

Our fully mature (we hope!) pre-frontal cortex entrains the client's pre-frontal cortex as the original caregiving would have/could have/should have done in the first place. We provide the kind of attuned, empathic experiences—empathy for themselves and for their suffering, and

empathy for their responses to events and the stories of themselves they create in response to those events— that reboots all of the integrative functions of their pre-frontal cortex. Clients strengthen their capacities to relate to themselves and to others with ease, skill, and grace; to be organized and make plans; and to see the big picture and shift gears among various perspectives and choices with both stability and flexibility.

Further, when we provide non-shaming, non-blaming guidance and expertise—in our theories, our maps, and our vision of problems and solutions—we allow our clients to experience themselves as acceptable, loveable, cherished, and worthy and of significance to their family and community.

Kindness is more important than wisdom, and the recognition of that is the beginning of wisdom.
—Theodore Rubin

We also shift from being the expert to becoming guides of experience and experiment (since that's how the brain learns and rewires), wisely offering reflection and integration of the new learning. Regardless of our theoretical orientation or preferred modality, all of this is done through the neural entrainment of the relationship, therapist to client.

Steve Porges's [8] Polyvagal Theory sophisticates our understanding of why empathic, attuned relationships work to create the safety and trust essential to increase the plasticity in the client's brain and increase the capacities for change, growth, and learning.

Safety and connection are fostered by the most recently evolved part of the autonomic nervous system (ANS), the neural circuitry that regulates the body-brain's homeostasis—the ventral vagal pathway of the parasympathetic branch of the ANS. This is what Dr. Porges calls the “smart” vagus or the “social” vagus. The ventral vagus perceives and processes cues of safety—or not—from the facial expressions and tone and prosody of voice of others; it's part of the brain's “social engagement” system. (A gentle reminder here that the vagus nerve operates entirely below the level of conscious awareness. Even though we are using our head, there is no conscious “thinking” involved at all.) When interactions with others are warm, friendly, and kind, the brain stays in a functional homeostasis and the client feels comfortable, connected, belonging, okay, acceptable, and even lovable.

As clinicians, we activate the client's ventral vagal pathway by offering attunement and empathy conveyed through a gentle tone and rhythm of our voice—“low and slow”—and through our facial expressions of interest, curiosity, kindness, and acceptance. The client is entrained to feel connected, safe, resourced, and hopeful.

When the client feels safe and comfortable with us, their “social” vagus acts as a “vagal brake” on the arousal of the sympathetic nervous system (SNS), the branch of the autonomic nervous system that mobilizes us to take action in the world (using our limbs) to deal with any sense of danger. The “vagal brake” of the social vagus calms down the body-brain's autonomic fight-flight-freeze response when the client experiences any stress, distress, unease, anxiety, or sense of danger.

(By the way, activation of the SNS is a good thing when there's no fear. We mobilize and take action in the world—to play, learn, explore, and create. Sometimes taking action can return us to a sense of safety and calm again, too. The social vagus can support, even initiate, those adaptive responses of the SNS.)

The social vagus can also counter the over-activation of the more primitive dorsal vagus pathway of the parasympathetic branch (PNS) of the autonomic nervous system—what Dr. Porges and his collaborator Deb Dana [9] call the “dumb” vagus. The dorsal vagus responds to the neuroception of extreme danger or life threat by shutting down the nervous system, even to a state of feeling dorsal dead—out of connection, out of awareness, into a protective state of collapse. Clients will feel shut down, numbed out, checked out, even dissociated, not moving in any direction. When the dorsal vagus system has hijacked both the social engagement system and the SNS, the client drops into a state of hopelessness and despair. The dorsal dive is a powerful but sometimes costly survival strategy.

As clinicians, we track the moment-by-moment state of the client's nervous system: too revved up or too shut down or the Goldilocks sweet spot of equilibrium, calm and relaxed yet engaged and alert. That sweet spot is called the *window of tolerance* in trauma therapies and our neural entraining of the clients helps them come back into and expand their window of tolerance—a sense of safety and trust. And we offer our own engagement and regulation—through eye contact and attuned listening, our own calm and gentle support—to help clients regulate their sympathetic spikes and storms or their dorsal dips or dives (even dorsal deadness) and return to the equilibrium of their ventral vagus-monitored social engagement system (aka window of tolerance) where they can experience themselves as happy, active, interested, and resourced in solving the problems life will still throw in their way. They can relate to others as trustworthy, reliable resources and the world as benign, fun, and peaceful.

Barbara Fredrickson, [10] a pioneering researcher in the behavioral science of positive psychology, suggests an analogous form of positive dyadic regulation in her book *Love 2.0*. Dr. Fredrickson discovered that when two people are:

- * in physical proximity to each other
- * making eye contact
- * sharing a positive emotional experience
- * experiencing a mutual care and concern for each other

the neurochemistry of the two people begins to sync up; their neurochemical synchrony generates a felt sense of shared resonance that can be characterized as a moment of love, or certainly a state of safety. The relationship creates the conditions for rewiring and does the healing.

Probably a significant contributor to that neurochemical synchrony is the release of oxytocin—the brain's hormone of safety and trust, bonding and belonging, and of calm and connect. Sue Carter, this country's leading researcher of oxytocin, has said, “Especially early on, a single exposure of oxytocin can create a lifelong change in the brain.”

Besides doing my best to attune to and empathize with my clients' emotional states and regulate their nervous system through a calming entrainment with my own, I also intentionally teach them a tool that helps them use the memory of a safe resonant relationship (which may be with me) to activate the release of oxytocin—the brain's immediate antidote to the stress hormone cortisol—to help them regulate their own nervous system and return to a baseline physiological equilibrium, the social engagement system, and the window of tolerance.

Hand on the Heart

I will guide:

Simply place your own hand on your own heart center. Breathe gently, softly, deeply into your heart center. If you wish, breathe in a sense of ease or safety or goodness to your heart center. Then remember one moment, just one moment, when you felt safe, loved, and cherished by another human being. Not the entire relationship, just one moment. This could be with a spouse, a parent or a child, a friend or a therapist or a teacher. It could be a spiritual figure; it could be a pet. As you remember this moment of feeling safe and loved and cherished, let yourself feel the feeling of that moment. Let the feeling wash through your body, and let yourself stay there for 20 or 30 seconds.

Then I will explain:

When you do this Hand on the Heart exercise, the warm, safe touch of your hand on your heart center begins to activate the release of oxytocin, the brain's hormone of safety and trust, bonding and belonging, calm and connect. Warm, safe touch anywhere that feels comfortable on your body can release the oxytocin, but there are neural cells around the heart that communicate directly with the brain and more quickly begin the activation of the release.

Breathing deeply into the heart center activates the calming branch of the nervous system, the parasympathetic branch, and the body begins to relax. Breathing a sense of safety or ease or goodness or any positive emotion into the heart center puts the brakes on the very fast, very automatic survival responses of fight-flight-freeze. Remembering a moment of feeling safe and loved and cherished with someone really activates the release of the oxytocin, which is the brain's direct and immediate antidote to the stress hormone cortisol. Blood pressure goes down, and the heart rate stabilizes. This technique is powerful enough to calm down a panic attack in less than a minute.

I suggest to my clients that they practice Hand on the Heart ANY time they experience a startle or an upset, to be able to back out of a difficult emotional reaction before it hijacks them. Or even just to practice it to train the brain to create this new response to any difficult moment even before the moment happens. Research has shown that oxytocin flowing through the body-brain can pre-empt the stress response altogether.

When the Brain Gets Over-Stimulated: The Impact of Digital Technology on Neuroplasticity

There is both an upside and a downside to our increasing dependence on our digital devices for communicating with our fellow human beings—texting, emailing, Facebooking, or tweeting on the extended brains of our smartphones and computers. I want to review some of the important research findings about the impact of the social-digital revolution on relationships and suggest that the overuse of our devices may be a game-changer of neuroplasticity as well.

The Upside

Matthew Lieberman, [11] a neuropsychologist at UCLA, says in his book *Social: Why Our Brains Are Wired to Connect*:

This is what our brains are wired for: reaching out to and interacting with others. These are design features, not flaws. These social adaptations are central to making us the most successful species on earth . . . Increasing the social connections in our lives is probably the single easiest way to enhance our well-being.

Dr. Lieberman and many other researchers are documenting the powerful benefits to our physical and mental health of being and feeling resonantly connected to other people, whether in social, collegial, or intimate relationships. One example: the strength of our social network reduces stress and predicts mortality. Maintaining strong ties is as beneficial to our health as quitting smoking and more important to our longevity than the effects of obesity or physical inactivity. Another: lack of social connection makes us feel unsafe. Without social connection, the brain goes into self-preservation mode—the dorsal dive—decreasing our social skills and increasing loneliness and depression. These very real benefits of social connection come largely through our traditional modes of connecting—working together, raising a family together, volunteering together, playing sports together, or participating in a book club, choir, or bowling league.

The Downside

The kinds of connections we experience through our digital devices are what Sherry Turkle [12]—clinical psychologist, professor of psychology at MIT, and developer of MIT’s Initiative on Technology and Self—calls “connectivity” rather than genuine connection. Dr. Turkle has researched the impact of digital technology on relationships—capacities for empathy and intimacy, negotiation and compromise—for the last 25 years. Her findings on the pleasure—even addiction—of social connectivity versus the healing of genuine connection are significant and not encouraging.

Dr. Turkle has found an emerging trend in our capacities for relationship. We are morphing into more of a “pancake” style of relating—shallowing our relationships to broad-reaching but insubstantial, numerous but superficial, offering the illusion of companionship without the demands of friendship—1,000 friends on Facebook but no close friends—rather than the “cathedral” style of relating: the deep meaning, intimacy and vulnerability that we treasure in a marriage, a close friendship, or in therapy.

(An astonishing factoid from the May-June 2016 issue of *Scientific American Mind* in an article on “Friendship: The Remarkable Power of Our Closest Connections:” 50% of American adults now report they have zero close friends, down from two close friends just ten years ago. Zero.)

People are becoming less comfortable with “messy” emotions, choosing distance over closeness, efficiency over vulnerability, and avoiding face-to-face real-time conversations to avoid the risk of any difficult emotional vortex. Expression of emotions is more easily compromised or avoided, leading to a decrease in empathy. There are an increasing number of reports of people being fired from their jobs by text.

(Albert Mehrabian [13] noted in his book *Silent Messages* that 55% of all emotional communication is conveyed through facial expressions and body language, 38% through tone and prosody of voice, and only 7% through words. We need our bodies to communicate and regulate our emotions, and without the physical proximity of our bodies in our communication, the quality of emotional communication seems to be rapidly eroding.)

According to Dr. Turkle, people are becoming less comfortable with solitude and the deep reverie, introspection, and pondering that solitude affords. People are rapidly becoming less tolerant of the “boring bits” of life, always seeking the next connection, the next stimulation to fill up every nanosecond. People spend so much time on their devices there’s hardly any time left for the brain to consolidate all of the incoming info into long-term memory/learning.

American adults now spend 33 hours/week on devices; that’s 20% of all the time in a week and 30% of waking time. Teenagers, now called “screenagers,” spend 7 1/2 hours a day in front of a screen, texting 4,000 times a month or 130 times a day. They spend 30% of their time on social media, and almost 50% of all of their waking time on one device or another. One quarter of American teenagers are connected to a device within 5 minutes of waking up. Children aged two to six now spend two to four hours a day on screens. Computer training in early years—including in preschool—is now commonplace during a period in a child’s life when sufficient healthy play is critical to normal physical and mental development.

How might all of this screen time be affecting the brain itself? Dr. Turkle acknowledges that the social-digital revolution of the last two decades has happened so quickly that scientists, educators, mental health professionals, and policy makers have not been able to keep up, though we need to wake up and pay close and responsible attention.

Three effects are known so far.

Addiction

When we hear the “ping” on our computer or phone, the hope of connectivity—“Somebody’s trying to connect. I’m wanted! I’m loved!”—activates the release of dopamine: the neurotransmitter of pleasure, satisfaction and reward. People rush to their devices every time they hear a “ping,” interrupting whatever thought or conversation they might be having at the moment. (I’ve had therapy sessions interrupted more than once.) Or people compulsively check

their phone many times an hour; the average American adult now checks their phone about every 6.5 minutes.

The craving for the next hit of dopamine through digital devices can be addicting. Perhaps IS addicting. We need more careful research to know. It's an addiction as derailing of a person's capacities for genuine relating and resilient coping in facing life's challenges as any other addiction.

Brain Fog

Multi-tasking—rapidly switching from computer to phone to word document—takes metabolic energy in the brain. Too much multitasking fatigues the brain and causes brain fog. Researchers have found that multi-tasking degrades performance with each new task and contributes to more errors; some believe it even contributes to ADD. We need to give the brain a break every 60-90 minutes to reset itself, and being focused on our phones/computers, we frequently fail to do so.

Myopia

Near-sightedness is increasing significantly in developed countries, far faster than evolution would account for. The increased time of close focus on screens held close to the eyes without a balancing view to groups of people or nature may account for the change.

Overstimulation of the Brain

I would like to suggest another possible impact of over-dependence on our digital devices on the functioning of the brain itself that would impact a client's neuroplasticity and the possibilities for learning, change, and growth.

Excessive use of devices could overstimulate the sympathetic nervous system—mobilizing our brain to reach out to others, yes, but also generating a sense of anxiety whenever we're not connected to a device, and without the regulating and calming effects of the vagal social engagement system and the oxytocin that person-to-person relationships provide. On the other hand, more and more people are reporting more and more experiences of rejection and humiliation from unmonitored use of social media, oftentimes triggering the experiences of shame that derail the brain into the dorsal dive, numbing out, shutting down, and collapsing that we explore below.

Technology is not biology. Digital devices process information through electrical signals. Human brains process information through electrical and chemical signals. The neurochemical synchrony of the therapeutic relationship creates the neural safety net in the client's brain that primes the brain's neuroplasticity and readiness for learning, change, and growth. Without the biological benefit of real-time person-to-person relating, the entire potential of neuroplastic change could go unharnessed.

All of these trends are even more alarming among the younger generation growing up as digital natives. (One-third of ten year olds and two-thirds of all American teenagers own their own

mobile phone.) Without experience in empathic attunement and learning to self-regulate “messy” emotions, they grow up not even knowing what emotional-relational capacities they are missing.

Victoria Dunckley, [14] an integrative psychiatrist in Los Angeles, has found that the still-developing and vulnerable brains of children and teenagers cannot process the overstimulation of digital and media bombardment, and they have trouble modulating their emotions and arousal levels when stressed. She notes the precise correlation between increased diagnoses of ADHD, autism, and bi-polar in the last 10 years with growing and excessive time spent on screens, saying that the constant bombardment from electronic screen devices may be causing the young brains to short circuit. In her research with 500 children, teenagers, and young adults, she prescribed a strict 3-week electronic fast from all media to reverse what she calls Electronic Screen Syndrome and achieved a 50% reduction of symptoms across all psychiatric and diagnostic categories.

I’m learning it’s wise to assess digital addiction in my clients as much as I would assess addiction to substances or addiction to work. These devices serve the same purpose as other addictions: the defensive avoidance of vulnerable emotions and genuine connection. The artificial stimulation is meant to avoid loneliness and depression, but in fact usually exacerbates those symptoms.

What to Do

For my *individual* clients, I suggest a periodic “digital detox”—a vacation from devices for one to three days. (At least turn off the “ping” on the computer and phones so they can work on a project for 2-3 hours without interruption. We need to both rest and energize the brain by focusing on (flowing with) one project at a time for a significant stretch of time.) Trying to comply with such a suggestion can be very diagnostic, bringing to conscious awareness all manner of fear, shame, anxiety, loneliness, etc., that can be addressed in therapy, even if the attempted digital detox lasts only two hours.

For *couples*, I assign (require) homework of carving out time, at least 10 minutes to start, where they sit face to face with each other, television off, cell phones and computers off (preferably left in a different room) and talk with each other eye to eye, voice to voice, heart to heart about *anything*. The 7% content of the words is not really as important as the 93% nonverbal communication and resonance.

Because the brain learns best “little and often,” small experiences repeated many times, it’s more productive for brain and behavior change for my couples to talk with each other 10 minutes a day every day than to talk together for one hour on the weekend. (Doing both, even better). The physical proximity to activate the neuroception of the social engagement system can generate-recover experiences of safety-trust-love in the relationship.

For *families*, I recommend a modified digital fast, carving out spaces where use of all digital devices is prohibited—the dining room, the kitchen, the car—so that family members actually talk with each other while sharing the activities of daily family life. Also carving out time, half a day on the weekend or one full weekend a month, where pleasurable and nourishing family

activities like picnics, camping, playing board games or badminton, or playing with the dog, can be rediscovered.

For *everyone*: powering off all devices and media 30 minutes before going to bed (60 minutes is better for the body's circadian rhythm) and allowing 30 minutes to wake up in the morning and engage with the day and the real people in our lives before we turn the devices on again.

Digital Technology and Neuroplasticity

There's no question that the extension of the human brain through advent of the World Wide Web (created originally for the sharing of scientific research data quickly around the world, across cultures and disciplines), the Internet (and now the virtually unlimited storage of data in the virtual reality of the cloud and shared over networks at hyper-speed), and email has powerfully sped up the processing and transmission of information and data around the globe—stellar applications for business, science, government, the military, and even everyday planning of logistics.

And now clients can stay in touch with loved ones far away with far more ease and frequency than 10 years ago; they can reconnect with long-lost high school or college friends and share important moments and events with others.

In order to steer the impact of digital technology on the brain in a positive, even healing, direction, we need to bring awareness and empathy to all of our clients' efforts to deepen their social connections and increase their well-being. All of this harm reduction with our devices proposed above is intended to reawaken us to the blessings of so many other things in our lives, to protect the unfathomable magic of resonant, renewing relationships and the power of those relationships, hearing others, and hearing ourselves, to rewire our brains in wholesome, resilient directions.

Toxic Shames Shuts Down the Nervous System, Blocks Neuroplasticity

Whatever the triggering event might be—being blown off by a friend, failing to get a promotion at work, being criticized in front of co-workers or ridiculed at a family gathering—one of the most powerful derailers of our clients' resilience and well-being, and even the neuroplasticity of their brains, is shame. [15]

Shame is the intensely painful feeling or experience of believing we are flawed and therefore unworthy of acceptance and belonging. Shame erodes the part of ourselves that believes we are capable of change. We cannot change and grow when we are in shame, and we can't use shame to change ourselves or others.

—Brené Brown, PhD

Shame—the territory of embarrassment, rejection, failure, unworthiness, unlovability—has such a powerful impact on the sense of self, the psyche, because of our very human “biological imperative” to connect with other human beings: to belong, to be part of the tribe and feel wanted, accepted, and loved. Human beings, especially young, developing human beings, need

other human beings for safety and protection, comfort and soothing, regulation and mirroring, and validation and valuing. Perceiving one's self as disconnected, cut off, or exiled from the tribe triggers the neuroception of life threat and triggers the dorsal dive. Thinking shuts down, coping becomes hiding and withdrawal.

We know the individual brain's capacities to self-regulate, self-soothe, to be self-aware, self-accepting, become competent, self-protecting and self-actualizing, strengthen lifelong in interactions with other human beings, and develop initially *only* in interactions with other human brains. Shame presenting in our clinical sessions is a reliable hallmark of attachment trauma.

Shame is somewhat inevitable in the human condition. All tribes, clans, cultures, and societies have to teach their young how to survive, how to remain within the norms of acceptable [and life-saving] behaviors, and how to stay deserving of the group's protection if not love.

Toxic shame is all too common in human development. The nervous system of the developing child automatically seeks safety and protection, comfort and soothing, and regulation of its responses to perceived fear, danger, or life threat from caregivers nearby. It doesn't have to "learn" how to do that; it will automatically reach out unless later experience conditions it not to. The adult caregiver/parent is likewise hardwired to provide that care and will do so automatically unless its conditioning precludes it doing so. When that seeking of social engagement for dyadic regulation goes awry (see the review of attachment theory and brain development above) the immature brain experiences lack of protection-engagement as abandonment, dismissal, betrayal, and neglect, and long before the capacities for conscious processing mature in the brain, responds with withdrawal from seeking that social engagement as a counter-protective measure.

The developing but disconnected nervous system cannot sustain the seeking of connection—even the activation of seeking of connection (revving up of the SNS to reach out)—and goes into a dorsal dive, into shutting down, numbing out, collapsing, "hiding." "If you loved me you would find me."

Well into adulthood, any experience of rejection, humiliation, or betrayal can trigger this implicitly conditioned dorsal dive into feelings of shame and shut-down of the nervous system. In the immobilization of the over-activation of the dorsal vagus (the "dumb" vagus), the client's neuroplasticity is offline, listening is muted, learning is blocked, and change is inaccessible, seemingly impossible.

What to Do

The therapist's willingness to hang in there and connect with the client when they are shutting down and hiding out by offering attunement, empathy, understanding, and compassion for the defensive shutting down of the client's interpersonal engagement, is essential to create enough safety in the therapeutic relationship to recover the client's *neuroception* of safety so that the brain's neuroplasticity can come back online. The therapist's acceptance of the client, as they are, (becoming a safe re-parenting, secure re-attachment figure) is what recovers or develops for the first time the client's acceptance of themselves and begins to heal the shame.

The curious paradox is that when I accept myself just as I am, then I can change.
—Carl Rogers

I will often engage a shame-based client in a meta-processing of their experience of themselves in the room with me: what it's like to share their story, their feelings, their experience in the moment with me; how do they perceive me receiving them; would they be interested in hearing from me how I perceive them (full-on kindness, acceptance, appreciation, valuing); how is it for them to hear from me how I experience them; what happens inside of them when they hear how I experience them; what's it like for them to take in "living in the mind and heart of an attuned, empathic and self-possessed other." This often requires working through layers of objections and push away if needed, but noticing, reflecting on, and integrating any shifts in the client's experience of themselves, even tentative self-acceptance, begins to dissolve (rewire) the shame.

Rewiring Shame through Movement

There is another tool that can help clients safely explore their own embodied sense of shame and, with practice, shift it and rewire it for themselves. This is a technique I learned years ago from Natalie Rogers, an expressive arts therapist and Carl Rogers' daughter. It uses bottom-up shifts in the posture that carries the shame in the body to rewire the client's proprioception of the body's inside-out experience to shift the felt-sense experience of the self to a more positive state and a state of safety. That neuroception of safety shifts the functioning of the brain again, recovering the neuroplasticity that will allow the client to heal the toxic shame.

This exercise can be used to explore shifts of any agitation or shut down of the nervous system, any emotion of fear, anger, sadness, disgust, even nuance emotions of jealousy, resentment, disappointment, etc. I'm illustrating it here to shift the sense of shame, because clients can feel immediate benefit when they can lighten the felt-sense of shame in the body; they strengthen the motivation to continue the practice of self-directed neuroplasticity on their own.

In asking the client to experiment with this exercise, I first explore any sense of safety-connection-acceptance they experience with me in the moment, and will do this exercise with them in the moment, to ensure we have a safe enough container for them to experience success with this exercise.

I ask them to remember one small memory of shame (embarrassment, hurt, rejection, failure) and to feel the emotion of that memory in their body. I reiterate the suggestion that they work with only one small memory; to remember, not relive, and never to overwhelm. I ask them to let their body assume the physical posture of that emotion, then to let go of the memory and simply inhabit the physical posture; no "thinking" is required for this exercise to work.

We both let our bodies collapse into the posture of shame, however each of us experiences that. We hold this posture for 30–40 seconds, to really let the neuroception of that feeling be strong. Then we each let our bodies move, on their own, without thinking, without going to the head at all, to the opposite posture. The client doesn't have to know what this new posture, this new emotion is called. He/she simply remains in the posture, inhabiting the posture for another 30–40 seconds. Then we each return to inhabit again the original negative posture of shame for 20

seconds or so, return to the second opposite posture for another 20 seconds, and then let the body move to some posture in the middle, a posture that will integrate the felt sense of the two opposite postures.

Next, I ask the client to take a moment to notice and reflect on their experience, noticing any shifts. Then we re-open the dialogue, exploring and naming any shifts they have experienced. The first time I used this technique with a client, he was exploring depression. He had assumed the posture opposite to depression would be one of happiness. To his surprise and to his learning, he realized the opposite of depression, for him in that moment, was reverence. He had shifted his experience; he had learned from the intuitive wisdom of his own experience.

Many clinicians and clients have now learned of this technique—to shift the posture of the body in order to shift the physiological state of the body and shift the emotional state in the brain—through the TED talk of Amy Cuddy of the Harvard Business School, who teaches a technique she calls Power Posing, used to help people feel strong and empowered before they face a difficult situation like a job interview or a business meeting or appearing in court. Amy shares her own very moving story of bouncing back from disaster in her TED talk, now the second most viewed talk in the history of TED. When we use the moving of our bodies to shift from one emotional state to another, we are training our brain in the reconditioning or rewiring of our emotional experiences, using self-directed neuroplasticity to rewire our sense of ourselves.

Neuroplasticity and Trauma

Trauma is a fact of life. It doesn't have to be a life sentence.”
—Peter Levine, developer of Somatic Experiencing

—Whatever the triggering event—losing one's home in a hurricane or a flood, losing a loved one through a car accident or to a heart attack—trauma derails, at least temporarily, a person's capacities to cope with that event(s). Whether a one-time acute event, or chronic, whether occurring in adulthood or early in childhood (which makes people far more vulnerable to the pathology of trauma), a person experiencing trauma experiences overwhelm, an upheaving of their life as it was. Trauma calls into question a sense of one's self, one's sense of how the world works. And any trauma can both over-mobilize the sympathetic nervous system—causing agitation, stress, or hyperarousal— and over-mobilize the dorsal dive of the parasympathetic nervous system—leading to numbing out, shutting down, or collapsing.

We know how differently different people can respond to the same potentially traumatizing events, coping well or not coping at all. One client loses a job and gets derailed into depression for six months. Another client loses a job and within two months has found a new career path. Any client may respond to a car accident, a cancer diagnosis, losing a home, losing a relationship, or losing a sense of direction, resiliently at one point in their life, yet become completely overwhelmed at another, depending on their capacities and resources at the time.

There was a wonderful article in the February 11, 2016 issue of the *New Yorker* this past winter, “How People Learn to Become Resilient,” that summarizes a lot of the important research about

why some people become more skillful in dealing with disappointment, difficulty, and disaster and others don't.

A key finding in that research is that a person's *perception* of a potentially traumatizing event and a person's *conception* about their capacity to cope with that event—or not—is a key determinant of whether they will be traumatized—or not. Summed up by George Bonanno, director of the Loss, Trauma, and Emotion lab at Columbia University:

Do you conceptualize an event as traumatizing or as an opportunity to grow?

Learning to grow from the “opportunity” of a trauma requires that clinicians and clients learn how to harness the neuroplasticity of the client's brain to do that learning, to move into what is called post-traumatic growth.

The field of trauma therapy is evolving in many ways, shifting from locating trauma in the external event—natural disaster, murder of a loved one, rape, combat, imprisonment—to locating the potential for trauma, and the potential for recovery from trauma, in the *response* to the event. I.e., different people can experience the same hurricane or a similar armed robbery; one may develop full-blown PTSD, another evidence no symptoms at all.

How you respond to the issue . . . is the issue.
—Frankie Perez

We're learning that all trauma is experienced in the body and that trauma memories are stored implicitly in body-memory, outside of awareness and sometimes difficult to recall to conscious awareness. (Deep bows to *The Body Remembers* by Babette Rothschild [16] and *The Body Keeps the Score* by Bessel van der Kolk [17].) We are learning that for trauma therapy to be safe, efficient, and effective, trauma treatment needs to include sufficient somatic resourcing and body-based tools to allow trauma responses to be accessed, moved through the body, and then reflected-integrated into conscious awareness (As in the exercise above to rewire toxic shame from attachment trauma).

What to Do

We're learning that safety is essential; the client's neuroception of safety in the therapeutic relationship is the neural platform for neuroplasticity, for learning, recovery, and even growth from trauma. (Stephen Porges would say safety IS the treatment.) As always, we foster this neuroception of safety with interest, openness, curiosity, and acceptance in our stance toward the client's experience, through compassion and comfort in our facial expressions—using a soothing tone and prosody of voice, using eye contact, shared positive emotions and shared mutual care to generate the neurochemical and emotional resonance that signals safety to the client's brain.

Some psycho-education about vagal regulation of the hyper-arousal and hypo-arousal of the nervous system can help clients normalize their very normal responses to abnormal, potentially traumatizing events, and release any shame at all about their responses to those events. Some psycho-education and exploration within the safety of the therapeutic relationship of the window

of tolerance, finding the sweet spot of physiological equilibrium between too much revving up (sympathetic spikes and storms) and too much shutting down (dorsal dips and dives) can help clients monitor and modify their own reactivity to any trauma they have experienced.

Learning to use the neuroplasticity of the client's brain to rewire somatic and emotional responses to any traumatizing event is essential. We're learning about memory deconsolidation-reconsolidation, explained beautifully in Bruce Ecker's *Unlocking the Emotional Brain*. [18]

When we can “light up” the neural networks constellating a negative memory—meaning we can evoke a visual image of an event, the emotions associated with that event, locating those emotions in our body, and bring to mind negative beliefs about the self triggered by that event—and then deliberately evoke a positive memory or experience or even new positive memory that will strongly contradict or disconfirm the original negative memory, and hold those two memories, negative and positive in awareness at the same time, or toggle back and forth between the two, the juxtaposition itself will cause the neural networks constellating those memories to fall apart and instantly rewire a fraction of a second later. When the positive is much stronger than the negative, it can “trump” the negative. Neuroscientists have only seen this in their scanners in the last 5–7 years, but it is the neural basis for the healing in all trauma therapy.

Wished For Outcome

Wished For Outcome is an exercise I frequently do as a guided visualization to help clients recover from an event they have experienced as traumatizing. Guided visualizations are powerful tools of neuroplasticity; whatever the brain can imagine is real to the brain, even if what's being imagined could never happen in real life. The example here uses the Wished For Outcome to help the client rewire any traumatizing sense of shame from a moment in a relationship that didn't go so well and the client wound up feeling badly about themselves. (Shame is such a huge part of trauma; learning to rewire shame is a powerful entrée to recovering from trauma.)

I do caution the client to start small. One individual specific incident to work with, not the entire relationship and not the most difficult relationship, at least to start. This is in order to maintain safety, to not re-trigger, re-live, re-traumatize while they are learning the technique and their brain is getting a chance to experience success at rewiring itself. I also advise them to go slowly, to take their time for their own intuitive wisdom to have a spacious sense of time to bring whatever it needs to bring to consciousness and to awareness.

Begin by coming into a sense of presence, aware of being in your own body in this moment, in this place. Bring a sense of kindness and openness to your experience, evoking a sense of interest and curiosity, and anchoring in a sense of safety and trust.

Then, begin the exercise by remembering one moment, one small moment, when an interaction between you and another person went awry, and you wound up feeling not very good about yourself, you wound up feeling badly. Stay anchored in your own awareness and your own self-compassion as you evoke this memory, and you light up all the neural networks constellating this memory by remembering where you were, who you were with, remembering what you said, and what they said; remembering what you did, and what they did; and remembering how all of that

made you feel, at the time, or even now as you remember the event. Notice how you feel, or felt, and see if you can locate where you feel or felt that in your body. The visceral sense of the experience. Notice any negative thoughts you may have about yourself now because of what you experienced then. Let the evoking of this negative experience be as vivid as you can, lighting up the memory so it can be rewired.

Then, you create the positive resource that you will juxtapose with this negative memory to do the rewiring, by beginning to imagine a different outcome to this scenario. A different, more satisfactory resolution of the event. Remembering, whatever you can imagine is real to the brain, even if this new ending never could have happened in real life.

So you begin to imagine something different you might have said. You imagine something different the other person could have said, even if that never could have happened in real life. Let your brain do its own imagining and its own rewiring. Imagine something different you might have done. Imagine the other person doing something differently, even if that never could have happened in real life. Let your imagination create a more satisfactory resolution of the entire event. You can even imagine someone who wasn't there at the time coming in and doing something helpful.

As this new scenario unfolds, let it come to a new more wished-for outcome. And light up all the neural networks of this new resolution. Let yourself feel how you feel with this new ending, and where you feel those feelings in your body. Let yourself notice any new more positive thoughts you have about yourself, given this new outcome. Let the experience of this resolution be vivid in its details and vital in your imagination. Strengthen your experience of the thoughts and feelings of this new ending.

Then, gently touch back in to the original negative experience. Touch it lightly. And then let it go and return to resting in the experience of the new ending. Then touch into the negative experience again, just briefly; notice any shifts. Then return to the resource of the new positive ending. Touch into the negative again, let it go, and rest in the feelings and thoughts of the new positive ending.

Then you take a moment to pause and reflect on your experience of the entire exercise, noticing any shifts.

This technique of memory deconsolidation-reconsolidation does not change what happened, but it does change the client's relationship to what happened. And it doesn't re-write history, but it does rewire the brain.

Post-Traumatic Growth

Jim Rendon reports in *Upside: The New Science of Post-Traumatic Growth* [19] some of the encouraging research about recovering from trauma, even finding new meaning and purpose in life *because* of the trauma, not just in spite of it. He reports that 75% of all American adults will experience at least one traumatizing event in their lifetime, but that only 8% will develop full-blown post-traumatic stress disorder—flashbacks, nightmares, hypervigilance, withdrawal,

numbing out, and/or shutting down. And more than 50% of people experiencing trauma will recover fully—more than coming to terms with the trauma, they find new meaning, purpose, and new life because of the event, not in spite of it.

Of course, researchers and clinicians are interested in what accounts for the full recovery of more than half of people who experience trauma, very real trauma, in their lives. Among the elements identified as key to full recovery from trauma (not necessarily in a linear sequence):

1. Acceptance of the reality of the event(s) and the consequences of the event (s).

This happened. This really happened. Even if it ever should have or it's not fair. Accepting that the consequences can be devastating and the process of recovering/rebuilding could go on for years. Accepting the event and the recovery as the new reality. "Acceptance coping" has been identified as a significant predictor of post-traumatic growth. "Normal is never going to be what normal used to be."

(Mindful self-compassion practice—the awareness and acceptance of what has happened and the very normal reactions to what has happened, and the awareness and compassionate acceptance of themselves as the experiencer of what has happened—can be very helpful here.)

2. Support from family/friends/community who believe in the client's recovery and healing.

In addition to the physical support of a safe haven and chicken soup, trauma survivors need to have people around them, near them, who believe the person experiencing the trauma can fully recover. No conflict or confusion, no ambivalence or argument about that. Not a quick gloss-over of "You'll be fine!" but empathy for the fear and also the perspective of the long view—you will be fine someday—that the person may not be able to access at first.

(Therapy can be very important in providing this support and in helping the survivor accept it from others.)

3. Finding a community of other people with the same trauma

People who have been there and who know, without the client having to do a lot of explaining or defending. Camaraderie and common humanity without having to explain helps us want to stay on the planet; we can stop feeling sorry for self and engage with, even help, others in the same struggle.

(Group therapy can be very helpful here.)

4. Finding positive moments even in the midst of a catastrophe.

A smile, a good meal, a stroll in the park, or a moment of laughter can provide a brief and necessary respite from unbearable fear or grief. Experiencing, savoring, taking in the good of a positive moment is not a bypass. It's a tool of skillful distraction, shifting experience in the moment so that the brain can shift gears and open perception to a larger perspective.

(Taking in the good can be very helpful here.)

5. Positive re-framing; finding positive meaning in a negative event.

Recovering the capacity to “turn a regrettable moment into a teachable moment” is a tremendous turning point in recovery from trauma; finding the hidden gift, the silver lining. How does this fit into my life story? This includes forgiving one’s self for any part of the trauma.

(Journaling or writing a new narrative of one’s life and getting some emotional distance from the event(s) can be very helpful here. See Coherent Narrative exercise below.)

6. Communicating about the trauma.

Talking with others, coming out of isolation or feeling like the only one. Recognizing, getting support of common humanity.

(Sharing the story with a larger audience, speaking or writing, beyond family and friends, can be very helpful here.)

7. Helping others

Volunteering brings the client out of isolation into a sense of common humanity and larger community, finding a place in the world again. Volunteering also helps them integrate and pass along what they’ve learned, to recover a sense of competence, empowerment, and mastery.

Doing a kindness produces the single most reliable momentary increase in well-being of any exercise we have tested.

—Martin Seligman

8. Appreciating that the new life came *because* of the catastrophe, not just in spite of it.

No one chooses to have a catastrophe befall them or anyone they love; no one wants to have to cope with life’s unwanted, disruptive changes over and over and over. Yet the disappointments, difficulties, even disasters that are always part of every human life can be the catalyst not just for a course correction but for an entirely new direction. Clients can recover their centeredness and groundedness, and move authentically into a new life of new meaning and purpose.

Guiding clients in an exercise like Coherent Narrative below and journaling about recovering from a past traumatizing event, can be helpful here in accessing their capacities to bring to resolution any trauma they are experiencing now.

Coherent Narrative

A useful exercise is to use this entire trajectory as an inquiry into how well and how completely a client has processed and come to terms with any event that upheaved their life once upon a time, and yet led to new learnings, new opportunities, and new growth that would not have happened otherwise. Because the brain processes information differently when imagining, when verbalizing, and when writing, this journaling exercise can help the brain process and integrate a traumatizing event into the coherent narrative of the client's entire lifetime, dis-identifying with the trauma as who they are and distancing from the emotional charge of the trauma.

1. Take a moment of quiet inner reflection to identify a struggle in your own life that was very difficult, even disruptive at the time, or an event that was truly challenging or even catastrophic at the time, as long as you feel resolved now about the issue or event. As long as you feel you have recovered from the impact of the event, whatever steps you took to do that.
2. Write down the event that you're choosing to work with for this exercise and write down what you remember of your reactions and responses to the event, even as those evolved over time.
3. Reflect on any sense of self, identity, belief systems, or rules about how the world works that were challenged by this event; what was upheaved.
3. Reflect on any of the steps in the post-traumatic growth trajectory (briefly outlined in the section above) that you might have used in your own recovery. How were they helpful?
4. Reflect on any steps of the PTG trajectory that you did not use, but you think now might have been helpful at the time.
5. Identify any learning, hidden gift, or silver lining from the recovery of this event. Is there any knowledge you would not have learned if this event hadn't happened?
6. Reflect on any new sense of self, identity, belief systems, or rules about how the world works that might have emerged from your post-traumatic growth process. How is your life different—perhaps even better—now *because of this event*?
7. Take a moment to reflect on your process in this exercise. Notice any shifts in perspective. Was there any new learning or insight from doing this process?
8. Take a moment to acknowledge your own skills in recovering from an upset in your life; own your own capacities to bounce back.

Neuroplasticity—the Game Changer

Neuroplasticity per se isn't what solves a client's problems. Neuroplasticity helps recover the functioning in the client's brain that supports them in solving their problems. Clinicians can provide the safety in the therapeutic relationship that primes the neuroplasticity in the client's brain and guide them in the experiences that will use that neuroplasticity to rewire old, not-so-functional patterns of coping and encode new more flexible, more adaptive patterns of coping. In

the process, the client learns to empower themselves, making wise choices. They become themselves the game changer.

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