# Beyond Phrenology

## *Let's look at how the brain really works*

BY MARY SYKES WYLIE

Brain science may be all the rage among psychotherapists, but that doesn't mean most psychotherapists actually know much about it. And yet, who hasn't fallen prey to the seductions of what might be called the new phrenology—the assignment of emotional or relational problems in clients to particular brain regions or functions, often with implausible, if not laughable, results?

In the world of pop neuroscience, it all seems fairly simple. The left hemisphere is the seat of logic and analysis, and the right hemisphere is where the brain stores intuition and artistic creativity. Fear and anger lurk in the amygdala like brother ogres brooding in a deep cave, memory lives in the hippocampus, and empathy comes from mirror neurons that somehow "see" and "get" the signals other people send. Low serotonin "causes" depression, while dopamine is a pleasure chemical, and oxytocin is the brain's own love potion.

But, in reality, the brain isn't just a storehouse full of discrete modules and chemicals with complicated names, each precipitating a particular function, feeling, or process. Just about every mental function, from doing a simple arithmetic problem to experiencing transcendent feelings of love or spirituality, results from external stimuli and a vast range of neural activities and connections, drawing on many brain regions interacting with each other—systems within systems. In fact, most mental functions involve many regions of the brain performing a variety of functions that don't necessarily predict or correlate with the specific behaviors or feelings to which they're supposedly attached.

Much, much harder than playing phrenologist is actually grasping something of the unimaginably complex, fully dynamic brain processes that shape our mental and physical lives. The problem is, of course, that most people can feel their eyes glazing over and their own brains going offline when threatened with serious neuroscience, and yet, if therapists are ever going to bring genuine insights—not just soundbites—from neuroscience into the practice of therapy, they need a much more nuanced and sophisticated understanding of how the brain actually works.

How can they acquire this knowledge without becoming brain scientists themselves? Even more pressing, what real-life practical therapeutic implications, if any, can truly be drawn from neuroscience? To the rescue come two brain experts who are very good teachers, and who not only elucidate—each from a unique perspective—dynamic brain processes, but demonstrate with remarkable clarity what they mean for the daily practice of psychotherapy.

Norman Doidge, psychiatrist, training psychoanalyst, and neuroscience researcher (as well as poet and award-winning essayist), has spent the last 14 years exploring how to integrate recent discoveries in brain science, particularly neuroplasticity, into psychotherapeutic practice. He's the author of *The Brain That Changes Itself*, a *New York Times* bestseller that describes the brain's astonishing capacity for change, even in people seriously disabled from conditions like strokes, brain injuries, cerebral palsy, and learning disorders, not to mention entrenched depression, anxiety, and crippling character traits. In contrast, in what Doidge calls the plastic paradox, brain plasticity doesn't always work out for the best. Says Doidge, "if you do something that's good for you, the circuitry

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will fire faster, stronger, and more clearly. Over time, it'll take up more cortical real estate and become your default circuitry. But it's also true that if you do something that's bad for you, the same thing happens. . . . The plastic paradox accounts for both our flexibility when we choose to do something for the first time as well as our symptomatic rigidity." Probably nobody in neurobiology and psychotherapy has made a stronger case for the truth of the old adage "use it or lose it," or argued more convincingly for routinely considering the power of plasticity in day-to-day psychotherapy.

Stephen Porges, a professor in the Department of Psychiatry and the director of the Brain-Body Center in the College of Medicine at the University of Illinois at Chicago, is a leading expert in developmental psychophysiology and developmental behavioral neuroscience. In his groundbreaking book *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation,* he explores the evolution of the neurobiological system underlying our automatic emotional responses to other people and our unconscious ability to detect threats in the environment. What this means for psychotherapy is that hard scientific evidence now exists for what most therapists instinctively know: successful therapy depends utterly on establishing safe, caring, mutually trustworthy, stable relationships with clients.

## NORMAN DOIDGE ON THE USE-IT-OR-LOSE-IT BRAIN

**You've written about people with extreme cognitive or psychological problems who, against all odds, managed to recover much of their functioning through what you call neuroplastic breakthroughs. Can you give an example of what these kinds of people taught you about the brain?**

**NORMAN DOIDGE:** One person who taught me an enormous amount is a psychologist named Barbara Arrowsmith, who was born with a devastating array of learning disorders, including dyslexia. She had great difficulty processing concepts, an inability to sense where her body was in space, and difficulties in the Broca's area of the brain that made her sound at times like someone who'd had a stroke. One of her problems was that she couldn't perform any mental function that required her to understand the relationship among symbols. For instance, she couldn't understand prepositions because prepositions use language symbols to describe relationships: the cup is *on* the table; the middle finger is *between* the thumb and the pinky. She had trouble understanding many mathematical concepts because they also involved understanding symbolic relationships. And she couldn't read an analog clock because she couldn't tell the relationship between the minute and the hour hands, which are symbols too.

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Despite a traumatic childhood, she managed to get through college because of her remarkable memory and extraordinary determination. To keep up, she'd sometimes read the same passage in a textbook 20 or 30 times. As a graduate student in psychology—she got into the program because of her extraordinary memory and ability to observe—she heard about some lab research with rats and mice whose brain functioning had been shown to improve dramatically after receiving special cognitive stimulation in environments with various kinds of rat toys. After learning about that study, she had an epiphany and decided that she should be able to improve her own brain function through cognitive exercises. Since one of her most obvious problems was reading a wristwatch, she got pictures made of how the hands looked at different times. She started off simply with just an hour hand, then added a minute hand, and made hundreds of these cards. Then she got one of her friends to hold up a card with the answer on the back, and she had to guess it right before she went on to the next card. Then she added seconds, then weeks and months and years. She kept doing this despite the fact that it was mentally exhausting. Eventually, she was able to tell the exact time using five and six-handed clocks and also began to be able to understand numbers and logic and calculation.

After this experience, she set up a school to help other people with learning disabilities. After sending some of my clients to her school and seeing them get better, I got more interested in studying different kinds of learning disorders and working with people

who'd had strokes. In the process, I learned more and more about the brain's remarkable plasticity.

The basic principle of neuroplasticity is the idea that brain tissue, in some respects, works like muscle tissue: once it gets stimulated through exertion, it develops itself. The corollary is that if you don't stimulate a certain part of the brain, that cortical real estate is taken over by other functions. In other words, we have a use-it-or-lose-it brain.

One practical application of this knowledge is exemplified in the work of a psychologist named Edward Taub, who discovered the principle of learned nonuse. So if I have a stroke and can't use my left hand, I'll stop trying to use it during the typical six weeks of brain swelling following the stroke. During this time, the feedback mechanism of the brain is basically saying, "The left hand doesn't work. Stop trying to use it. Use your right hand more." But if the person focuses too soon on doing things with the right hand, the left hand isn't given the opportunity to recover. So Taub found that by preventing people from using their right hand and by forcing them to do even babylike motions with the left hand, the result was far more increased functioning in their left hand. In fact, when people who've gone through Taub's therapy get scanned afterward, it's found that other brain areas have taken over for the area that was originally damaged in the stroke.

**So how do these findings apply in the context of psychotherapy?**

**DOIDGE:** It turns out that learned nonuse also happens when a certain kind of a psychological process gets you to engage in one behavior, cognitive operation, or kind of interaction and not another. Thus, your knowledge of the thing you're not doing, or the side of yourself you're not exercising, can atrophy, especially if it's a psychological defense. Just having an insight into the defense isn't sufficient. A good psychotherapist has to be attuned to the developmental issue a person is facing because, if the learned nonuse goes far back, the person can be almost infantile in that area of functioning.

Another important principle for therapists to understand in applying neuroplasticity in the therapy room is what I call the plastic paradox. We know that neurons that fire together wire together. If you do something that's good for you, the circuitry will fire faster, stronger, and more clearly. Over time, it'll take up more cortical real estate and become your default circuitry in some situations, but it's also true that if you do something that's bad for you, the same thing happens, so neuroplasticity explains bad habits, addictions, and patterns that we can't easily break.

When I explain this to patients, I tell them neuroplasticity is like snow. The first time you go skiing down a mountain with fresh snow on it, you can take almost any path you want, as long as there aren't any trees or rocks in your way, but if you had a good run the first time, the next run tends to be very close to that one. Eventually, if you keep it up, you'll develop tracks in the snow that become harder and harder to get out of.

The plastic paradox accounts for both our flexibility when we choose to do something for the first time as well as our symptomatic rigidity. Each time we respond to a trigger in a particular way, we actually deepen the neural circuitry supporting it. Each time you do the thing that's bad for you, like go into another relationship with someone who treats you in a demeaning way, you're going to deepen that pattern.

**So what has your understanding of neuroplasticity taught you as a therapist about changing habit patterns?**

**DOIDGE:** Sometimes I think it's good for therapists to do with their clients what Taub does with his neurological patients. If a client has a behavior that's not serving her well right now and another one that's underdeveloped, you need to put a kind of a cast on that problematic habitual behavior and help her exercise the one that's harder to do. But first she has to understand that it's possible and have a sense of how much effort is going to be required. She also has to know that she needs to pay attention while she's engaging in the new behavior or thought pattern, because the best and the quickest way to get neuroplastic change is by paying close attention. I've seen people defeat bad habits, severe anxiety-disorder issues, and obsessive-compulsive disorder by understanding that they can drive brain change in a positive direction using their own minds.

Of course, I don't believe that the discovery of neuroplasticity somehow replaces all of our other therapeutic skills. Nevertheless, the understanding of neuroplasticity makes you realize that talk therapy is more than just talk. In fact, the right kind of therapeutic talk can be seen as just as much of a biological intervention as medication. When you get people to focus on their key issues, those parts of the brain that are involved in the conflicts or difficulties are being triggered as they talk about them. As psychoanalyst and psychiatrist Susan Vaughan has said, psychotherapy is like microsurgery, in that we're getting precisely at the circuitry required to make change.

For that reason, I think hypnosis, which can help people to pay sustained attention to different aspects of their own functioning, is good for taking people out of automatized behavior. Be it with smoking or a problematic way of thinking about themselves, hypnosis can be effective at quickly getting people past the circuitry that supports bad habits and creating new paths into another kind of circuitry or mental set.

As a therapist, I use my understanding of the plastic paradox to make sure that in each of my sessions, in so far as it's possible, neither I nor

my patient are making their problem worse.

**Where do you see the next great advances in psychotherapy coming from?**

**DOIDGE:** I think a lot of the newer methods in our field—approaches like recent developments in hypnosis, hypnoanalysis, brainspotting, and eye movement desensitization and reprocessing—are good at helping people get into different states quickly. When that happens, rather than reinforcing the problem or inadvertently retraumatizing people, it's amazing how fast certain aspects of change can occur. But we need to bear in mind that the brain isn't a machine and can't be changed by just moving a couple of wires around. Neuroplasticity teaches that change is still something we need to grow into.

## STEPHEN PORGES ON SIGNALING SAFETY

**Can you give a nontechnical explanation of Polyvagal Theory and why it matters to therapists?**

**STEPHEN PORGES:** Polyvagal Theory begins with the recognition that mammals come into the world needing other mammals to take care of them and interact with them. So we have to convey to each other that we're safe to come close to, and we have to utilize others to help us self-regulate. When we come into the world, we have to functionally trick the nervous systems of our parents into saying, "This baby is cute; I want to take care of this child." Throughout life, we have to continue to functionally trigger the nervous system of others in our species into saying, "I'm safe and it's OK for me to hug you, to have sex with you, and to reproduce with you." What makes human civilization possible is our ability in the appropriate context to present the cues of safety to each other to down-regulate defensiveness and, thus, make further interaction possible.

The face and the intonation of the voice are critical vehicles for conveying our physiological state to each other so that we can determine whether we present a threat. If a person's voice is prosodic, it's conveying to others that their physiological state is calm. But if a person's voice is higher in pitch with a narrow frequency, it's saying, "Don't come near me." Why would you feel calmer when I use a prosodic voice? Because it triggers brain structures that engage our middle ear muscles, and increases the tone of the myelinated vagus. The little middle ear muscles shift the sensitivity of our hearing to human voices and functionally tune out low-frequency sounds that signal the possibility of a predator being present. Of course, if we live in a dangerous environment, we want to remain vigilant of low-frequency sounds. In fact, many children who live in dangerous environments have a nervous system adapted to detect predators, rather than speech, and have language delays.

I coined the term *neuroception* to describe our automatic, unconscious ability to detect risk in the environment. Usually, we're not cognitively aware of why we're reacting one way and not another. We respond emotionally to people and situations and then try to figure out why we're responding in that way. It's as if we each have our own TSA agent in us. If we tighten up and pull away when a person attempts to give us a hug, it's like our personal TSA agent is saying, "I'm not taking any chances: no one's getting on board this plane." In fact, that's really what social engagement is about: the evaluation of safety through proximity.

**Why do you think so many therapists have gotten so interested in your work?**

**PORGES:** Polyvagal Theory shows us how social interactions facilitate both mental and physical health in a way that's often ignored in the mental health field. Currently, there's a great emphasis on the manualization of treatment procedures without conveying the central aspect of what makes treatment work: helping the client feel safe with the therapist.

I think what first caught the attention of therapists was that the theory provided an explanation of shutting down as a defensive strategy to life threat. If you're immobilized, held down, and abused, you may dissociate or pass out. It's like the mouse playing dead in the jaws of a cat. Does the mouse *want* to immobilize? There's no choice; it's a reflex. And humans behave in this way, too. This gave trauma therapists, in particular, new insight into the terrifying experiences and subsequent reflexes that their clients had long been telling them about. When that ancient evolutionary defense system of freezing and going numb is put to use, it's not easy to stop it.

Before Polyvagal Theory, there was the idea that, because they'd experienced a stressful event, every trauma survivor should be in a high state of sympathetic activation. So the trauma world was locked into trying to define the effects of trauma and abuse through looking at only a part of the human nervous system. And when certain patients came in numb and frozen or dissociated, their therapists were often confused.

**So at the practical level, what difference does Polyvagal Theory make for psychotherapists?**

**PORGES:** It enables therapists to work more closely with clients to make the treatment environment safer. For example, there's a video by Pat Ogden, the developer of Sensorimotor Psychotherapy, manipulating a client's sense of neuroception by adjusting her own proximity to the client. Pat moves her chair away from the client while continually asking if the client feels more comfortable. Pat has a large office, and when she moved her chair approximately 20 feet from the client, the client requested that she come closer. By adjusting the degree of physical distance between

the client and the therapist, the client could recalibrate her nervous system and feel in control, and even start to smile and laugh. Pat's work is centered on modulating states of safety for optimal functioning, and this understanding of neurophysiology comes out of Polyvagal Theory.

**What does Polyvagal Theory tell us about what makes a good psychotherapist?**

**PORGES:** I'm often asked, "Why don't you develop a school of therapy based on Polyvagal Theory?" But the point is that some of the participants who are busy taking notes at my workshops may not have the interpersonal sensitivity and style that enables them to convey safety to clients. They simply may not have a command of the subtle nonverbal features that make master clinicians effective. From my viewpoint, it doesn't matter what a therapist's degree is in or what his or her theoretical model is. Effective therapists are defined by their ability to interact functionally: above all, they know how to make another person feel safe.

Part of it has to do with calling attention to processes of communication that are often ignored in clinical training. For example, there's the intonation of the voice, which has its roots in our evolutionary history as mammals, as we discussed earlier. Tone of voice and the acoustic properties of sounds are important. If the acoustic stimulation contains certain frequencies, we tend to feel safe. For example, we tend to feel safe and our social behavior is facilitated when we listen to the acoustic frequencies that characterize a mother's lullaby, the melody in Mozart's symphonies, and many folk songs, especially those using melodic female voices. We need to understand the powerful emotional influence the acoustic environment exerts on us. Our industrial world is dominated by low-frequency sounds, which our nervous system interprets as meaning that a predator is present.

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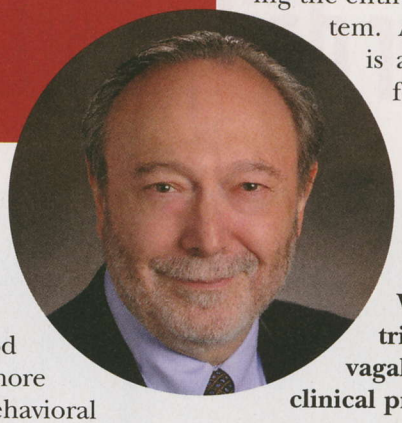

From this perspective, the therapeutic process is less dependent on the words or the therapeutic method being used and more dependent on behavioral cues, gestures, and how things are said. I'm not sure that beyond a certain point we can train clinicians to be more effective therapists if they don't naturally have the basic skills to create safety in the consulting room. In fact, I think there are many people drawn to the therapy trade who probably shouldn't be in it. They're not safe enough themselves to convey safety to others.

It seems to me that there's a public perception, which assumes that going for mental or medical care is like taking your car to an automobile shop. They assume that humans, like cars, can be diagnosed and fixed. There's very little understanding of the dynamics of the relationship with the therapist, which, more than any method or procedure, is the most important thing going on.

**What can therapists do to build on their natural abilities to create an atmosphere of safety with clients?**

**PORGES:** When I was an adolescent, I was a clarinetist. What did I learn from that? Among other things, it taught me a lot about breath. When you play the clarinet, you're basically exhaling slowly, controlling the muscles of your face, and listening. It's similar to what goes on in Pranayama Yoga. Slow exhalation increases the calming vagal influence on the heart. It also increases the neural tone of the facial muscles, while you regulate the viscera. It's a totally integrated polyvagal experience that involves the interaction between the vagus and the facial muscles—basically, recruiting the entire social-engagement system. And that's what music is about. When I'm asked for tips to help therapists feel calmer and more in control, I sometimes tell them to take up a wind instrument or singing lessons.

**What's the biggest contribution you think Polyvagal Theory has made to clinical practice?**

**PORGES:** I think my biggest contribution is helping therapists understand how the transition through evolution between reptiles and mammals, from isolation to increasing social interaction, is central to understanding what goes on in psychotherapy. Humans when threatened are similar to other mammals: they shift states to defend, become more reptilian, and lose access to their social communication skills. By understanding this adaptive reaction to danger, we've uncovered a neurobiological mechanism that enables us to better understand and treat mental disorders. Even in the intimacy of the

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clinical encounter, the relevance of evolutionary adaptation is being played out in therapists' offices every day.

**What's been the most important lesson for your own life that you've drawn from your work on the polyvagal system?**

**PORGES:** It's actually learning about the importance of listening. Once you understand the importance of role reversal and reciprocity in healthy relationships, you realize that listening is usually much more therapeutic than talking. It also makes life a lot more interesting and entertaining. pn

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