

# “The Mystery of Being”

## Bodies, minds, brains

“Truth is process, not object”

“The more certain our knowledge, the less we know”

“The four most important words in science are ‘We do not know’”

*These opening words reflect the merit of listening broadly.*

*The title: Gabriel Marcel, a 20<sup>th</sup>-century Christian existentialist philosopher*

*“Truth is process...”: Iain McGilchrist, a psychiatrist and writer who crosses subject boundaries*

*“The more certain our knowledge...”: Roger Scruton, a conservative philosopher*

*“The four most important words...”: Matthew Cobb, Professor of Zoology, University of Manchester*

### INTRODUCTIONS<sup>1</sup>

I am not a neuroscientist. Nor a psychotherapist. I am definitely not a medical professional. I am someone who studies and is fascinated by the human condition. Who are we? How can we live lives that are happy, fulfilling, harmonious? What is the meaning of this life? Big questions. It is good to question. The practice of enquiry.

On occasion in yoga teaching, it can be forgotten that class participants may well not be chemistry undergraduates nor philosophy PhD candidates. Teachers might use their knowledge to baffle rather than empower, to separate themselves instead of inspiring and informing those who come to class. A question for us as teachers is: how does what we teach and how we teach land with those attending?

This is an attempt to very briefly look at a very large subject. This looking is guided by different paths: psychology, anatomy, neuroscience. This exploration is based on various sources of research on the body and the mind and the brain and what is perhaps happening within: clearly a vast subject! For some, this is the work of their lifetime. For me, these are more notes and my attempt to make some sense of this enormous and evolving subject.

Being clear about my own beliefs is essential to accessing the words and ideas below. I do not think that we need to know how an internal combustion engine works in order to drive a car.<sup>2</sup> But we do need to know how to drive and also it is helpful to know basic car maintenance (like adding fuel). As yoga teachers, our abilities of relating to people and explaining ideas are much more valuable to us in our work than our knowledge of an internal combustion engine.

Instead of causing confusion, I aspire towards informed clarity. Rather than reductionism (reducing life to varied parts), I believe in holism: that everything connects. I wish that these ideas and practices of yoga, meditation and more help us to wake up: to become brighter and lighter, to be more fully aware of life’s precariousness and life’s preciousness. This matters to me because I believe that waking up is what we are born to do. I wish us to be more conscious of the awesome beauty that is being in these bodies.

I have used a number of quotes from various books that were read in researching this article. I have found them to be informative and inspirational; they are referenced at the end. May these quotes help us towards this insight expressed by the 19<sup>th</sup>-century novelist George Eliot.

*Character is a process and an unfolding... Character is not cut in marble...It is something living and changing.*<sup>3</sup>

You can choose to read this article in different ways: from taking note of each reference as you go to flowing from start to finish. Feel free to skim (at times this article is quite technical); feel free to read every reference — and feel free to read somewhere in-between those two places.

## CHANGING

For centuries, human beings have been trying to understand this body. What is it? Is this body ‘me’? Individuals have dedicated their lives to such questions; some have died for their beliefs. In 3<sup>rd</sup> century BCE China, the *Annals of Lu Buwei* described one understanding of body.

As a general rule, humans have 360 joints, nine apertures, five repositories, and six storehouses. It is desirable that skin be taut, the blood vessels open to free circulation, the sinews and bones hard, the mind and will harmonious, and the qi active. If all this is achieved, illness will find no place to lodge, and evil no means to grow. Illness remains and its malevolence grows because the qi are blocked. When water is blocked, it becomes stagnant; when a tree is blocked, it becomes infested with wood-boring insects; when a plant is blocked, it withers.<sup>4</sup>

This shows that these discussions and enquiries have a very lengthy history (such as this text being over 2000 years old).

In yoga, we can get quite fixed on hips and hamstrings. Fascinated by flexibility, focusing on lengthening, engagement and stretching. As a consequence of these fascinations, we could neglect the importance of other body systems such as the brain and the mind. It is important to note that mind and brain are widely considered to be two separate things — and of course there are contrasting views regarding this distinction. Perhaps one way of describing their difference is that brain is more matter and mind is more consciousness.

In biological terms, it is because of the brain (and the nervous system) that we are able to move and to communicate. The brain is absolutely essential to our functioning. Without the brain, we are dead. No brain, no life. As much as no heart, no life; that without functioning lungs and liver, then life becomes extremely difficult. We are complex vertebrate creatures with multiple needs and multiple subsystems.

A key is that the brain is ‘plastic’ (thus able to change) as are other body parts, such as those hips and hamstrings. The mind is malleable — like other parts of this body. As practitioners, it is vital for us to remember this. In the not-too distant past, this was not the accepted view; it was generally agreed that brain pathways were fixed and could not be regenerated. But neuroscience now shows that we can alter the brain’s structure and connections. This is neuroplasticity: a description that only became better known from the 1970s. Among neuroplasticity’s great discoveries include the realisation that through encountering new experiences, our brains change.

Fred Gage, a pioneering neuroscientist, said in 2011: “The brain is an organ. It is tissue that is changing all the time and it is regulated by our environment. Our brains are affected by what we do...The thing we have to remember is that neurogenesis is not an event, it is a process.”<sup>5</sup> It is now widely accepted that learning a new skill at any age can positively influence and actually change millions of brain nerve connections.<sup>6</sup> The brain is elastic and greatly benefits from exercises such as learning to play a musical instrument or studying a foreign language or walking a different route home.

## TUNA STEAK AND SOLID RUBBER

The first vertebrate brain evolved more than 500 million years ago. The average adult human brain weighs about 1.3kg; the average adult head weighs about 4kg. So the material protecting the brain weighs substantially more than the brain itself. Paul Broks, a neuropsychologist and author of *Into The Silent*

*Land*, said that the brain would “carve like a very tender tuna steak”.<sup>7</sup> He described the feel of a brain to be similar to a solid rubber.

The brain is about 2.5% of our body weight yet it consumes about 20% of our energy when we are at rest. Because of this considerable consumption of energy, the brain is continually looking for ways to be most efficient (such as predicting, which saves on information processing). In contrast, an elephant’s brain weighs about 6kg; a cat’s brain weighs about 30g; a newly born infant’s brain weighs about 400g. Frontal lobes can make up as much as 35% of the human brain but only about 17% for the brains of other apes and about 7% for dogs’ brains.

The average human brain has approximately 85 billion neurons (“the fundamental units of the brain and nervous system, the cells responsible for receiving sensory input from the external world, for sending motor commands to our muscles, and for transforming and relaying the electrical signals at every step in between”);<sup>8</sup> 100 trillion synapses (“the site of transmission of electric nerve impulses between two nerve cells (neurons)”);<sup>9</sup> and billions of glia (“non-neuronal cells (i.e. not nerves) of the brain and nervous system”).<sup>10</sup> These figures are debated. According to Lisa Feldman Barrett (a psychology professor who has become well-known for her studies into emotions and brain functioning), the brain has 128 billion neurons.<sup>11</sup> All this wiring is being bathed in a soup of chemicals: “Your brain network is not stable — it changes continuously.”<sup>12</sup>

Cognitive scientist and philosopher David Chalmers wrote in 1996: “Whoever would have thought that this hunk of grey matter would be the sort of thing that could produce vivid subjective experience? And yet it does.”<sup>13</sup>

According to Iain McGilchrist, “It has been estimated that there are more connections within the human brain than there are particles in the known universe.”<sup>14</sup> For David Eagleman, a scientist and a populariser of neuroscience, “what you find in the brain is a system of such complexity that it bankrupts language...it is a living fabric, with communities and marriages and divorces.”<sup>15</sup>

## **DIVIDINGS?**

The brain could be viewed as having three anatomical divisions (hindbrain, midbrain, forebrain) and two different hemispheres (right, left). According to most studies, the right hemisphere is longer, wider, larger and heavier.

Back to Iain McGilchrist: “In general terms the left hemisphere yields narrow, focused attention, mainly for the purpose of getting and feeding. The right hemisphere yields a broad, vigilant attention, the purpose of which appears to be awareness of signals from surroundings...the left hemisphere takes a local short-term view, whereas the right hemisphere sees the bigger picture...the left hemisphere needs certainty and needs to be right...the right hemisphere’s tolerance of uncertainty is implied everywhere in its subtle ability to use metaphor, irony and humour.”<sup>16</sup> Yet according to Matthew Cobb, “there are no clear fundamental differences in the functions of the two sides of the brain...the brain does not work as two separate halves, but as an integrated whole.”<sup>17</sup> There are many different views (and of course, views change).

Some early views of the body tended to assume that the heart was the seat of intelligence. And there were other opinions. Charles Gross wrote in his history of neuroscience about Alcmaeon of Croton, a Greek philosopher and medical theorist born about 510 BCE: “he believed the seat of sensations is in the brain... All the senses are connected in some way with the brain.”<sup>18</sup> But for Aristotle (4<sup>th</sup> century BCE), the heart was the seat of intelligence and the brain was a cooling mechanism for blood. In *Parts of Animals* (dated about 350 BCE), he wrote: “the brain is not responsible for any of the sensations at all...the seat and source of sensation is the heart.”<sup>19</sup>

## HOLES IN HEADS

Trepanation — drilling a hole in the head — is a practice that dates back up to 6000 years ago.<sup>20</sup> There are recorded cases where this was advised as treatment for headaches. John Verano, an anthropology professor, said: “In medieval Europe there was an idea that insanity might be represented by rocks in your brain, or the devil in your brain and you could drill a hole in somebody’s skull and maybe release the demons.”<sup>21</sup>

In the 19<sup>th</sup> century, there were studies that showed the connections between the brain and senses and body functioning. Korbinian Brodmann (1869–1918) was a neurologist who mapped the cerebral cortex (the outer layer of the brain). His definitions of 52 distinct regions are still used today, known as ‘Brodmann areas’. But another 19<sup>th</sup>-century idea that was subsequently dismissed as pseudoscience is that of phrenology, where the brain was perceived as a jigsaw puzzle with different pieces producing/affecting different human qualities. Phrenology was also used to ‘prove’ the superiority of white Europeans (particularly men and the upper classes).

One way of comprehending the brain is that different areas have different functions — but please note that these are great generalising approximations! This approach includes the theory of ‘localisation’: “the brain is a complex machine, made up of parts, each of which performs a specific mental function.”<sup>22</sup> Three examples of this could be the temporal lobe (often processing sound and language), occipital lobe (often processing visual images) and the parietal lobe (often processes spatial relationships) — and then much more specific areas within the brain for particular tasks.

The reticular activating system is the source of arousal for the brain and this arousal releases neuromodulators and neurotransmitters, such as acetylcholine, dopamine, glutamate, histamine, noradrenaline, oxytocin and serotonin. Acetylcholine is the main neurotransmitter of the parasympathetic nervous system; anti-psychotic drugs often block dopamine; glutamate plays an important role in brain functioning; histamine can be a cause of many so-called ‘anxiety’ disorders; anti-anxiety drugs often block noradrenaline (and low levels of noradrenaline can be factors in ADHD [Attention Deficit Hyperactivity Disorder]).

Oxytocin can be released when we are experiencing close emotional connection and thus can help us to lessen our vigilance and be more trusting. Yet oxytocin also helps to bond us together in opposition to ‘other’. Serotonin can be underactive in depression. About 90% of serotonin is produced in the gut and low levels of it can be linked to conditions such as Irritable Bowel Syndrome.<sup>23</sup>

## ERRORS AND ONIONS

A common error has been to view the brain as having a reptilian part, a mammalian part and a human part (a 2020 paper had the great title ‘Your Brain Is Not An Onion With A Tiny Reptile Inside’).<sup>24</sup> One origin for this view was Plato (4<sup>th</sup> century BCE) who proposed that within the mind there was a continual struggle between instinct (reptile), emotions (mammal) and rationality (human). Lisa Feldman Barrett wrote: “The triune brain [having three parts] is one of the most successful and widespread errors in all of science.”<sup>25</sup>

Mark Solms, a neuropsychologist and author wrote in 2021: “the brain is structurally hierarchical ... The deepest core of the brainstem contains the most ancient structures, in evolutionary terms, and the highest levels of the cortex contain the most recent ones. This does not mean that the lower (and older) structures are less important than the higher (newer) ones. On the contrary, functionally speaking, the highest forebrain structures are merely elaborations of the lowest brainstem ones.”<sup>26</sup>

But in all of these descriptions of different areas, two hemispheres, anatomical divisions and neuromodulators, this crucial point by Paul Broks has to be repeatedly emphasised.

“What became clear was that the brain could not be fully understood if you treated it as an isolated object...No brain is an island...The brain evolved as a means of orchestrating adaptive interaction between the organism and the world.”<sup>27</sup>

## CONSCIOUSNESS

The question of mind and consciousness has sometimes been called the question that has no answer. Stuart Sutherland, a psychologist, declared about consciousness: “it is impossible to specify what it is, what it does, or why it evolved.”<sup>28</sup> Dealing with such questions requires the ability to be at ease in ambiguity, balancing scientific rationalism with poetic imagination. Answering the question of consciousness might be said to be almost like asking a seagull to construct a skyscraper or a sheep to write something similar to Shakespeare.

A dictionary definition of mind is “the part of a person that makes it possible for him or her to think, feel emotions and understand things...” (*Cambridge English Dictionary*).<sup>29</sup> This question of how matter (that 1.3kg we call ‘brain’) becomes mind can be like a dog chasing its tail. As philosopher John Searle puts it: “How does the brain get over the hump from electrochemistry to feeling?”<sup>30</sup> He has not yet come up with an answer...

But we are our consciousness; consciousness and mind are inextricably connected. And being consciousness,<sup>31</sup> one current accepted view is that consciousness is generated in the upper brain stem. It is fundamentally ‘affective’ (“the general sense of feeling that comes from your body. Scientists call this ‘affect’. Feelings of affect range from pleasant to unpleasant, from idle to activated”)<sup>32</sup> and it is about maintaining the body’s steady internal state (this can be called ‘homeostasis’). Self-maintenance and self-preservation are fundamental aspects of our being conscious. In the words of Lisa Feldman Barrett: “energy efficiency was a key to survival.”<sup>33</sup>

Much of what happens within us and around us is below our conscious awareness. In the words of Mark Solms, “the scientific evidence showing that we are unaware of most of what we perceive and learn is now overwhelming.”<sup>34</sup> It is also clear that we are living fractionally in the past as we do not perceive the world instantaneously (the speed of sensory nerve actions is estimated to be about 30 metres a second). The philosopher Andy Clark said that these factors and more mean that our conscious experience is like a “controlled hallucination”.<sup>35</sup>

Yet a person who has done practices such as psychotherapy or meditation or martial arts could have different experiences. Of course, while doing a lot of practice will not necessarily speed up the transmission of information from the outside to the inside, it can reduce our unawareness. Studies have shown that the brains of long-term meditation practitioners have thicker insula; this is a consequence of being activated through paying attention with the result that our abilities to be attentive are enhanced.<sup>36</sup>

In terms of our abilities to remember, Matthew Cobb wrote: “memory is malleable...it is constructed, and it can be false...it has a material basis...Biological memory is rich, unreliable and highly interconnected, with access to it taking place via multiple routes, not through a single address.”<sup>37</sup>

Responding to the sometime proposed comparison of brain to computers, he described these multiple routes as ‘wetware’: “In a computer, software and hardware are separate; however, our brains and our minds consist of what can best be described as wetware in which what is happening and where it is happening are completely intertwined.”<sup>38</sup> An approach suggested by Paul Broks is that “minds emerge from process and interaction, not substance”.<sup>39</sup>

## STIMULATE AND SOOTHE

Our minds contained in our bodies have as well as all these processes, interactions and substances, innumerable pathways and possibilities. A highly simplistic approach that can give some insights is ‘stimulate and soothe’: two parts of this story about being a human body. Obviously, ‘stimulate and soothe’ is an incredibly basic view; life is vastly more than a simple see-saw of this and that, either/or.

However, these broad brushstrokes can be helpful as long as we are fully aware of what they are: broad brushstrokes.

For many, much of life can be highly stimulating: caffeine, processed foods, commuting, social interaction, screens. Techniques and behaviours that are stimulating could include eating a spicy curry; going for a run; doing a boxing practice; skin brushing; a breathing practice like *kapalbhati*; participating in a pub quiz with a group of good friends; jumping into cold water. And more.

Stimulation is crucial to the experience of life and very much part of most people's lives. Without stimulation, we would not be living breathing doing feeling interacting beings. But there is a need for this stimulating to be balanced by soothing.

Techniques that could help soothing could include walks in nature (this can also be called 'forest bathing' — a simple example is tree hugging); conscious slowing down; deliberate avoidance of stimulants such as social media; consciously cultivating patience; being connected to people and places that feel grounded and calm; encouraging positive perspectives (without difficulties denialism); eating dark coloured fruit (such as blueberries and blackberries — good for brain functioning); practices such as coherent breathing and gentle movement. And more.

Sometimes we need more stimulating, sometimes we need more soothing. Sometimes too much stimulating results in over-excitement (that can become manic behaviour) and then there can be depletion (such as the depression that can follow the grandiosity of mania). Sometimes too much soothing results in dullness and lack of engagement. Sometimes stimulation flows easily into soothing; sometimes soothing transforms into stimulating. Simply being aware of the breath inhale can be stimulating; and simply being aware of the breath exhale can be soothing. It is all about observing what and how we are doing and being aware of innate patterns.

Remember: soothing is neither better nor worse than stimulating; it is about finding an appropriate balance — and knowing that this balance is not a fixed state, that it changes during the day, seasonally and as we get older.

## **CONNECTING AND CONNECTING...**

What might appear to be separate parts do undoubtedly connect. An example: "How much pain we feel is determined in significant part by our brains and minds — our current mood, our past experience of pain, our psychology and how serious we think our injury is."<sup>40</sup> The body, the mind, the brain are in continual connection. Pain can be more about how we are doing within our bodies than the actual injury itself.<sup>41</sup>

Another example: for many, feelings of tiredness or loneliness can make an injury feel more painful. The brain reacts to a signal that

it receives (about an injury, for example) but the reaction is not purely a response to the stimulus itself; it is influenced by other factors. Lisa Feldman Barrett gave this beautiful example: "If your loved one is in pain, you can lessen her suffering by merely holding her hand."<sup>42</sup>

A further example of connectivity are the links between abdomen and brain. Matthew Cobb wrote "fundamental aspects of brain biochemistry can be affected by the microbes that live in the gut".<sup>43</sup> An interesting observation is that the 'average' human gut microbiome (that is, the microorganisms that live in the digestive tracts) may weigh about 2.3kg — substantially more than the brain, although of course there is much more to life than weight and size. Cobb again: "By situating the brain in its anatomical, physiological and evolutionary context, we get a richer understanding of how the various bits of our bodies interact to produce our behaviour and, ultimately, our mind."<sup>44</sup>

How we see the world alters who we are. Research has shown that after playing aggressive video games, participants (especially young men) can become more likely to respond aggressively.<sup>45</sup> People report that wine tastes better if they are told it is expensive.<sup>46</sup> And our upbringing can significantly influence our brains. Writing about the developing brain of a child, Lisa Feldman Barrett stated “adversity and poverty are afflictions from which little brains struggle to recover.”<sup>47</sup> Our conditions of life significantly impact our brains.

In the words of Lisa Feldman Barrett, “If your body budget is already depleted by the circumstances of life — like physical illness, financial hardship, hormone surges, or simply not sleeping or exercising enough — your brain becomes more vulnerable to stress of all kinds ... a long period of chronic stress can harm a human brain.”<sup>48</sup> Studies have shown that people who experienced verbal abuse when they were children are more likely to be anxious and depressed during young adulthood; “chronic verbal abuse in childhood predisposes people to mood disorders in young adulthood.”<sup>49</sup> And it has to be said that this can potentially carry far beyond young adulthood. An increasingly common description of adverse childhood experiences is ‘toxic stress’.<sup>50</sup>

## HELPFUL PERSPECTIVES

There are dangers that obsessing on small details can mean missing the broader picture. A consequence of this obsessing is compartmentalising and disconnecting; rather than connectivity, a joining of dots, having a holistic approach. We need to avoid being seduced by complex theories that are actually neither understandable nor appropriate to us as yoga teachers. Remember that internal combustion engine!

Yoga (and other practices) can have a substantial impact upon brain and body functioning. Yoga can help with stress and anxiety; it can help us to calm down and feel better. Many yoga practices balance both the stimulate and the soothe. Another practice that offers this balance is psychotherapy. In the words of Eric Kandel, winner of the 2000 Nobel Prize in Medicine, “There is no longer any doubt that psychotherapy can result in detectable changes in the brain.”<sup>51</sup>

One conclusion reached by Lisa Feldman Barrett is “We have more control over reality than we might think. We also have more responsibility for reality than we might realise...A superpower works best when you know you have it.”<sup>52</sup>

As much as it is clear that we are a herd inside our own bodies (remember all those neurons and synapses and glia and much more), we need a herd to survive and thrive: we are gregarious animals. In the opinion of Elizabeth Markle, a professor of community mental health, “our neurobiology is regulated by attachment relationships...community, done well, has the power to create some of the village or tribe experience that I think potentiates human wellbeing more effectively.”<sup>53</sup>

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Another title I thought of for this article was ‘a trip within the skin’. Because hopefully this is a trip: these ideas, the suggestions of who we are, examples of how we can alter our ways of being. We are much more than mechanisms. As well as our bodies containing these brains, we are obviously dependent on breathing, our central nervous system, our physical structures. These are all absolutely essential to life. A helpful perspective is less reducing and fewer hierarchies; instead an emphasising of connections and holism. These words from George Pugh seem a fitting close to this piece.

“If the human brain were so simple that  
we could understand it,  
we would be so simple that we couldn’t.”<sup>54</sup>

Norman Blair  
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These are the main books that I used for this article. If you wanted to read just one, I recommend Matthew Cobb’s *The Idea of The Brain*.

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<sup>1</sup> Gabriel Marcel: cited in McGilchrist 2019: 430; “truth is a process...”: cited in McGilchrist 2019: 154; Roger Scruton. 1994. *Modern Philosophy: An introduction and survey*. Bloomsbury, PAGE.; Cobb 2021: 9.

<sup>2</sup> Thank you to Austin Ince for this image of the internal combustion engine.

<sup>3</sup> George Eliot. 2003. (orig 1871). *Middlemarch*. Penguin, pp 140, 694.

<sup>4</sup> *Annals of Lu Buwei*: quoted in Peter Deadman. 2016. *Live Well, Live Long*. Journal of Chinese Medicine, 199.

<sup>5</sup> Fred Gage: quoted in Strauch 2010: 134.

<sup>6</sup> Michael Merzenich, neuroscientist, quoted in Doidge 2007: 47: “practicing a new skill, under the right conditions, can change hundreds of millions and possibly billions of the connections between the nerve cells in our brain maps.”

<sup>7</sup> Broks 2003: 53.

<sup>8</sup> neurons: <https://qbi.uq.edu.au/brain/brain-anatomy/what-neuron>

<sup>9</sup> synapses: <https://www.britannica.com/science/synapse>

<sup>10</sup> glia: <https://qbi.uq.edu.au/brain-basics/brain/brain-physiology/what-are-glia>

<sup>11</sup> Feldman Barrett 2020: 132.

<sup>12</sup> Feldman Barrett 2020: 36.

<sup>13</sup> Quoted in Solms 2021: 358.

<sup>14</sup> McGilchrist 2019: 9.

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- <sup>15</sup> Clare Wilson. 15 May 2021. ‘David Eagleman Interview’. *New Scientist*.
- <sup>16</sup> McGilchrist 2019: 27.
- <sup>17</sup> Cobb 2021: 347.
- <sup>18</sup> Charles G Gross 1987. ‘Neuroscience, Early History of’. In G Adelman (ed). *Encyclopedia of Neuroscience*. Birkhauser, 843.
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- <sup>22</sup> Doidge 2007: 12.
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- <sup>25</sup> Feldman Barrett 2020: 15, 24.
- <sup>26</sup> Solms 2021: 135.
- <sup>27</sup> Broks 2003: 49.
- <sup>28</sup> Oliver Burkeman. ‘Why can’t the world’s greatest minds solve the mystery of consciousness?’ 21 January 2015 <https://www.theguardian.com/science/2015/jan/21/-sp-why-cant-worlds-greatest-minds-solve-mystery-consciousness>
- <sup>29</sup> <https://dictionary.cambridge.org/dictionary/english/mind>
- <sup>30</sup> Quoted in Solms 2021: 241.
- <sup>31</sup> Inspired by Solms 2021: 295.
- <sup>32</sup> Feldman Barrett 2020: 104.
- <sup>33</sup> Feldman Barrett 2020: 5.
- <sup>34</sup> Solms 2021: 78.
- <sup>35</sup> Quoted in Feldman Barrett 2020: 154.
- <sup>36</sup> Doidge 2007: 290.
- <sup>37</sup> Cobb 2021: 231.
- <sup>38</sup> Cobb 2021: 376.
- <sup>39</sup> Broks 2003: 56.
- <sup>40</sup> Doidge 2007: 191.
- <sup>41</sup> In the words of neurologist VS Ramachandran: “Pain is an opinion on the organism’s state of health rather than a mere reflexive response to injury”: quoted in Doidge 2007: 192.
- <sup>42</sup> Feldman Barrett 2020: 85.
- <sup>43</sup> Cobb 2021: 383.
- <sup>44</sup> Cobb 2021: 383.
- <sup>45</sup> Alice Park.. 24 March 2014. ‘Little By Little, Violent Video Games Make Us More Aggressive’. *Time*.
- <sup>46</sup> Feldman Barrett 2020: 111.

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<sup>47</sup> Feldman Barrett 2020: 61.

<sup>48</sup> Feldman Barrett 2020: 91.

<sup>49</sup> Feldman Barrett 2020: 156–7.

<sup>50</sup> Teresa Brockie et al. 2015. ‘The Relationship of Adverse Childhood Experiences to PTSD, Depression, Poly-Drug Use and Suicide Attempt in Reservation-Based Native American Adolescents and Young Adults’. *American Journal of Community Psychology*. June: 55 (3–4): 411–21. <https://pubmed.ncbi.nlm.nih.gov/25893815/>

<sup>51</sup> Doidge 2007: 233.

<sup>52</sup> Feldman Barrett 2020: 123.

<sup>53</sup> Claire Bushey. 19 June 2021. “‘We are not meant to be isolated beings’”: on Covid and communal living’. *Financial Times* 19 June 2021.

<sup>54</sup> George Pugh. 1977. *The Biological Origin of Human Values*. Basic Books, 154. He said that the quote originally came from his father, Emerson Pugh.