

## Neuroscience maps the whole person

Therapists now have a map of the whole person that is rooted in human biology. More precisely, we have a series of maps derived from the work of various neuroscientists that combine to form an overview of psyche, mind and body. Neuroscience shines light on the heart as well as the head, on feeling as well as thinking, and on what happens in relationships. It offers fresh insights into what can go wrong in human development and what can go right.

Like maps we use to navigate the world, these neuroscience maps are not the territory. Rather, they are a means of orienting ourselves in the therapy room. Once oriented, we can put them aside and explore the nature of the particular landscape we find ourselves in with individual clients. Neuroscience can open up the territory in illuminating ways.

I will outline six maps that together, I believe, give us this comprehensive view of the person, and then describe their relevance to some features of the landscape often encountered in therapeutic journeys.

### Map one: the nervous system

Neuroscience concerns the nervous system – or systems, because to understand the whole we need to know the parts.

The nervous system shows us the body as well as the brain. The latter is part of the *central nervous system* that includes the spinal cord. So in discussing the brain, we are looking at an anatomical structure that descends deep into the body. The rest of the body is animated by the *peripheral nervous system* that links the brainstem (at the base of the brain) and the spinal cord to every corner of the body. Restricting our gaze to the brain in the head means missing the reality of brain and body working together.

A substantial chunk of both central and peripheral systems is the *autonomic nervous system*. This determines what happens in our body that we cannot control directly: heart rate, blood pressure, arousal, digestion and so forth. The exception is breathing, which is both autonomic and consciously controlled – hence the value of breathing techniques to calm the body and thereby calm the mind.

To understand the autonomic system, we must follow its anatomical division into two branches. One, the *sympathetic nervous system*, raises arousal levels, waking us up in the morning, energising whatever we do, and fuelling our emotional life. The other, the *parasympathetic nervous system*, does the opposite, slowing us down so we unwind, relax and sleep. We need a balance of both – enough sympathetic arousal to function and find life meaningful, and enough parasympathetic calming to rest and recover from life's stresses.

Imbalances in the autonomic system bring people to therapy. For example, the excess of sympathetic arousal in anger that wrecks relationships, or the excess of parasympathetic slowing and shutdown involved in dissociation or chronic fatigue.

### Map two: neural architecture across three axes

From this brain and body starting point, we can appreciate the brain itself, that comprises the bulk of the central nervous system, in terms of three structural axes.

The first is the *top-bottom axis*, although it's also a bottom-top one since the brain has evolved bottom-up and neural development in childhood follows the same direction. The top is the cortex, the familiar wrinkly stuff in brain images, while the bottom is the collection of oddly-shaped areas (including the amygdala, hippocampus and brainstem) that sit underneath and that comprise the subcortex. A rough way to characterise what they do: the subcortex generates possible actions, while the cortex sifts these and chooses the best one. A client's chaotic behaviour may reflect an untrammelled subcortex, whereas his coherent behaviours, including defensive ones, may reflect his cortex fine-tuning subcortical impulses.

The second is the *front-back axis* in the cortex between the frontal lobes and the three posterior lobes (occipital, temporal, parietal). The latter receive sensory signals from eyes, ears and viscera (bodily organs and so forth), while the former receive the fruits of sensory processing in order to integrate them into a 'higher-order picture'. The more sophisticated a creature's social life, the bigger their frontal lobes – hence humans and dolphins have particularly large ones. A rough way to characterise the front-back axis: the posterior lobes enable fast, habitual reactions, while the frontal

lobes enable slower, reflective responses. In therapy, we bring the frontal lobes to bear on experience and behaviour so they learn to inhibit habitual reactions that lead to unhappiness.

The third is the *left-right axis* that reflects nature's most visible divide in the brain – the one between the cerebral hemispheres of the cortex. Why has evolution opted for two brains instead of one? Iain McGilchrist believes that dividing it in two enables simultaneous focused attention to the foreground (left) and open attention to the background (right), allowing a creature to focus on its prey so it can eat, while being alert to predators lest it gets eaten itself.<sup>1</sup>

The divide also allows the right hemisphere, which has richer connections with subcortex and body than the left, to work as an ensemble with the bodily viscera, while the left can function more independently from the body. The brain gets the best of both worlds: right keeps inner and outer (including other people) worlds in sync with each other, freeing left to focus on specific tasks (such as constructing sentences). Hence the left hemisphere says “I have a body”, while the right says “I am my body”.<sup>1</sup> In one, we can feel disconnected inside, in the other we can feel at one with body and feeling.

The left-right axis is of great significance in therapy. It helps in understanding the fragmentation of traumatic experiences and points to the need to balance cognitive work with affective work. The therapist must guide the client towards the inner world of his right hemisphere where the felt sense of the whole situation, and his emotional vulnerability, unresolved trauma, and ‘real self’ await him.

Understanding the left-right map requires both hemispheres. We may think we have understood something when in reality only our left hemisphere has. Real understanding requires reflecting on our experience over time so that the right hemisphere gets a feel for the nature of the divide.

### **Map three: polyvagal theory**

Nervous systems must relate to other people's nervous systems if they are to thrive and prosper. Stephen Porges's polyvagal theory elaborates the two-way division of the autonomic nervous system described above into a three-way division involving the vagus nerve that explains autonomic states in relationships:<sup>2,3</sup>

- *safety*: the ventral vagus (cortically controlled) balances sympathetic and parasympathetic nervous systems, enabling rewarding social engagement and a good therapeutic relationship
- *danger*: the sympathetic nervous system (triggered subcortically) dominates, fuelling human versions of fight-flight behaviours, defensiveness and conflict
- *life threat*: the dorsal vagus (evolutionarily old and controlled from the brainstem) brings on freezing, shutdown, dissociation and overwhelming shame

The three states can overlap. Therapy requires safety, but danger can lead to breakthroughs, and there can be recovery from life threat. Much human behaviour that is considered normal is actually an enactment of fight-flight reactions, yet nothing creative in human affairs happens without social engagement. Polyvagal theory helps us to see the distinctions.

### **Map four: the window of tolerance**

Relationships evoke feelings, and polyvagal theory aligns with the window of tolerance that maps our emotional arousal levels.<sup>4,5</sup> Safety is found within the window, where we can tolerate our emotional reactions to each other without losing our sense of self and other (the technical term is ‘affect regulation’). Outside the window, danger threatens in the form of hyper-arousal: we are overwhelmed with emotion and act out. And danger can become life threat, a state of very low arousal where we collapse inside and emotions shut down.

The window of tolerance and polyvagal theory can both be explained to clients with simple diagrams. They normalise a lot of distressing experiences, and may make more sense than psychological explanations.

### **Map five: core emotional systems**

Neuroscience looks for emotions amongst specific neural pathways and neurochemicals. Jaak Panksepp outlines seven primary emotional systems:<sup>6</sup>

- **SEEKING**: the motivation to get what we want, including seeking help from therapists and meaning in life

**RAGE:** our anger when we don't get what we want, sometimes enacted in the transference in therapy

**FEAR:** our reaction to threat, and a part of traumatic experience

**CARE:** our instinct to care for our children and for each other, central to intimate relationships including the therapeutic one

**PANIC-GRIEF:** separation anxiety and grief when we lose a loved one, key to mourning our losses

**LUST:** the urge to continue the species, sometimes felt in therapy but hopefully not acted out

**PLAY:** how young mammals develop their social skills and older ones enjoy life – and an aspect of creativity in therapy

This is a bottom-up and evolutionary view of our emotions. A top-down, psychological perspective might lead us to a different basic set, but Panksepp's biological schema covers the emotions we might hope to evoke in therapy.

### **Map six: different levels of emotional control**

Another contribution from Panksepp is a three level mapping of emotional control in the brain.<sup>6</sup> The *primary level*, centred in brainstem areas, comprises the seven emotional systems just described. This is where fear, rage, grief and so forth are triggered in their raw state, as when catharsis erupts in the therapy room. These primary emotions lie waiting in the wings for even the most shutdown clients.

The *secondary level* is centred higher in the subcortex in areas such as the amygdala. Here lie engrained emotional habits that we struggle to control, such as over-anxious reactions or difficulties saying 'no'. This is where primary emotions are elaborated into the spread of all our other feelings. Shame is a good example: a fundamental feeling and state, but not a primary emotion.

Where we can exercise control is at the *tertiary level* in the cortex. Here, we can choose to bring our emotional lives and behaviours into awareness, reflect on them, and experience them in the presence of another. Therapy can only work directly with this level, but the primary and secondary levels manifest when the dialogue is meaningful, and then our frontal lobes can get to work.

### **Features of the landscape revealed by neuroscience maps**

How can the neuroscience maps help us orient ourselves in the therapy room? Here are some suggestions.

*Conscious – unconscious.* Most brain activity is unconscious and always will be. But a line dividing the conscious mind from an unconscious one cannot be found in the brain. The left-right axis is not such a divide: left hemisphere activity is more foreground and right hemisphere activity more background, but if we turn our attention to the background (felt sense, nonverbal communication and so forth), whatever is there can come into awareness.

The notion of 'the unconscious' risks confusing background feelings with dissociated sensory and emotional fragments of experience following trauma. They should be kept apart: clients can be encouraged to bring background things into the foreground, but trauma fragments must be allowed to appear in their own time lest the client become re-traumatised.

'Unconscious' works better as an adjective than as a noun. Unconscious feelings can come into awareness, and forgotten memories may be remembered, but there is no unconscious mind as a place to search for supposedly 'repressed' feelings and memories.

*Defences – dissociation.* Psychological defences are left hemisphere devices – suppression, avoidance and denial of what is rooted in the right hemisphere, such as painful feelings and interpersonal situations that might pitch us from polyvagal safety into danger. Dissociation, by contrast, is a right brain phenomenon in which the normal integration of the sensory, emotional and cognitive aspects of experience turns to fragmentation, leaving us adrift inside.

Dissociation is often described as a defence, but this is surely wrong. We have a degree of choice over whether to be defensive, but none when we dissociate. Defences can be challenged, but clients must be helped to recover from dissociation. The two concepts overlap in that we defend against experiences in which we risk dissociating (again) and experiencing the accompanying shame.

*Psychological – biobehavioural.* Some things that happen in therapy are better seen from a biobehavioural angle than a psychological one.<sup>2</sup> For example, when dealing with trauma and dissociation: old emotions erupt and need support rather than interpretation, and dissociative states require the therapist to help the client to come back into their body. Therapists can psychologise anything, but it may not always be helpful to do so.

*Explicit memory – implicit memory.* Explicit memory is our autobiographical memory of our life story and of facts we have learnt, while implicit memory is of our somatic and emotional experience that we can never recall but which we enact on a regular basis. The former is only available from around two years old because it requires the hippocampus which is insufficiently developed until this age. Implicit memory, on the other hand, starts in the womb, and plays out in patterns of attachment and affect regulation which clients enact in their relationships, including the therapeutic one. Therapy involves both kinds of memory, but working with them is quite different.

*Foreground mind – background bodymind.* Instead of the fundamental divide in the psyche being between conscious and unconscious minds, I think neuroscience supports one based on nature's divide between the hemispheres.

Our left hemisphere mind is generally foreground, speaking, interpreting situations, puzzling things over, inventing excuses, rationalising, and so forth. Our right hemisphere mind is more entwined with the inner life of the body, so can be described as a bodymind in the background of our experience. Emotional body states, the felt sense of what's happening, our capacity for images, transference and countertransference, and much more, arise here.

## **Conclusion**

Therapists have been hearing about bits of neuroscience for some years now, and many trainings and workshops include some. But bits tend to be bitty – a neurochemical here, a brain area there. What is lacking is an overview, a contextual understanding into which we can fit the details. Having taught and written about neuroscience for many years, I think such an overview exists. It requires us to do what neuroscience itself, with its research specialisations, seems reluctant to do: to weave together a map of the whole person. Given our wide-ranging engagement with human nervous systems in our consulting rooms, we may be better placed than neuroscientists to do this.

## *References*

1. McGilchrist I. *The Master & His Emissary*. London: Yale University Press; 2009
2. Porges S. *The Pocket Guide to the Polyvagal Theory*. New York, NY: Norton; 2017
3. Porges S. *The Polyvagal Theory*. New York, NY: Norton; 2011
4. Siegel D. *The Developing Mind*, New York, NY: Guilford Press; 1999
5. Ogden P. 'Emotion, Mindfulness, and Movement' in D. Fosha, D. Siegel & M. Solomon (eds.) *The Healing Power of Emotion*. New York, NY: Norton; 2009 (pp. 204 to 231)
6. Panksepp J. & Biven L. *The Archaeology of Mind*. New York, NY: Norton; 2012

Peter Afford

September 2020