# Why Neuroscience Matters

Although neuroscience is particularly topical at the moment it is far from new as we have always been fascinated with the brain, for example, trepanation (drilling holes in the skull) is the second oldest recorded surgical procedure with evidence of this going back to the Neolithic age. The 19th century fascination with phrenology (feeling the shape and unevenness of the skull and using this to deduce intellectual and character traits) was perhaps as much, if not more, of a social phenomenon than a scientific one and although rapidly discredited, phrenology's lasting legacy – the concept of localisation of functions in the brain, has, to an extent, been validated by modern science. But the door to major breakthroughs in our understanding of the brain burst open in 1977 when the world's first magnetic resonance image (MRI) was taken. This heralded a rapid advance in imaging technology that continues apace. From MRI came fMRI; the ability to image the brain as it performed various functions which has given us unprecedented understanding of how the brain works. Today, credible neurofeedback headsets cost just a couple of hundred pounds and should you choose to do so, you can now sit at home with your games console and get accurate images of your brains activity, real-time, on the screen in front of you.

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This unprecedented access to the working brain has given us a new, evidence-based perspective on how the brain operates and means we now know more than ever about the brain's systems, processes, strengths and limitations. At Think Change we have been studying how to use this information to help individuals and organisations achieve their goals and enhance their wellbeing for nearly 10 years and believe that we have identified the most pertinent and practical applications for neuroscience in the workplace. In particular we believe that neuroscience can help improve understanding and performance in key areas such as: Change management, Working with others, Personal effectiveness, and Learning and development.

Underpinning much of the power of neuroscience is the concept of 'neuroplasticity' which first came to prominence via the 'Silver Spring Monkeys'. These were 17 macaque monkeys that were being studied in a brain mapping exercise in the USA in 1981. Intervention by PETA (People for the Ethical Treatment of Animals) led to an unexpected 10 year interruption to the study and when it resumed in 1991 the researchers found that the monkey's brains had changed significantly in the intervening period. This ran counter to the accepted science that the adult brain was fixed and immutable and upon publication the study's findings were widely scorned and dismissed. However, subsequent studies did validate the fact of the brain being able to change, and a longitudinal study of London Taxi Drivers as they undertook 'the knowledge' showed definitively – in parts thanks to the improved imaging techniques then available – that the brain could indeed grow, shrink and remap itself in response to its' environment. Dr Walter Mischel – renowned for his 'marshmallow' studies – has described the identification of neuroplasticity as the most important human science discovery of his lifetime because of the additional control and choice it gives us over our thinking, behaviour and destiny. In the workplace neuroplasticity is a game-changer because we now know definitively that the old dog *can* learn new tricks but we also know that this can be a physically demanding activity that the brain is reluctant to undertake. But it is now clear that we can use our thinking, to change our brain, so as to change our thinking, behaviour etc. The process is there within all of us – dependent upon a healthy brain, heart and lungs - but actualising it requires significant motivation and the right approach if we are to tap into its power.

> Neuroplasticity has been described as the most important human science finding of our time

Knowing that the brain *can* change, and our increased understanding of *how*, can make a real improvement in how we approach change at an individual, group and organisational level in the workplace. For instance, we know that from the brain's perspective that lasting change is best 'kick-started' by a self-generated 'A-Ha' moment. We also now know what can help or hinder

these ‘lightbulb’ moments from happening and design our change process accordingly. Similarly, we now know how to nurture and sustain a moment of insight so that it translates into habituated thinking or behaviour and can use these to significantly improve how we plan, manage and embed change. Using, for example, the Standish Groups bi-annual Chaos Report[1] looking at the effectiveness of change projects we can see that the track record of change in organisations is not very impressive – on average over the last decade they report 34% of change projects as being successful, 43% semi-successful and a constant rump of 19% that have failed, that is abandoned with no return. Using neuroscience to inform our change management approach has, we believe, the potential to transform this.

Typically only a third of change projects are deemed to be successful

When it comes to Working with others and Personal effectiveness then Professor MacLean’s longstanding ‘Triune Brain’ theory is a helpful model even if the latest neuroscience research raises as many questions as answers when it comes to validating it. The model states that the modern brain is made up of three elements that have evolved over different timescales:

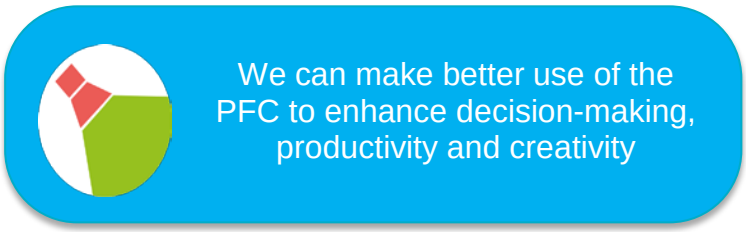
The **Reptilian** brain is the oldest part of the brain and is similar to the brain of a modern-day reptile. It controls genetically-determined behaviours such as breathing, heart beat and learned physical skills such as walking, running etc. It operates in a habitual, patterned way.

The **Mammalian** brain or Limbic system is composed of hippocampus, amygdala, hypothalamus and periventricular structures. This is concerned with emotion, attention, memories, instincts, and is where our sub-conscious decisions are made – based on emotion. The Mammalian brain can learn from experience in a way that the Reptilian brain can’t.

The **Neocortex** is the upper and frontal parts of our brain and controls higher executive thought such as speech, mathematics, thinking and reasoning. The neo-cortex is the conscious part of the mind but is only responsible for 10 – 20 percent of

brain function with most of the remainder being accounted for by the mammalian brain.

Knowing that most of our brain's work is sub-conscious and emotionally driven can be a hard pill for some business executives to swallow but once we accept this and start to try and work *with* the brain's mechanisms rather than unwittingly working *against* them, then we can make significant changes to our workplace effectiveness and well-being. For example, the prefrontal cortex (PFC) – a part of the brain responsible for executive functions and which is called upon extensively when we are undertaking, complex, demanding or new tasks has a limited capacity that gets run down – much like a battery – as we use it. The limited capacity for executive functioning has been demonstrated starkly by Danziger's analysis of parole hearings which showed that the likelihood of being granted parole diminished as the judge heard more cases. The probability of parole increased, but not sustainably, after the judge took a meal or refreshment break. One interpretation of the findings was that it shows the PFC running out of resource to make a genuinely considered decision and opting instead for the default choice of 'no parole'. Consider the implications of this for decision making in organisations? By understanding more about, and better managing our usage of the PFC, we can make a real difference to factors such as, decision-making quality, productivity and creativity.




Similarly knowing the brain's emotional bias and the fact that more often than not the Mammalian brain will have dealt with an issue before the Neocortex even knows that there is an issue can be very powerful in improving how we understand and interact with others in the workplace. Knowing the Mammalian brain's 'hot buttons' and its' limited repertoire of responses (fight, flight, freeze, flock) allows us to take more effective control of our brain state and reduce our level of anxiety. Sadly, for many people their day-to-day experience of work is a near constant state of low-level anxiety but there are very practical changes we can make to our behaviour, work-styles etc. that can deliver significant benefit. For example,

checking your email first thing in the morning may well have a significant, negative effect on your performance for the rest of the day. By understanding more of how the brain operates and by working out the implications for themselves people can identify the changes they can make to improve their performance and wellbeing. An understanding of neuroplasticity and how habits are formed will significantly increase the likelihood of their being able to make these changes last

For Learning and Development (L&D) lasting change is the 'Holy Grail' and, if truth be told, the track record to date is not very good. Again, our increasing knowledge of the brain allows us to make small but significant changes to the architecture, design and delivery of L&D products and services so as to significantly increase their 'brain-friendliness'. For example, an understanding of neuroplasticity gives us confidence that people can change and allows us to 'design-in' features that support brain change. Similarly, we can use models such as RAD (Reticular activating system, Amygdala, Dopamine) to encourage learner engagement and deliver a more effective experience. Knowing how emotional state effects the brain's performance and its limited capacity for deliberate, considered engagement with a topic also helps us to enhance our L&D products and services.

> Understanding how habits are formed can allow us to change these by dropping old ones or embedding new ones

By understanding how the brain perceives and processes information we can make it more likely that our L&D products and services hit the 'sweet spot' that can deliver long term change.

To paraphrase the statistician George E P Box, 'essentially, all models are wrong but some are useful" and whilst this undoubtedly applies to neuroscience the balance is probably weighted significantly more to the 'helpful' rather than 'wrong' end of the scale. Neuroscience will help us but the search for a 'silver bullet' continues and is unlikely to exist.