A Scientific Theory of Focusing Part One

Science hasn't figured out everything about how brain and body interact, and it probably never will. But in recent years it's come far enough to be interesting – very interesting. It offers us a new framework for thinking about our inner life. So let's try crossing our experience of Focusing with the science and see where it leads us.

This article is divided into two parts: the first lays out a basic picture of how we feel what we feel in the body, while the second asks some specific questions about our Focusing experience.

The brain, the body and the nervous system

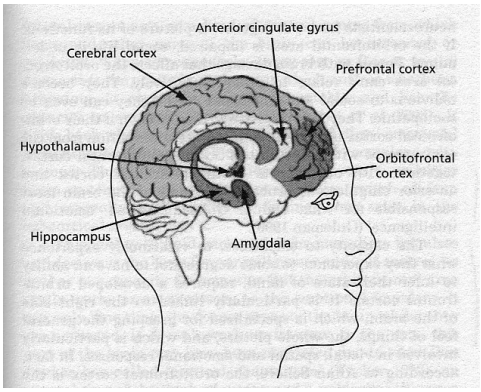
The brain is part of the *central nervous system* that extends to the base of the spinal cord, so when we talk about the brain, we are already well down into the body. It's just that nature has found it convenient to put most of it into our heads, well away from all the stuff sloshing around in our bodies. The central nervous system connects directly to the *peripheral nervous system* that extends all through the body – to organs, muscles and every single blood vessel.

The part of the nervous system that looks after us below our conscious awareness is the *autonomic nervous system.* It looks after falling asleep, waking up, heartbeat, breathing and many other bodily phenomena. The branch of it that enables us to move and act is the *sympathetic nervous system,* and the other branch that allows us to slow down and relax is the *parasympathetic nervous system.* Another part of it that's interesting for focusers is the *enteric nervous system* in the lining of the gut. This looks after digestion and has a major influence on how we feel. But according to Michael Gershon, the scientist who has done most to draw attention to it, it doesn't do poetry or philosophy – which means it doesn't do Focusing either.

The human nervous system is the most complex thing in the universe – so far discovered, at any rate. Some 100 billion nerve cells – *neurons* – and around one thousand trillion *synapses* that connect these cells into a vast mesh of networks, like trees in a world of dense forests. Neurons are useless and will die unless they network with other neurons, and synapses enable them to do this. Such unimaginable numbers and complexity are needed for each of us to live an individual life. The networks function through patterns of 'firing' across synapses to influence the behaviour of the next neurons in the chain. Enough is now known about these neural forests and their firing patterns for us to look at our human experience in a fresh light.

Without a body supplying oxygen and blood and much more, there could be no brain. And, vice versa, bodies need brains to co-ordinate their movement with their senses. Plants don't need a nervous system, but creatures from worms upwards do. From nature's viewpoint, bodies and brains are one whole thing – it's only human minds that separate them into two things.

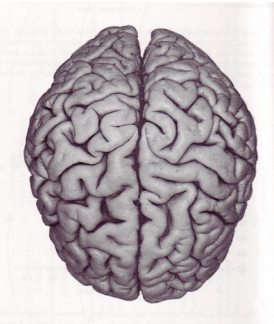
It's necessary to understand a little of the brain's architecture. It has evolved from the bottom up, starting with (1) the brainstem and other parts of what gets called the *reptilian brain* that look after bodily regulation (the unmarked lower areas in the diagram), moving up into (2) middle areas, including the well-known *amygdala* and *hippocampus,* collectively referred to as the *limbic system,* that are associated with generating emotions, all of which are covered by (3) the familiar wrinkly stuff, the *cortex* (latin for covering), that has expanded massively with all the highly evolved functions associated with human brains such as language and abstraction. The most important dividing line in this vertical arrangement is between cortex and *sub-cortex* i.e. everything that lies below the cortex and that evolved earlier. What is important to realise is that all the fancy functions of the cortex depend on neural networks that include sub-cortical areas. So whatever we do, we maintain a connection with the early stages of brain evolution.



That's the vertical arrangement, and there's also the horizontal one between the *left hemisphere* and the *right hemisphere.* These cerebral hemispheres get referred to as right brain and left brain, and each one includes not only the visible divide in the cortex but also the two sides of the limbic systems – so for example we have two amygdalas, one on the left and one on the right. This division may have come about because brains orchestrate the movement of the

body, so evolution gave us a nervous system for the limbs on each side of the body. These two systems have to be integrated, so we have connections between the two sides: the bunch of pathways between the right and left cortical hemispheres are called the *corpus callosum.*

We need both sides of our brain to do anything properly, but different neural functions are specialised for one side of the cortex or the other. The left brain, for example, is dominant for language and the right brain for unconscious emotional communication: this means that more areas in the dominant side fire up when you do that thing than on the other side. But note that the non-dominant side is still involved to a degree. And also note that when we say the left brain is dominant for language, this only means that some areas in it are firing up when we speak. Other areas are specialised for other things. This aspect of neural complexity means that it's nonsense to talk of 'left brain' and 'right brain' people. But the distinction between which side is dominant for which function is a significant one for discussing our Focusing experience.



A key point: the right brain is more connected to subcortical areas and therefore to the body than is the left brain. The reason for this is the specialisation of brain areas for specific functions brought about by evolution, in particular the development of language. The main distinction I shall use in this article is between left and right brains, and this horizontal division implies the vertical one. Further, subcortical areas are more connected to the body than cortical areas are. So, for example, 'right brain dominance' means more areas lighting up there than in the left brain, more involvement of subcortical areas and more linking with the body. I'm trying to make a simple but valid point here about arrangements that are extremely complex.

Conscious awareness: the other thing to appreciate about the brain is the distinction between what we are aware of and what we are not aware of. Think of neural firing as being like continually shifting constellations of lights coming on and going off. Each one is associated with something that the brain is doing. Then think of those constellations being of lights in the depths of the ocean. Those close to the surface become visible, but the deeper they are, the further from consciousness they are. Much of what our brains do never comes to the surface of our awareness, but at the same time it's possible to see more of what's happening a little way under the surface if we train ourselves to do so. Which is what we do when we learn Focusing: awareness of the background state of our feelings and of our body increases. So the divide between conscious and unconscious is not clear cut, and Gendlin is right to question the validity of the notion of 'the unconscious'. Nevertheless, much happens in our brains that we never become aware of, and this challenges our habit of taking a conscious, mind-biased view of what's happening in our heads and consigning much of what is not conscious to the body.

How does the brain change the body?

Changes in the body start in the brain. Anything called 'motor' in the brain – motor neurons, motor cortex – is there to get the body to move. Motor movements may be visible, such as crossing your legs, or barely visible, such as tightening the shoulders or relaxing face muscles. So here we're talking about gesture, posture and facial expression as well as movement. Motion includes *emotion,* and there are two sorts of muscles: *striated* ones that move the limbs, and *smooth* ones that move the organs. So motor movements include inner things, like the heart beating faster, the lungs drawing in more oxygen and the intestines stopping digestion.

Because muscle contractions don't happen in isolation, the brain also changes the chemistry in the body, as when it signals the adrenal glands to produce more adrenalin. So limbs move, the rest of the body shifts to support the limb movement, the organs shift gears as needed, and the chemistry in the blood changes – hormones, for example. And plenty more besides is changed, including the lymphatic system and the immune system. The sympathetic nervous system gets you revved up for action, the parasympathetic slows you down to relax, digest your lunch, rest.

Emotional changes in the body include changes in heartbeat and bloodflow, in depth and rate of breathing, in the hormones going into the bloodstream, in digestion, and small postural adjustments as well as big movements. Some of these changes, such as breathing, can be consciously controlled, whilst others, such as heart rate, can't – except indirectly by deliberately relaxing in the hope of thereby slowing your breathing and heart rate. The better you are at this, the more you can influence your autonomic processes.

Is the brain the control centre, commanding everything that happens in the body? Not really, no. How the changes initiated by the brain play out in the body is very much down to the body, which has a big say in determining the duration and intensity of emotional states. 'Sensory' areas in the brain – sensory neurons, somatosensory cortex etc. – get feedback from the body as well as from the external senses and adjust the rest of the brain accordingly. An example: if you feel anxious, your heart races and tells your brain you are in danger, and you telling yourself you are safe may not slow it down again. But if you take beta-blocker drugs, they will act directly on your heart to slow it, and it will then tell the brain the danger is over – a case of changing the body to change the mind. And the body can do some things of its own accord. There are processes within each cell in the body that are independent of the brain, and there is some scope for the enteric nervous system to move parts of the intestines itself, for example. Our overall autonomic state has a large bearing on our sense of well-being.

So brain and body work as a single complex organism, inter-affecting each other. The bodily changes that happen in Focusing probably start in the brain: you pay attention to bodily feeling, your attention enables new associations to arise in the brain, and the brain changes the body to suit the new state – and then your body gives you the felt details of this new state of affairs. Charles Darwin was writing about this mutual inter-affecting a long time ago:

> "when the mind is strongly excited, we might expect that it would instantly affect in a direct manner the heart; and this is universally acknowledged… when the heart is affected it reacts on the brain; and the state of the brain again reacts through the pneumo-gastric (vagus) nerve on the heart; so that under any excitement there will be much mutual action and reaction between these, the two most important organs of the body"

In the field of psychosomatic medicine, John Sarno, a doctor running a New York pain clinic, has written about tension myositis syndrome (TMS), which he thinks applies to a range of conditions including back pain, chronic fatigue and repetitive strain injury. His theory is that unconscious emotions in the brain are the cause of these symptoms in the body, and the mechanism he proposes is that the brain reduces the blood supply to a particular body area, so it's deprived of oxygen. The phrase "it's all in the mind" doesn't really describe what's happening because the bodily changes are perfectly real – it's the brain-initiated triggers that are the issue.

How does the body change the brain?

The outside of the body: touch is signalled to the brain via precise nerve pathways. One lot of nerves are for 'firm' touch, enabling you to pick up objects and manipulate them, and another lot are for 'soft' touch that enables you to enjoy affectionate emotional touch from other people. The areas in the brain that receive these signals have been precisely mapped.

The inside of the body: changes in blood chemistry change the brain directly via its blood supply. If you're stressed, for example, your body releases cortisol into the bloodstream to mobilise energy, and some of it goes to your brain so it too is energised. Changes in the *viscera* – the fleshy inner stuff, organs, blood vessels and so forth – are signalled via the nervous system to body sensing areas of the brain, including the somatosensory cortex and the *insula.* Some interesting anatomy: more sensory nerves lead from the body to the brain than motor ones from the brain to the body. In the gut area of the *vagus,* a bundle of nerves that co-ordinate autonomic changes to organs, 90% of its nerves go from gut to brain, leaving only 10% to go the other way. And every blood vessel in the body has a nerve pathway back to the brain.

The body changes the emotional state of the brain. All this biology points to the power the body has to influence the brain, which is constantly being updated on the body's emotional state. "The brain is the body's captive audience", says Antonio Damasio, the neuroscientist who has gone furthest into mind, body and feelings. Quite small changes – a few blood vessels dilating, a slight shift in hormonal balance, little movements in the gut – may have a profound effect on how we actually feel.

Damasio says that whilst the brain can predict our emotional reactions to situations based on previous experience, the actual way we react depends on what happens in the body, which may be different. And there may be situations where the brain is unable to predict our emotional response at all and has to wait to see how the changes play out in the body to form a clear picture. So to have a fluid, responsive emotional experience, the brain needs bodily feedback.

How do we know what we're feeling?

Our brains know how we're feeling even if we don't! – by both a direct route that lies within the

brain itself and by an indirect route that involves the body. But the question here is also how *we* know, that is, how we make our feelings *conscious.*

The direct route to knowing what we're feeling skips the body. Emotional changes start in the limbic system, for example when the amygdala triggers anxiety. Limbic areas tell the frontal areas of the cortex what they are up to, changing their cognitive state in the process. By noticing our cognitive state – the sort of thoughts going through our mind, and the rate at which we think them, for example – we can sometimes know roughly what we're feeling.

The indirect route to knowing what we're feeling involves the body. The limbic system triggers changes in the body, and these bodily changes are then fed back to the brain, via the chemistry in the blood and signals in the sensory nerves described above. This indirect route gives the brain a more nuanced and in the moment picture of our emotional state. If we pay attention to what's happening in our body, we too will become aware of this more nuanced perception of our feeling, to add to our picture of our cognitive state. Obviously we do this a lot in Focusing.

Our *interoceptive sense* enables us to gauge the inner state of my body – we use it a lot in Focusing. It contrasts with the *proprioceptive sense* which tells us where our limbs are, and with the *kinaesthetic sense* that tells us about our bodily movements in space. We use all three senses in Wholebody Focusing, and I wonder if this is one reason for it's popularity – three senses make felt sense more accessible than just one sense. Scientists talk of interoception as an unclear sense – unclear in that whilst we know we are in an emotional state, we may not know exactly what sort of an emotional state. Maybe this also points to what is unclear in a felt sense – we need time and space to find words that fit the feeling.

Interoception involves two brain areas in particular, the *insula* and the *anterior cingulate*. These are areas of the cortex that came earlier in evolutionary development than, for example, the frontal cortex, and that anatomically are close to the limbic areas. This means they are more involved in what's happening in the body and in our emotional experience. Focusing probably leans on these two areas a lot, suggesting that the practice involves connecting our most highly evolved capacities of reflection with more ancient capacities of sensing the body. Dan Siegel's book 'The Mindful Brain' includes some recent research into the effects of mindfulness practice on these areas of the brain, and what he says is probably relevant to Focusing too.

Damasio distinguishes emotion from feeling by saying that the actual state of body and brain is the emotion, while the brain's mapping of this state is the feeling. Emotions and feelings do not need to be made conscious for them to have profound effects on us. Because these feeling-mappings of emotional states leave memory traces in our neural networks, the brain is able to refer to them so that we can make decisions without having to trigger the same emotional state in the body every time. So he talks of *as-if feelings* and *somatic markers* – echoes of previous positive and negative bodily states. The upshot may be that whilst we can rely on 'as if' feelings and somatic markers much of the time, paying attention to the current body state sometimes will allow us not to just do what we've always done – an affirmation of the role of Focusing.

Furthermore, Damasio says that to become conscious of what we are feeling, we need a third stage beyond the emotion (in the body) and the feeling of that emotion (in the brain) that animals have. The human refinement is "the feeling of knowing" that at first is wordless and that we then interpret, and which he also describes as "the feeing of what happens". It's in the moment and it involves the body. Sounds suspiciously like a felt sense, does it not?

How do our feelings influence our thoughts?

Emotional changes lead to cognitive changes. And emotional changes, though triggered in the brain, happen in the body which feeds them back to the brain – so our bodies change how we think. The brain wants to integrate its cognitive activities with feeling and body state, and we function at our best when they are aligned. If the situation calls for a changed emotional state, it also calls for a changed cognitive state. But as we know, cognition, especially when it is based in language, can become dissociated from feelings and body. This may provide a short term gain for us, but it will tend to exact a long term price in terms of a lack of neural integration.

For example, when we become anxious, we tend to think anxious thoughts. The content of our thoughts changes, and also the rhythm and colour of them – the manner of thinking, if you like. If we then try to think calming thoughts, we may be able to ease our anxiety – or not. It's the level of integration in our brains that determines whether we are successful or not. More

integration will make it easier, because we will have more pathways from our frontal cortex to our amygdala that can send signals to inhibit it from firing and making us anxious.

Emotion and feeling have enormous power to disrupt thinking – because, as Damasio says, "the brain is a body-oriented brain". Here's a mainstream neuroscientist giving the body a degree of emphasis that's normally the preserve of focusers! And Jaak Panksepp, a neuroscientist who studies emotion in mammals, says that it is only at moderate levels of emotional arousal that thinking and feeling work well together – too much arousal disables the capacity to think, while too little leads to mental deadness.

Intuition is a cognitive ability that probably requires a good level of integration of thinking with bodily feeling. Instead of thinking through a situation step by step, the mind takes an intuitive leap based on past experience that need not be made conscious. That's how scientists tend to think about intuition, though some focusers may argue it is based on more than just past experience, such as some form of intrinsic 'body wisdom'. Given that past experience is of unfathomable depth in the brain, and given the capacity of the nervous system to come up with novel associations in response to new situations, this point is debateable.

A good illustration of the power of feeling to influence thought is a clinical story told by the neuroscientist Vilayanur Ramachandran. A young man was in hospital with brain injury after a car accident. As he was coming out of coma, his mother came to see him – but he said she was not his mother, she was an "imposter". Shocked, the next day his mother phoned him instead. He said "hi mum" and they had a good conversation. So the next day, thinking all was now well, she visited him in hospital again. The same thing happened – "you look like my mother but you're an imposter, go away!". How to explain this bizarre behaviour? The neurological explanation is straightforward: the man's brain injury involved damage to neural pathways between his visual cortex and his brain areas involved with feeling, but the same connections in his auditory cortex were undamaged. The sight of his mother failed to evoke the feeling of his mother, so his brain concluded that the woman had to be an imposter – whereas when he only heard her voice, the usual feeling was present and his brain knew it was his mother.

Next…

Part 2 tackles specific questions about our Focusing experience: felt shifts, body wisdom, listening, images and transcendent experience etc.

References available on request.

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August 2010