

Get Your Head Around The Thing Inside It

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The psychotherapy world is wondering what to do about the emerging science of the brain. Both Freud and Jung began their careers with an early pioneer of neurology, Jean Martin Charcot, in Paris. Had the science been as evolved in their day as it is now, psychotherapy might have developed quite differently. Maybe it is for the best that we have had to wait until now for neuroscience to be a real resource for therapy, because it has forced us to build our foundations in the personal, subjective experience that is so necessary to the practice of good therapy. Those foundations are surely strong enough now to withstand some input from a more objective scientific field.

So should psychotherapists bother with neuroscience?

I think the short answer is 'yes'. Neuroscience is at last broadening its horizons beyond cognition and behaviour, and giving us biologically specific information about more profound topics such as feeling and emotion, memory, the mind-body question and the holy grail of brain science, consciousness – things that therapists are concerned with.

Those who say 'no' have a number of arguments. The first is that neuroscience is a vast and complicated subject, so why even try to understand it? Well, you can be discerning and cherry-pick the useful bits. The second is the fear that objective science could supplant the subjective and experiential basis of good therapy. My answer to this is simple: don't let it. Another objection is that neuroscience seems to be short on instant advice as to how we should change the way we work. That's true – my own view is that the subject requires a slower imbibing and some fresh thinking if we are to incorporate its perspectives into our work. Finally, a recent letter in a British counselling journal questions the value of neuroscience by pointing out that putting people's heads into scanners will never prove whether things like the Oedipus complex actually exist. Of course it won't. What it can do is help us to think outside our customary box – not tell us whether we've been led up the garden path for the last hundred years!

My own view is that neuroscience is a goldmine for therapists. It's an emerging science that is shedding more and more light on the biology behind the human experiences that we work with. Many neuroscientists are in broad agreement with us on some basic human things, for example:-

- most of what goes on in our heads is unconscious
- thoughts and feelings are highly dependent on the emotional state of the body
- emotions & feelings often prevail over conscious thought & deliberate behaviour
- minds and brains are inherently relational with other minds and brains
- the experiences of infancy lay down patterns for the rest of life
- psychological change (based on neural connections) later in life is possible

Why dismiss a science that's on our side in a world that remains quite ignorant and suspicious about therapy? The real question is not whether we should bother with neuroscience, but how best to set about the dialogue and learn from it. At some point in the future, therapists not knowing about the brain may become the equivalent of doctors not knowing about anatomy. And beyond this, the whole marvellous enterprise of understanding the biological basis of the human mind is one that only cynics and dullards would want to ignore.

What is needed, I think, is to take our time to read up on neuroscience and to let it become part of our background understanding with which we think about therapy. We need some creative thinking and practice arising out of understanding the brain better, and good writing to make the subject accessible and stimulating. There is no point in over-loading our grey matter with excess technical detail. This complex science needs to be digested, mulled over and presented in a way that therapists can engage with – and even enjoy.

I have begun teaching an introduction to the subject on Diploma and Masters courses at the Psychosynthesis Trust in London. My aim is to present an overview of the brain and say a little about aspects of how it works that are relevant to therapy – like emotion and feeling, the mind-body question, memory, perception, consciousness – and about some of the pathology – depression, anxiety, stress, trauma, addiction, dissociation and so forth.

My aim here is to give therapists who have yet to venture into this territory a taste of some of the potential connections we might make with neuroscience as time goes on.

Five things about the brain it's useful to know

Here is a selection of some key features of brain biology that I think are worth reflecting on in the light of our experience of therapy.

1. the brain is in the body as well as in the head

We equate the brain with our heads, but the brain is a part of the *central nervous system* that extends to the base of the spine and which leads to the *peripheral nervous system* that extends throughout the entire body. It makes sense for nature to place the core of the neural network in one place and the functions of other organs elsewhere. But the network itself is a distributed one. If you were to pull a brain out of its body with its connections intact, you would have six feet of dribbling nerve endings as well as the lump of jelly that sits in the head.

The brain is a body-oriented brain, and its capacity to act independently of the body is limited. The brain's first job is to see that the body of which it is a part survives, so it both determines many aspects of what happens in the body and monitors what is happening even when it does not. And there is plenty of evidence that the brain's functions that extend beyond survival work better when it listens to the emotional currents of the body. When the brain is damaged so that it doesn't register bodily emotion properly, other things like decision-making and relationships cease to function properly.

2. the clever stuff in the cortex is underpinned by a sub-cortex bent on survival

At the bottom of the brain are the *brain stem* and *cerebellum*, known as the 'reptilian brain', that do basic things like putting you to sleep, waking you up and maintaining your balance. In the middle lies a collection of areas, sometimes called the *limbic system*, that we share with other mammals and that runs much of our emotional lives. It includes the *amygdala* that generates emotional reactions, the *hypothalamus* that adjusts body chemistry and the *hippocampus* that lays down long term memory. All these bits sit underneath the wrinkly stuff at the top, the *cortex*. This area is greatly expanded in humans, hence the term *neocortex* – neo for 'new'. It enables mental attributes that distinguish us from other animals – such as language, conscious thought and the ability to know what we are feeling.

This layered arrangement means that however clever our cortices become, they can never escape the animal brain that sits below in the *sub-cortex*. The vertical divide is a biological basis for many human problems, such as our difficulty in controlling addictive behaviours and instinctive emotional reactions driven by the limbic system's quest for survival and satisfaction. Think Zinedine Zidane head-butting Materazzi in the 2006 World Cup final (interestingly, he said afterwards that he had thought about what he was doing, so his cortex went along with his sub-cortical impulse).

3. two brains in one: the left brain does the detail, the right brain does the big picture

The two cerebral hemispheres comprise both the top level of the wrinkly cortex and the limbic system nestled underneath. So when people talk of the amygdala, for example, they really mean the two amygdalas. The two hemispheres are wired together: the *corpus callosum* bridges the left and right cortices, and the *anterior commissure* joins the two sides of the limbic system.

The idea that the right brain is emotional whilst the left is logical is overly simplistic, but there is broad agreement that the left brain is good at focused attention to detail and the right brain is good at dealing with the broad context. You need both for any task. However, these differences in processing style give rise to areas of *dominance* where one side works harder, such as:-

left brain dominance	right brain dominance
positive emotions	negative emotions
approach behaviour	withdrawal behaviour
conscious processes	unconscious processes
smoothing over, denial, confabulation	noticing discrepancies and anomalies

If we live in a world that frequently promotes left brain dominance, it's obvious that therapy of any depth is going to counterbalance this with some right brain dominance – especially when we consider that the right brain also appears to be dominant for the following:-

- integrated body sense: mapping the viscera (organs), muscles and bones
- subjective emotional experiences and emotionally-laden memories
- the empathic perception of others' emotional states
- the non-verbal communication of unconscious states (through facial expression etc.)

This dual-brain architecture means that aspects of right brain dominance such as body awareness, emotional experience, and behavioural patterns in relationships are not always accessible to a person's conscious thought that is left brain dominant. The left brain struggles to overcome

emotional and relational difficulties that are rooted in the right brain and relatively immune from conscious control. A major task of therapy is therefore to get the two sides better wired up together. Working with imagery, the body, feelings, transference and countertransference probably help to do this.

4. the brain is an electrical forest in a chemical soup

Brains are like forests: each brain cell (a *neuron*) is like a tree with a deep root (an *axon*) that connects to one of the many branches (*dendrites*) of another tree via a *synapse*. The cortex is the outer layer of neuron-trees: inner layers are to be found in the limbic system and brainstem. The forest adds up to a neural network on a vast scale. Some 100 billion neurons, each of which make between 1,000 and 10,000 connections with other neurons, give us a living network of some 1,000 trillion connections. That's a very, very big number. If you turned the connectivity of the world's telephone network into brain connections, you would have a mere cubic centimetre of brain! Add to this the variation in ways that each connection can operate, far more than the simple on or off states of an electronic circuit, and you have a degree of complexity that is enough for scientists to start correlating many things about our human experience.

Neurons communicate in bursts of electrical activity that 'fire' chemical messages in the form of *neurotransmitters* across synapses. There are at least 50 of these, such as serotonin (associated with optimism) and dopamine (associated with arousal). In addition, the chemical soup contains *hormones* like cortisol that regulates your stress level and oxytocin that floods the brain when you fall in love, and *neuropeptides* like endorphins and enkephalins that reduce pain and stress. Candace Pert, a biochemist who wrote *Molecules of Emotion*, calls this chemistry an "unconscious emotional vocabulary". It adds yet more complexity to the already complex connectivity of neurons.

Therapy is about making the network connections work more effectively: growing new ones where needed, and pruning out old ones that are no longer needed. Although new synaptic connections can be made at the rate of about 1,000 a minute when we are stimulated (as I hope you may be while reading this article), it takes more than a few thousand new connections to bring about the sort of personality change that happens when someone turns their life around in a significant way. Profound change in therapy means that the brain changes: the therapist telling the client to think differently may have some effect, but the client becoming aware, for example, of how angry and frustrated he really is about not feeling loved for who he knows himself to be – so that he can feel those feelings and think about what to do differently as a result – involves fresh connections forming in the brain at all levels. This is a long-term process that needs both conscious effort and rest, and, sometimes, requires long term therapy for the brain to rewire itself.

5. emotion changes the brain

Thanks to the mammalian sub-cortex that's evolved to help us survive, our brains are built for emotion and feeling to rule the roost. It can be hard to think our way out of feeling down, and easy for our emotions to disrupt our consciously constructed plans. The limbic system can take over when it senses the need to, and only the patient work of bringing feelings to the light of consciousness can temper this.

Emotion in the body, generated by the brain, not only gets signalled back to the brain but it actually changes the way the brain works. The nervous system signals changes in the skin, blood vessels, organs, muscles and joints to the limbic system and the *somatosensory cortex*. At the same time, the changing chemistry of hormones and peptides released in the body into the bloodstream finds its way up to the brain, penetrating the *blood brain barrier* that protects the brain from potentially dangerous things that enter the body. These neural and chemical signals lead to changes in the brain's cognitive state: for example, the brain can put more or less effort into processing the current body state. Body and emotion mapping in the brain is 'online', dynamic and normally unconscious – until, perhaps, we turn our attention 'inside' towards our inner feeling states in the therapy room.

Five contributions from neuroscience that are relevant to therapy

Here are some examples of ideas from the world of neuroscience that have struck me as having practical relevance to the practice of therapy.

1. LeDoux: traumatic memory can get stuck in the amygdala

The best known contribution so far, this has already changed clinical practice through the work of practitioners such as Bessel van der Kolk. Joseph LeDoux is a New York neuroscientist, author of *The Emotional Brain* and *Synaptic Self*, and known for putting the amygdala on the map. He makes two key points about the amygdala. The first is that it generates instinctive fear-based reactions. If

your eyes see a snake in your path, the amygdala triggers a bodily response via a 'quick and dirty' pathway to other brain areas that control movement. So you jump out of the way, perhaps – or rather your body does, for *you* only realise what has happened a moment later after the amygdala has told your cortex about the snake via another pathway that, although slower, provides a fuller picture of the situation and enables you to think about it.

His second point is that the slower pathway may not function if the experience is overwhelming. The 'memory' stays stuck in the amygdala, out of reach of consciousness yet ready to provoke another quick-and-dirty, fear-based reaction when stimuli trigger it. The body experiences something similar to the original overwhelming event, but the mind doesn't know why the distressing experience is happening. Margaret Wilkinson, a Jungian analyst and author of *Coming Into Mind* summarises this situation nicely: "the mind that is fundamentally associative [in nature] becomes dissociative as a defensive measure, leaving trauma to be expressed as it was experienced, in the body". A traumatised client can be 're-traumatised' in this way if the original experience is stirred up. They need first to relax sufficiently for the brain to start processing the trauma – and *then* they will be able to explore it with the therapist. There is a delicate line between an unhelpful re-stirring and a helpful unfolding of a natural process that has become blocked, and not pushing the client to recall such experiences before they feel ready helps to keep to it. LeDoux thinks the result of successful therapy is to strengthen cortical control over the amygdala.

2. Panksepp: primary emotions are governed by separate 'systems' in the brain

Jaak Panksepp, a psychobiologist who has researched 'affective neuroscience' in animals as well as humans, describes seven basic 'emotional systems' in the brain. These are our primary emotions and instincts, the ones we are born with and that we share with animals:-

- Seeking* enables us to be curious and to make meaning of what we find. In a healthy brain, *seeking* is up and running a lot of the time.
- Rage* is our frustration when we don't get what we want. When strongly activated, it leads to outbursts of aggression, when less strongly, to irritation and annoyance.
- Fear* governs fight-flight-freeze reactions and helps us to escape from danger. It generates 'fear-anxiety' and paranoia.
- Panic* is responsible for separation distress, feelings of loss and sorrow, and 'panic-anxiety'.
- Lust* is associated with gratification. It switches the *seeking* system off.
- Care* a social emotion that, for example, influences the behaviour of both mother and child so they can bond.
- Play* is necessary for the healthy development of the brain as well as the body.

These are not theoretical distinctions, they are specific brain systems with particular synaptic pathways and cascades of chemicals. I like to reflect on which system may be dominant for a client in a session, and find the *fear* and *panic* distinction useful in responding to anxiety. It also helps to explain a client's changeable mood and state of mind from one week's session to the next – and maybe my own sometimes!

3. Schore: the right brain is dominant for the unconscious processes of relating

Allan Schore, a psychodynamic therapist who describes himself as a 'clinician-scientist', has spent years trawling through neuroscience research and has made a well documented account of the unconscious processes of relating that go on in the right brain. This side of the brain is dominant in the first 18 months of life, and the unconscious processing of emotional stimuli throughout the rest of life is associated more with it than with the left side: the limbic system has more connections into the right brain than into the left. He believes the unconscious is a cohesive mental structure that responds to life experience according to its own interpretative scheme, the roots of which are laid down in early attachment relationships. The core of the self is nonverbal and unconscious, and patterned by the regulation of emotion in infancy.

Schore presents a modern account of attachment theory based on our biology. He describes the attunement of mother and child in the first stage of infancy, and proposes that attachment is really the interactive regulation of emotion between the two of them. He emphasises the need for the mother to repair the inevitable misattunements that stress her child. She can minimise her baby's negative feelings and amplify what is positive, including play, creating not only a sense of safety but also a positively charged curiosity in her child. If all goes well, the child grows up knowing they can regulate their emotional ups and downs both with their own coping capacities and within relationships. Schore believes that effective therapy supplies a corrective emotional experience for

poor attachment patterns by expanding the client's implicit relational knowing – but for this to happen they must have a “vivid affective relationship” with the therapist.

4. Edelman: a memory is, to some degree, an act of imagination

Gerald Edelman, a Nobel prize winning neuroscientist, is known for his theory of ‘neural darwinism’, the view that the brain develops by selecting its most adaptive responses to experience. He spoke at the 2006 conference of the European Association for Psychotherapy in Cambridge on “how matter becomes imagination”. His forte is showing how the biology of the brain can give rise to our conscious experience, and providing a way out of the Cartesian dualism whereby we try to separate attributes of mind, such as consciousness and imagination, from the physical stuff in our heads.

Edelman says memory is a system property of the brain: it cannot be equated with particular neural connections, changes to synapses or brain chemistry, but is “the dynamic result of the interactions of *all* these factors acting together”. The ensemble of neurons that is involved in any particular memory is usually different each time you have the memory, and this makes memory robust through time – though not always as accurate as we might like.

Edelman says a particular memory is not a replication of an earlier sequence of events but rather “a form of constructive *recategorisation* during ongoing experience”. Perception can alter the recall of memories, and recalling memories can alter the way we perceive. So in therapy we must treat the client's memories as stories to respond to (which does not mean not taking them seriously). Going looking for memories is highly dubious, because there is no hidden store of lost memories to search. Rather, engaging with the therapist enables the client to go deeper into their experiencing and associations, and fresh memory–stories to unfold with time. According to Edelman, “every act of perception is, to some degree, an act of creation, and every act of memory is, to some degree, an act of imagination”.

5. Damasio: consciousness is the feeling of what happens

Antonio Damasio is a neurologist who draws on his work with brain damage patients. His first two books, *Descartes' Error*, that sets out to correct “the abyssal separation of mind and body since Descartes”, and *The Feeling of What Happens*, on the nature of consciousness, have attracted interest far beyond his profession. In his second book he proposes that consciousness is a particular sort of feeling: the feeling of what happens. It is formed by (1) the emotion in the body, and (2) the feeling (in the brain, but usually unconscious) of that emotion. Consciousness is then a third stage: the knowing of this feeling of that emotion. Humans share the first two stages with animals, and add the third – the capacity to know that we have a feeling.

The first step of becoming conscious of feeling something, he says, is “the feeling of knowing that's wordless”, and “only thereafter can inferences and interpretations begin to occur regarding the feeling of knowing”. This sounds similar to the process of making feelings conscious in therapy, whereby the client is aware of feeling ‘something’ and is supported by the therapist to stay with the process of allowing words and images and associations to unfold from that ‘something’ until it can be expressed and understood. Damasio regards feelings as being “just as cognitive as any other perceptual image”. Perhaps we could start talking about ‘cognitive emotional therapy’ – the sort of therapy practised by the majority of counsellors and therapists trained in integrative, humanistic and transpersonal approaches.

Conclusions and future possibilities

Here are some ideas about possible longer–term implications of neuroscience for therapists that occur to me.

Neuroscience supports working with the body, with body awareness, with imagery, with feeling and emotion, with transference and countertransference – and working long term

All of these ways of working therapeutically engage the right brain, and any activity that engages it is potentially therapeutic. The most useful aspect of therapy may be the client's coming to know what they are really feeling and why it is perfectly natural and understandable, given their life experience, that they should be feeling it. A greater ability to recognise and name feelings means more neural connectedness, including between right and left brains and between cortex and sub-cortex. And neuroscience supports the need to work long term when early attachment patterns need to be addressed.

The end of the ‘blank screen’

As Schore says, the client needs to have a “vivid affective relationship” with their therapist. He makes a detailed and specific case for this, which I think is supported by neuroscience generally. If the therapist refuses to be a real person for the client to relate to, the risk is that dysfunctional

attachment patterns will be reinforced. But if both parties work together to bring their felt experience to the light of consciousness, then new synaptic pathways can open up in the brain to support a more functional emotional awareness in relationship.

Time to challenge the dominance of cognitive behavioural therapy in certain quarters?

Thinking differently and behaving differently can lead to feeling differently, but from the brain's point of view it is more powerful to bring what is actually felt to consciousness because this bridges the vertical divide between cortex and sub-cortex and the horizontal divide between right and left brains. Changes that are based in the client's emotional experience with the therapist are more likely to be of lasting value and to trigger a chain of positive consequences. If you think CBT is overly dominant where you work and you want to challenge this, arm yourself with some neuroscience to strengthen your case.

A unifying thread for a fragmented profession

The hundreds of different sorts of therapy generate diversity, but they may also undermine our contribution to society by presenting a fragmented and unnecessarily complicated face to the general public. Freudian analysis and CBT are both quite well known to non-therapists, but how can they make sense of the wide range of therapeutic practices, with which most of us work, that lie in-between? If we want to weave the threads of the therapy world into a more unified and comprehensible profession, the biological input of neuroscience has a lot to offer.

Reducing the shame attached to mental health problems

The more that stress, depression, anxiety, addictions, PTSD, personality disorders and so forth can be understood in concrete biological terms rather than abstract conceptual ones, the less shameful they may seem – and the more those who suffer these conditions may feel open to getting help.

Therapy may get better

Neuroscience will no doubt offer further powerful insights that will help us to refine our thinking about our work, and to be more precise about what the client's problem is and what needs to change. I don't think it should replace anything we already have, nor should it supplant the personal, subjective crucible in which we work. But it may just give us, and our clients, more understanding of what's going on in our inner worlds.

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