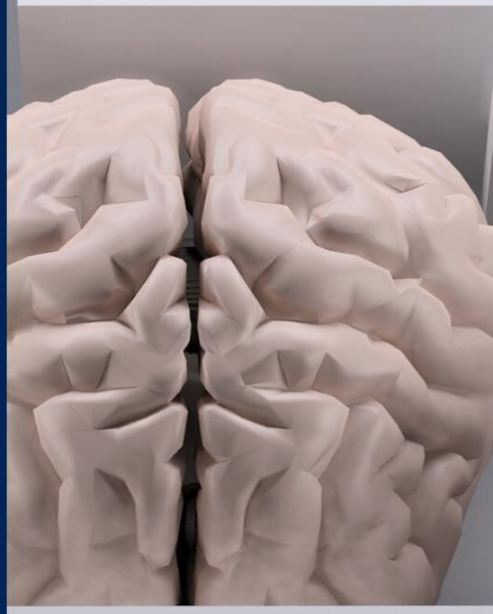
BUSTING NEURO MYTH-CONCEPTIONS IN APPLIED ORGANISATIONAL NEUROSCIENCE



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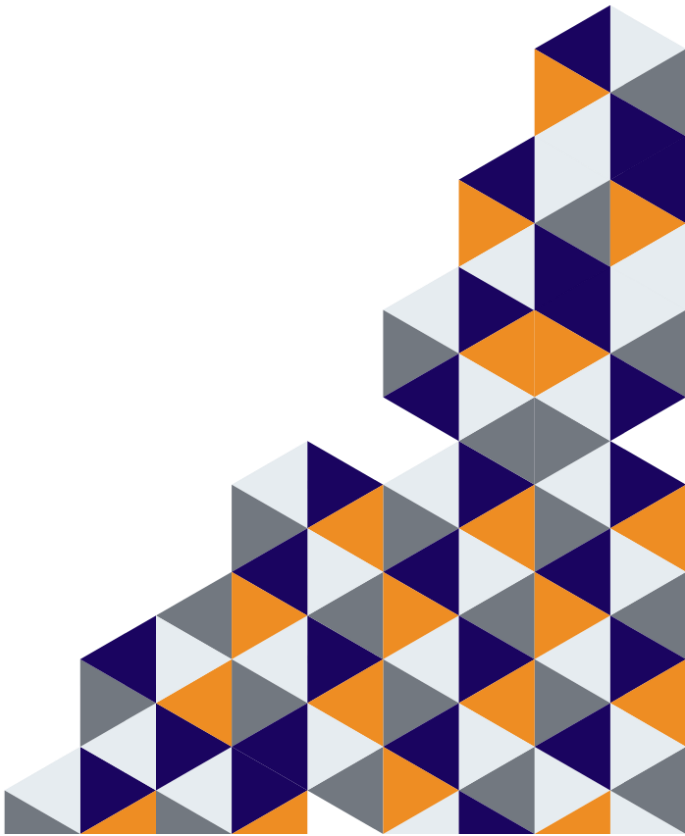
i. ABOUT THE BUSTING MYTHS SERIES

The profession of Industrial psychology places a high premium on its constituents' ability to balance the roles of a scientist (developing and testing theories) and practitioner (solving real-world problems) (Van Vuuren, 2010; Walker, 2008). When industrial psychologists can balance these roles, they are celebrated as scientist-practitioner champions (Highhouse & Schmitt, 2013) or evidence-based practitioners (Briner & Rousseau, 2011). If you would like to gauge what the prevalence is of an evidence-based approach is in your community of practitioners, reflect on the questions proposed in Addendum A. Even though this is an envisioned state for all practitioners, there continues to be a gap between the science and practice of industrial psychology for many professionals (Rynes-Weller, 2012). For example, there might be scientific evidence that discounts commonly held beliefs among practitioners and their stakeholders. Additionally, personal accounts through years of experience with behaviours in the workplace might make practitioners sceptical about scientific discoveries that do not hold up to clinical intuition. The divide between the science and practice of industrial psychology makes the field susceptible to myths (non-evidence based beliefs) in everyday practice, which might cause harm to professionals and their clients (Rynes-Weller, 2012). A study conducted by Kagee and Breet (2015) revealed that, of 50 statements that are not empirically supported, 22 statements received a moderate to a high level of endorsement by psychologists in South Africa. It is possible that training in South Africa does not prepare psychologists to base their practice on empirical evidence (Kagee & Breet, 2015). It is, therefore, essential to close the gap by addressing and disputing common myths in industrial psychology.

This booklet will aim to bust myths in organisational neuroscience. The booklet is a result of the collaborative effort of the Johannesburg Regional Branch and Interest Group in Applied Organisational Neuroscience (IGAON).



ii. ABOUT THE AUTHORS

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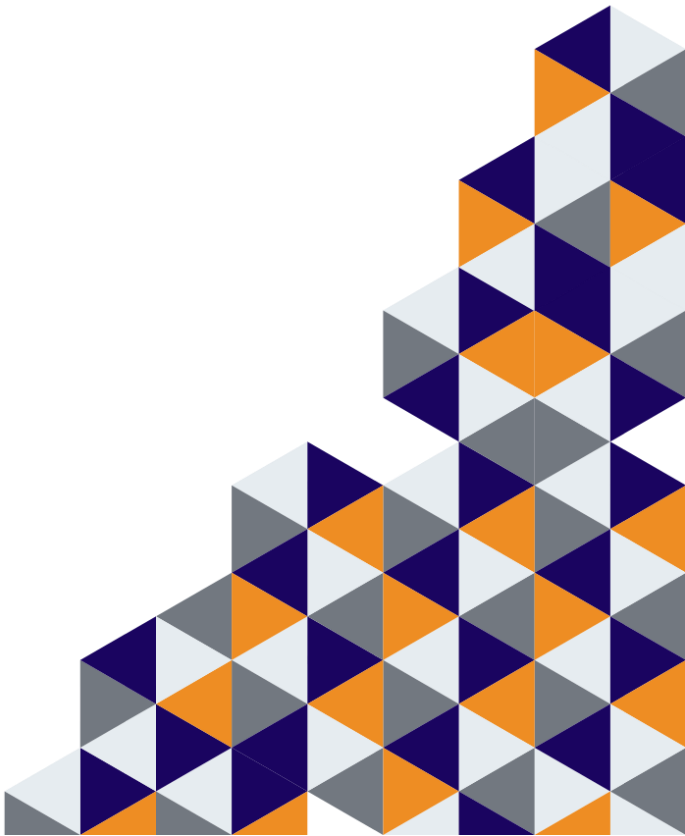

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1. POINTS OF DEPARTURE

1.1 What is organisational neuroscience?

Organisational neuroscience (ON) is an approach to spanning the divide between neuroscience (the scientific study of the nervous system) and organisational science. ON represents a paradigm or interpretive framework that sheds new light on well known industrial and organisational psychological problems (Becker et al., 2011). There are many neuroscientific theories, modalities, and methods to study human behaviour within the applied settings of organisations (at the individual, group, organisational or inter-organisational level). Examples include PsychoNeuro-Immunology (Irwin,2008); Social Cognitive and Affective Neuroscience (Ochsner & Lieberman, 2001); Neuro-Psychotherapy (Grawe, 2007); and Neurofeedback (Thibault et al., 2015), to name a few.

Organisation neuroscience as a new field still needs some philosophical and theoretical heavy lifting before it can take its place as a meaningful paradigm in organisational behaviour research (Lindebaum & Zundel, 2013). Why this statement? Organisational behaviour phenomena are inherently complex, and when attempting to work in an interdisciplinary way, it is essential that the research contribution is simple to understand while providing rigorous and accurate results that are not reductionist (Healey & Hodgkinson, 2014). Organisational neuroscience research needs to differentiate between "pseudo-science" assertions and findings that are supported by scientific evidence. Interest driven over-claiming or skewed research findings by practitioners is a real concern as it can distort findings rather than clarify neuroscience phenomena as it relates to organisational behaviour (Lindebaum & Zundel, 2013). Presenting possible neuro-myth conceptions (as we do in this whitepaper) is one attempt to avoid such "pseudo-science" assertions.

1.2 Why is organisational neuroscience important?

Organisational neuroscience is important as it enables organisational scholars to look at the neuro-physiological roots on which the studied psychological construct draws in conjunction with other social and environmental factors. Besides, the growing use of brain imaging and related neuro-psychological techniques is defining new ways of understanding individuals and group behaviour. Applied organisational neuroscience is beginning to be the discipline that takes these new findings and translate it into practical use by translating and synthesising this new neuroscience knowledge and making it accessible and useful in organisations. According to Healey & Hodgkinson (2014), we can use translational research in the applied organisational neuroscience domain by synthesising neuroscientific insights to enrich organisational psychology phenomena while still using social science research methods that are familiar to organisational researchers (for example, using social cognitive neuroscience research to elucidate on the constructs at play in the study of group psycho-dynamics in an organisational context).

1.3 When is organisational neuroscience necessary?

Firstly, (and stating the obvious) neuroscience is necessary when researching the field of neuropsychology. The latter is both an experimental and clinical field of psychology that targets how behaviour and cognition are predisposed by brain functioning and is concerned with the diagnosis and treatment of behavioural and cognitive effects of neurological disorders (Zillner et al., 2008).

Secondly, when organisational behavioural phenomena need to be understood from multiple levels of analysis. For example, in the research study on: "Differentiating transformational and non-transformational leaders based on neurological imaging" by Balthazard et al. (2011) both EEG and self-report inventories were deployed to study the phenomenon of leadership. This combination of both behavioural and brain data allows organisational scholars to converge on theoretical explanations that are robust and malleable and are not tied to a single explicit experimental methodology (Ochsner & Kosslyn, 2013).

Finally, when the need is to build more prosperous, more robust theories that are aimed at understanding the micro-foundations of organisational behaviour. The Scientific Realism research paradigm connects and unifies concepts from diverse fields like neuroscience and organisational psychology (Rutzou, 2016). They are located at different levels of explanation. This rich theory building is also argued through consilience, which involves the use of independent methods of measurement, meaning that the methods have few shared characteristics (Wilson, 1998).

According to Becker et al. (2011), consilience enables the building of richer and more robust theories, especially in organisational neuroscience where some scholars argue that psychology is not entirely distinct from the study of properties relating to the interaction of neurons and synapses. In essence, the concept that all the different areas of research are studying one real, existing universe is an apparent explanation of why scientific knowledge determined in one field of inquiry has often helped in understanding other fields (Wilson, 1998). It is postulated that this consilience of lenses can also help debunk potential myths in neuroscience and psychology.

2. MYTHS AND THE IMPORTANCE OF DISPELLING THEM

2.1 What do we mean by a myth in psychology?

Myths could be perceived as the publics', or a professional community's, commonly held and mistaken beliefs about facts in psychology (Lilienfeld, Lynn, Ruscio, & Beyerstein, 2010). There are three characteristics that these mistaken beliefs share, namely that they are stable, go against established scientific evidence, and are strongly influenced by how people make sense of the world (Hammer, 1996). For this booklet, we will refer to myths as mistaken beliefs that outright contradict evidence based on psychological research (Lilienfeld et al., 2010). Per Lilienfeld et al.'s (2010) conceptualisation, we will interchangeably use the term 'psychomythology' to refer to myths in psychology in this booklet. Before we provide further reasons for why myths should be dispelled, we would like to provide you with a little toolbox to help you spot myths in the wild. With the wild, we mean myths as they occur in everyday practice, not just myths that are clearly ring-fenced by academics. You can do this by employing the acronym – **FRESH BS**. A breakdown of the acronym will be provided below.

F (Fake news): The media might often portray information as far more sensational than it truly is. For example, Pinker (2018) outlined that the media often paints a far bleaker picture of the current state of human society than what the evidence would suggest. On many indices, such as education and health, the evidence suggests that human society is progressing in the right direction (Pinker, 2018).

R (Representativeness): Be careful when people forward arguments that artificially attribute things to each other based on their seeming resemblance (Tversky & Kahneman, 1974). For example, the belief that a human figure drawing with large eyes might resemble somebody who is paranoid might seem plausible, even though there is little scientific evidence to support this claim (Lilienfeld et al., 2010).

E (Exaggerations): Not all myths are entirely false. For example, women and men do tend to differ concerning some personality traits and career interests (Costa, Terracciano, & McCrae, 2001; Lippa, 2010). However, it might be unwarranted to exaggerate this finding by stating that women are from Venus and that men are from Mars (Gray, 1992).

S (Selective perception): All humans, even registered psychologists, tend to filter the world through a particular lens and, as a result, do not always perceive reality as it truly is (Lilienfeld et al., 2010). In this respect, human lenses might be tainted by factors such as the availability heuristic. The availability heuristic suggests that people rely on information stored in their memory to make sense of new occurrences (Tversky & Kahneman, 1974). For example, a recent report about a mass shooting performed by a schizophrenic patient might falsely lead people to conclude that this mental disorder is associated with violence, which is not a scientifically valid claim.

H (Heresy): False beliefs can easily be spread through word-of-mouth. It is important to note that, just because something is said time and again, does not necessarily make it true (Lilienfeld et al., 2010). For example, the phrase that 'opposites attract' has very little

scientific merit to back it. On the contrary, similarities in terms of personality traits make for happier marriages (Lazarus, 2001).

B (Biased sample): We often revel at the most recent discoveries in non-scientific articles or claims made by seasoned professionals, but we do little to investigate the sample on which their conclusions are based. It might be that these revolutionary discoveries were based on a very specific sample that cannot be generalised to the majority of people. A clinician might state that, based on his/her years of experience with smokers, smoking addiction is very difficult to stop. However, the psychologist might only be exposed to a very small number of people that are typically desperate to stop smoking.

S (Simple answers): When something seems too good to be true, it probably is. The temptation is always there to provide an oversimplification for a complex problem. It might be posed as a cutting edge solution that will revolutionise psychology, such as speed reading, but may have little evidence to back it (Lilienfeld et al., 2010).

The intention of this booklet is not only to arm professionals with the required knowledge to identify myths in organisational neuroscience but also to empower professionals with the necessary skills to think critically about discoveries and conventions in psychology (maybe even what is shared in this booklet).

2.2 Why is it important to dispel myths?

Following Van Vuuren's (2010) model of ethics, we believe that it is important to dispel myths due to the potential harm that it has for the self (people professionals) and others (clients receiving professional services). A visual adaptation of the proposed model is provided below.

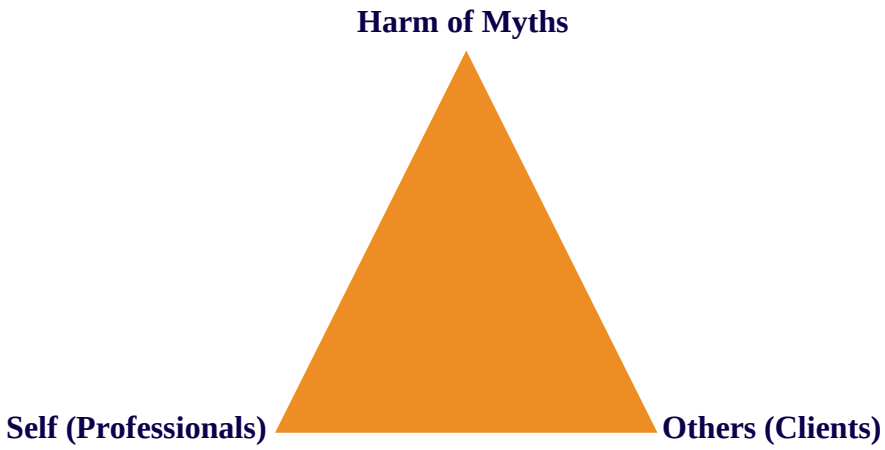


Figure 1. Defining ethics. Adapted from "Industrial psychology: Goodness of fit. Fit for goodness" by L.J. Van Vuuren (2010), *South African Journal of Industrial Psychology*, 36, p. 7.

The harm of myths for the self (professionals): An important part of being a professional is the ability to help solve problems by providing decision-makers with an independent, objective,

and evidence-based opinion about matters surrounding psychology in the workplace (Lilienfeld et al., 2010; Van Vuuren, 2010). The credibility of psychological professionals, including the longevity of the profession, could be severely damaged if mistaken beliefs about psychology are perpetuated (Lilienfeld et al., 2010; Van Vuuren, 2010).

The harm of myths for others (clients): Given the gravity attached to professional's advice, clients might make significant investments in terms of time and money, which might be completely wasted if based on false information (Lilienfeld et al., 2010; Van Vuuren, 2010). Also, false information might, directly and indirectly, do more damage to the psychological wellbeing of a client than when a client received no advice (Lilienfeld et al., 2010; Van Vuuren, 2010).

2.3 A myth's lifecycle and organisational neuroscience's vulnerability

As per Furnham's (2004) contention about myths in management, we believe that psychological assessments fall prey to myths through a sequential process with seven stages, which will be outlined below.

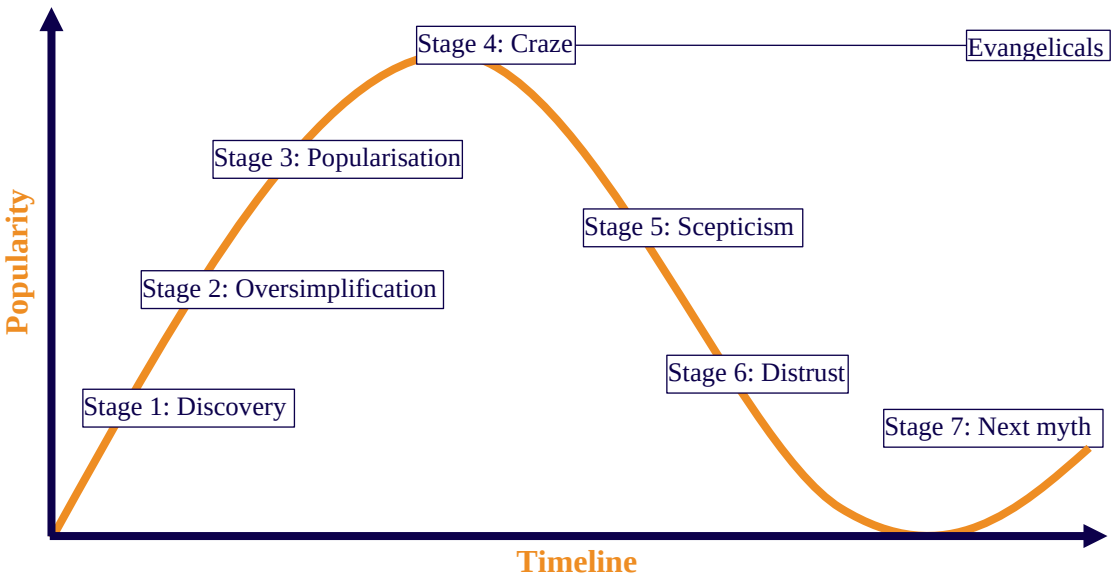


Figure 2. Timeline of myths. Based on "Management and myths: Challanging business fads, fallacies and fashions." by A. Furnham (2004), p. 3.

Stage 1 – Discovery: A myth might have its origins in an initial discovery at an academic institution (Furnham, 2004).

Stage 2 – Oversimplification: Somebody might read the paper and provide an oversimplification of its findings to others. Due to people's selective memory, they might only choose to perpetuate one specific thing about the article, and through repetition, this one piece of information might take hold as fact, irrespective of the context in which it was said (Furnham, 2004).

Stage 3 – Popularisation: A charismatic individual might come across the oversimplification of a complex issue and, given its appealing nature as a simple answer, popularise it among psychological professionals and laypeople alike (Furnham, 2004).

Stage 4 – Craze: As excitement about the idea spreads, it is widely adopted as a state of the art practice in applied organisational neuroscience (Furnham, 2004).

Stage 5 – Scepticism: Some scholars are willing to stick their necks out to counter the emerging myth. However, practitioners might initially be defensive about the counter findings (Furnham, 2004).

Stage 6 – Distrust: The media gets hold of a myth and publically denounce the finding. A complete distrust of a particular finding, perhaps even its related scope of practice, might develop as a result of the misleading idea. Even though a thorough understanding of the original claim in all its complexity might have yielded some interesting insights, the idea is now completely abandoned (Furnham, 2004).

Stage 7 – Next myth: As practitioners' distrust of a myth eventually increases, due to lacking evidence, charismatic individuals might start to gravitate to another myth to popularise (Furnham, 2004). Some psychologists and laypeople alike might be so swayed by a myth that they remain, evangelical followers, irrespective of the compounding evidence against a myth, which can cause serious reputational damage to the professional's career. It accentuates the importance of psychological professionals being able to immunise themselves against myths by adopting the necessary critical skills.

No one is immune to myths. With any new areas of interest that professionals embark on, they often run the risk to over-inflate their understanding of and competence in a particular field. According to Kruger and Dunning (1999), people who learn something new might lack the metacognitive understanding (the ability to know how little you know) to make an accurate judgement of a new area of competence. We believe that organisational neuroscience might be vulnerable to myths, and the associated discoveries, for the below reasons.

Reason 1. Organisational neuroscience is an emerging field, and practitioners might prematurely search for definitive statements about the nature of the brain.

Reason 2. Practitioners that use organisational neuroscience might start to think to reductionistic about human behaviour, rather than to consider the complete complexity of the topic of interest.

Reason 3. Organisational neuroscience has become a fad, which sometimes makes it hard to differentiate fact from fiction.

3. MOVING FROM FICTION TO FACT

In this section, the four surprising insights from organisational neuroscience listed below will be discussed.

1. We only use 10% of our brain – a case for natural selection
2. Our emotional states are universal and can be readily inferred (read) from our facial expressions
3. The brain is like a boundless computer
4. NLP is a neuro-scientific methodology to change human behaviour patterns

3.1 We only use 10% of our brain

This must be one of the most widely believed and disseminated brain myths that there is. It is still widely circulated, even if mostly in movies, think Limitless, the Sci-fi Thriller written by Leslie Dixon and others like it. More surprising; however, a study by Kagee and Breet (2015) highlighted that several psychologists within South Africa said this myth was probably true (38% of respondents), and a further 11% said this was true. It is an appealing thought, from a personal potential perspective, to think that 90% of our brain is going unused creating hope in our endeavours to cast off human constraints, but there is no empirical evidence to support such a belief.

Some have attributed Albert Einstein as saying he only used 10% of his brain, but there is no record supporting such a claim (Beyerstein, 1999). Harvard psychologists Willian James and Boris Stols, who were proponents of reserve energy theories, tested their theory while working with child prodigy William Sidis. It was William James who was said to say that we only meet a fraction of our full mental potential (Scientific American, 2004). Lowell Thomas in a foreword to Dale Carnegie's book How to Win Friends and Influence People, then *falsely* stated that William James had said: "that the average man develops only ten percent of his latent mental ability" (Carnegie, 1936). It was not the first instance but was one of the most prominent examples of the myth's dissemination. This myth may likely have gained traction through a misunderstanding of early neurological research in the 19th century. Research by Larl Lashley, who explored the function or brain regions with electric shocks, discovered that this had no effect on some regions concluding that they must not have an absolute function and is where the term "silent cortex" originated but which has since been debunked (Wang & Aamodt, 2008). The misunderstanding of the regional functions and specifically Glial cell support of localised neurons may have helped perpetuate the myth (Kalat, 1998).

3.1.1 What logic and evidence suggest that this is a misleading assumption?

The problem with the idea that we use only 10 percent of our brain is that there is no scientific evidence or a credible basis to justify such a belief. Neurologists widely accept that we use nearly every part of the brain and that most of the brain is used most of the time (Beyerstein, 1999). In the case against dispelling the myth, evolutionists cite the evolutionary process as anything but wasteful as, over time, this would lead to the exclusion from the gene pool (Swaminathan, 2008). The brain-like every other organ, has gone through a natural selection

process and while it weighs a small percentage of the overall body weight (namely 2-3 percent) it consumes 20 percent of the available energy (Swaminathan, 2008). This equates to brain tissue being metabolically expensive to grow and maintain. With evolution streamlining and optimising systems for survival and a bigger brain increasing the chances of survival, it is unlikely that such a process would allow wastage at this scale for partial use of the brain (Swaminathan, 2008).

Clinical neurology and neuropsychology offer evidence in further refuting the myth. We know from these disciplines that losing 90 percent of the brain due to disease or accident has a profound impact on day-to-day functioning. One controversial case involved Terri Schiavo who lost 50 percent of her cerebrum which is responsible for conscious awareness. Her husband wanted to remove her feeding tube and, as such end her life. In this case, Schiavo had lost the capacity for thoughts, perceptions, memories, and emotions, which are in many ways the building blocks of being human (Beyerstein, 1987). For neuroscientists, "mind" equals brain function, whereas others believed they saw signs of consciousness in Schiavo. Experts found no evidence of higher mental functioning being spared in her case, and if given that 90 percent of the brain goes unused then she should not have been impaired to the degree she was. Even slight damage to small areas of the brain can have significant effects on functioning (Kolb & Whitshaw, 2003).

Incredibly advanced technologies, for example, Electroencephalograms (EEGs), positron emission tomography (PET) scanners and functionally magnetic resonance imaging (fMRI) machines, can track brain functioning with the aid of brain imaging techniques (Rosenzweig et al., 2005). Research using such techniques has aided in localising brain functions to specific regions that are used for different kinds of information processing. Certain areas may well be more active at any given time, but excluding brain damage, there is no part of the brain that is in absolute shutdown. Post-doctoral fellow Gabrielle-Ann Torre writes that using 100 percent of our brain is not even desirable as such activity overload could trigger an epileptic seizure (Torres, 2018). Even at rest, the brain is as active as reasonably possible through default mode networks which are widespread brain networks throughout the brain that are also active and synchronised despite active participation in cognitive tasks.

3.1.2 What are the ethical dangers of preserving this false belief?

Psychologists within South Africa are also bound by an ethical code of conduct (HPCSA, 2006). Annexure 12 highlights the imperative to maintain competence in the profession that is in line with international standards and best practice but above all to 'do no harm'. In light of this, practitioners have a responsibility to ensure that their efforts are supported by the most recent published research rather than by the latest 'fads' and trends. Lindebaum (2019) notes how the discipline of neuroscience has been popularised to the extent some ideas that have little or spurious research backing to support claims have become mainstream beliefs. Again, mental health practitioners under the auspices of the Health Professions Council of South Africa are ethically bound to ensure continued professional development, but this should go beyond mere compliance. It should be an endeavour that is intrinsically motivated by a desire to live out a scientist-practitioner model and an eagerness to ensure their practice is based on the latest research. Myers (2002) highlights how intuitions are subject to bias effects in

the form of confirmation bias and vividness effect to name a few. Psychologists should know this better than anyone and should, therefore, be eager to test claims and the latest trends against a scientific framework.

3.1.3 Organisational Implications

Within organisations there is often an implicit assumption that those in possession of a post-graduate degree in psychology have the requisite knowledge base and skills. Although possibly true for the most part, many including directors of education in South Africa's finest institutions, hold various epistemological and ontological positions which lead them to question whether all psychological interventions should be informed by evidential research data (Kagee & Lund, 2012). Holding such a position can lead professionals who do not adopt a scientific basis for thinking, towards erroneous notions of human behavior. This can cause untold harm when propagated and at the very least, formulating interventions that are not based on sound empirical findings, can be detrimental to individuals and would have questionable effectiveness. Certain elements of psychological practice such as assessments conducted within an employment context are governed by legislation that requires their use to be fair, not biased against anyone group as well as scientifically valid and reliable (Employment Equity Act). Unfortunately, not all areas of psychological practice are so explicitly regulated in their requirement for a scientific basis for use and approach. As such, organisations need to put checks and balances in place that require sound evidence to justify and support psychological interventions.

3.1.4 Implications for individual practitioners

Although we have not dealt with the growing literature in neurogenesis/neuroplasticity (Leaf, 2018), it is alluring to believe we have vast amounts of untapped cognitive potential where we can free ourselves from the shackles of our current human constraints - but is it science? This myth is not static, and there are variations of the belief that we should be aware of, such as shifting the argument to include the underutilisation of the subconscious. Despite the enduring nature of the myth for over a century, it is time to put the myth to rest. Perhaps when next confronted with statements that suggest this myth, you can ask, "what part exactly are you not using?".

3.2 Our emotional states are universal and can be readily inferred (read) from our facial expressions.

When last did you try to act cool while feeling hot by merely reading someone's facial expressions? Faces offer a rich resource of information for navigating the social world and play a crucial role, for example, in helping to decide whom to love, doubt, or help, and even who is found guilty of an offence or crime (Todorov, 2017).

We all have emotions built in from birth. They are distinctive, noticeable phenomena inside us. When something happens in the world, whether it's a fire alarm going off or a jealous glance, our emotions come online quickly and spontaneously as if someone has flipped a switch. We show emotions on our faces by way of smiles, frowns, and other typical

expressions that anyone can easily spot. Our voices reveal our emotions through laughter, screams, and cries. Our body language reveals our feelings with every gesture.

But emotions are complex and are a sophisticated form of information. Emotional intelligence (EI) is defined as an individuals' capacity to accurately perceive, understand, reason about, and regulate emotions and to apply that information to facilitate thought and achieve goals (Salovey and Mayer, 1990). In the world of work, we distinguish between trait EI and ability EI, and we endeavour to use valid and reliable psychometric instruments (Webb et al., 2013) to operationalise EI in selection, coaching, counselling, and developmental solutions (Huiyong Fan et al., 2009; Fan et al., 2010; Karim and Weisz, 2010). A review of the neuroscientific underpinnings of Trait/Ability EI and related psychometric instruments is beyond the scope of this paper (Killgore et al, 2017). Suffice to say that psychological knowledge and how both experts and non-experts appropriate it are ubiquitous and misconceptions about human nature abound.

We yield the call of Kagee and Breet (2015) also to review theoretically plausible (and cherished) ideas to contribute to the body of knowledge being studied. The focus of this part of the paper is only on the existing research on emotion generation, expression, and perception. The question being asked is whether the scientific evidence is adequately solid enough to validate the way it is used in organisational settings. We review the classical view of emotion and the theory of Contructed Emotion (Gross and Barett, 2011) to shed light on the proposed neuromyth above. Like any research on human behaviour, there seems to be a variety of theories and contradictory research findings when it comes to the generation, expression, and perception of emotion.

In the **classical view of emotion,** also called the Basic Emotions Model - emotions are labelled as specific incidences and or categories of emotion that share a distinctive pattern of Autonomic Nervous System (ANS) activity, a figurative fingerprint (Gross & Barrett, 2011). Thus different emotion categories have distinct, diagnostic neural configurations. The most researched and documented view is the universality of facial expressions of emotion (Ekman, Friesen, & Ellsworth, 1972). This theory of emotion goes back to Darwin (1872), who proposed that emotions and their expressions were biologically determined, evolutionarily adaptive, and universally similar. Darwin's claims were further researched by Tomkins (1962, 1963), who suggested that the seat of emotion was in the face, in line with the argument that emotion was the basis of human motivation. According to Tomkins, facial expressions were reliably associated with certain emotional states (Tomkins & McCarter, 1964).

In one of the most influential, set of experiments carried out in cultures worldwide, Paul Ekman (1972, cited in LeDoux, 2012) showed that all human beings share similar facial expressions for initially six recognisable basic emotions. These emotions, namely anger, fear, joy, surprise, disgust, and sadness, each can be identified by produced facial muscle movements and are almost identical across every culture.

This initial list of basic emotions has subsequently served as the foundation for much research on the neural basis of emotional functions in the human brain. Ekman also went on to

develop a classification of facial expressions called “Facial Action Coding”, where the six emotions mentioned above then split into a multitude of feelings and moods (Ekman, 1972).

In Ekman’s view, from anger to joy, to sadness to surprise, facial expressions are both universal and also culture-specific. He discovered strong evidence of the universality of some facial expressions of emotion as well as why expressions may appear differently across cultures. Through continued cross-cultural studies, Ekman also noticed that many of the apparent differences in facial expressions across cultures were due to context.

To describe this phenomenon, Ekman coined the term “display rules” which are rules we learn in the course of growing up about when, how, and to whom it is appropriate to show our emotional expressions. Later studies are known today as the “universality studies”, pointed to a high cross-cultural agreement in judgments of emotions in faces by people in both literate (Ekman, 1972, 1973; Ekman & Friesen, 1971; Ekman et al., 1969; Izard, 1971) and preliterate cultures (Ekman & Friesen, 1971; Ekman et al., 1969; Matsumoto, 2001; Matsumoto et al., 2008). These studies suggest that there are universal facial expressions for seven emotions – anger, contempt, disgust, fear, joy, sadness, and surprise (see Figure 1).

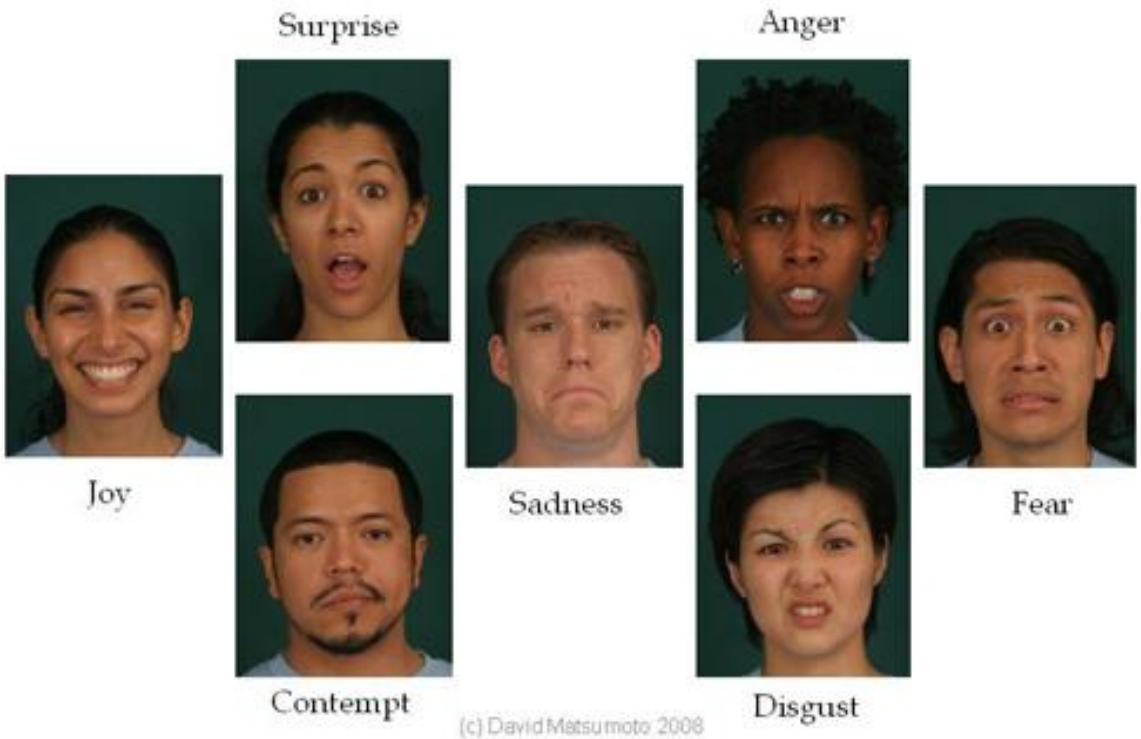


Figure 3. The Seven Basic Emotions and their Universal Expressions. Source :Ekman

These studies form part of what is called the essentialist approach and also include the work of Jaak Panksepp on basic emotion theory (Panksepp, 1998). It has been suggested that the various findings concerning the universality of facial expressions of emotion can help people, involved in a range of professions that require face-to-face interactions, to improve their

ability and skills in reading the emotions of others, and can also help in the development of rapport, trust, and building strong and constructive relationships.

To conclude, the classical view of emotion states that emotions are an evolutionary adjustment, having long ago been advantageous for survival, and now a fixed component of our biological nature. Emotion is understood as a separate faculty caused by its processes. As such, emotions are typically universal. We have many emotion circuits in our brain, and each is said to cause a distinct set of changes, which is a fingerprint and displayed by specific configurations of facial muscle movements. For example, perhaps an annoying team member prompts your "anger neurons," so your blood pressure rises; you glare and feel your blood boiling, and you go blank. Or an alarming TV series triggers your fear centre (the amygdala), so your heart races; you freeze and feel a flash of trepidation. Because we experience anger, happiness, surprise, and other emotions as clear and identifiable states of being, it seems reasonable to assume that each emotion has a defining underlying pattern in the brain and body (Gross & Barrett, 2011).

3.2.1 What logic and evidence suggest that this is a misleading assumption?

The classical view has been contested by the constructionist view of emotion to how emotions are made, expressed, and perceived. (Gendron & Barrett, 2009; Lindquist & Barrett, 2012). Rigorous meta-analysis studies (Siegel et al., 2018; and Barrett et al., 2019) propose that emotions are constructed and that the brain with only past experiences as a guide, makes predictions in constructing emotions. According to the constructionist view, the brain is not merely responding to stimuli in the world. In the construction approach, emotion is not a distinct "faculty" with its distinct mechanism. Instead, one key hypothesis that unites all constructionist theories is that an emotion word, such as happiness, refers to a population of highly variable instances, each of which is tailored to a specific situation or context (Barrett et al., 2019).

In the theory of Constructed Emotion (TCE) the primary purpose of the brain is said to predictively regulate physiological resources to organise the body's motor actions and learning in the short term and to meet the body's needs for growth, survival, and reproduction in the long term. This process of managing the brain and body's energy needs, called allostasis, is based on the proposition that the brain anticipates bodily needs and attempts to meet those needs before they arise as this is more efficient than responding to energetic needs after the fact. In this view, all mental events— cognition, emotion, perception, and action—are shaped by allostasis, and thus all decision making is embodied (through interoceptive signals), predictive, and concerned with balancing energy needs (Sterling, 2012).

We consider three constraints in the scientific research on emotions that have resulted in questions being raised about how emotions are expressed and read in facial movements. The constraints are, namely, limited reliability, lack of specificity and limited generalisability are set out in a meta-analysis study by (Siegel et al., 2018) – we summarise the findings below.

Limited reliability (i.e., occurrences of the same emotion category are neither reliably expressed through nor perceived from a common set of facial movements). Basic emotion

theory (or the classical view) claims that each emotion (such as sadness or fear) has an innate distinct essence which is triggered by environmental factors (Ekman, 1972; Panksepp 1998) and is then universally expressed. Thus, "sadness" is consistently and recognisably different from the patterns found regarding other emotions, such as, for example, anger and joy (for specific quotations, see for example; Ekman & Cordaro, 2001, p. 364)

Meta-analysis scientific evidence (Siegel et al., 2018) advocates that we do sometimes smile when happy, frown when sad, or scowl when angry, more so than what would be expected by chance. However, occurrences of the same emotion category are neither reliably nor consistently expressed through, nor perceived from, a standard set of facial movements (Barrett et al. 2019). Note: this meta-analysis research did not show zero reliability but low reliability.

Lack of specificity: (i.e., there is no single mapping amongst a configuration of facial movements and instances of an emotion category). Because we move our faces in many different ways when expressing emotions, for example, we frown both when we are angry and when we concentrate and when we are unsure, implies that there is no unique mapping between a pattern of facial movements and a specific emotion. (Barrett et al. 2019). Rather, the way we move our faces makes sense for the specific situation we find ourselves in. Again in this regard, a meta-analysis (i.e., statistical summaries of hundreds of experiments), has shown that there is no reliable relationship between any given emotion, (such as anger or any of the other six or seven universal emotions), and a specific set of physical changes in the autonomic nervous system (ANS) that accompanies the occurrences of that emotion (Siegel et al., 2018).

Limited generalisability: (i.e., the effects of context and culture have not been sufficiently documented and accounted for). Given that there are many variations across and within cultures, and even amongst people within a specific situation, in reading emotional expressions (Barret et al., 2019), it appears that we are generally more accurate in recognising, the emotions of people from within our own culture than from within others. Consequently, we use the stereotypes and context of our own cultures to make guesses about emotions, which implies that emotions are largely culture-specific.

3.2.2 What are the ethical dangers of preserving this false belief?

- Overlooking the fact that there are different (and mutually incompatible) perspectives on emotion that lead to different views about emotion generation, expression, perception, and regulation can leave practitioners ill-equipped to make informed decisions about how to measure emotions.
- Not making differences in perspective explicit can result in misunderstandings and misguidance on developing emotional capacities, including facial expression and perception of emotional expressions.
- On the contrary, making differences explicit can allow practitioners (and researchers) with different theoretical stances to collaborate productively and constructively despite seemingly impossible differences.

- Treating emotion as intelligence or trait and not addressing the allostatic regulation (embodied) part of emotion can result in sub-optimal solutions.
- Cultural diversity in facial expressions needs to be taken into account when emerging technologies that aspire to decode and react to human emotions, such as emotion recognition software, are being designed to recognise when people are, for example, lying or contemplating violent behaviour.

3.2.3 Implications for individual practitioners

- Practitioners need to become aware of their assumptions about emotional theories (are you aligned with the classical view of emotion or the construction view to emotions) as well as the consequences of measurement choices.
- Be cautious about using conclusive language to identify emotions such as "fingerprints," "signatures," or "biomarkers" of emotions OR rater contextualise your language within the theory or model that you support.
- Social Cognitive Science shows that we tend to read emotions and intentions in others based on whether we see them as part of our in-group or an outgroup (Mitchell et al., 2006). By favourably viewing ourselves, we tend to be more effective at recognising other facial expressions when they are similar to us. However, when others are seen as dissimilar, we often use unconscious biases to make sense of their expressions and interpersonal dynamics and then make false assumptions that their thoughts, feelings, and intentions are different to us.
- In situations of everyday life, be cautious about making generalised inferences about emotional meaning, solely based on facial movements and expressions. Consider the state of meta-analysis research on emotions and that the classical view of the universality of emotions is currently being contested. Instead, we need to recognise that emotional reactions and interpretations of facial movements and expressions can vary from culture to culture and from situation to situation.
- Cultural stereotypes are a first base of understanding others, but over time as we learn what facial movements mean in certain situations for that person – we can make better guesses. Thus knowing when and how to intervene, to adapt one's behaviours and communication styles, or engage the support and help of others, are all skills that must be brought into play.
- Consider that the human brain uses predictive processing to ensure allostasis (manage the body's energy needs) to create cognition, emotion, affective feelings, perception, and action. This understanding will not only lead to enhanced models of individual behaviour across contexts but will also lead to better training and development solutions.

To conclude: Both Theories of Emotion (Classical and Constructed) offer unique perspectives from which to examine human behaviour at work. The latest scientific evidence seems to show that the human brain is not a battleground between emotion and rationality. Emotions don't live in one part and rationality in another part. Instead, emotions are complex constructions of the whole brain. A brain is a meaning-making machine that makes predictions based on experience and what is happening right now. The literature review set

out in this part of the paper indicates that further research is required to how facial movements are used to express emotions and convey other social information in various contexts. Practitioners are encouraged to develop new research hypotheses to understand the nature of emotion.

3.3 Our brain is like a computer

The world of work is changing at a rapid rate, and humans are under pressure to keep up (World Economic Forum, 2020). Every year the intersection between humans and machines becomes more blurred (Deloitte Human Capital Trends, 2020), and the search to how best to use the computers we work with and the computer in our heads increases (Catagnus, Simpson, Grant & Rock, 2020). With increased work demands, more is asked of employees in terms of working hours, information processing, and cognitive capacity (Carmichael, 2015; Hallowell, 2005; Perlow & Porter, 2009). This is exacerbated by the use of always-on technology and the amount of information that needs to be processed by employees in the workplace each day. In South Africa, this has resulted in our working hours being amongst some of the highest in the world (Roser, 2020). With more data produced every day and wider access to it, it is no wonder that humans are now more distracted (Alexander et al., 2016; Eppler & Mengis, 2004) than possibly at any other time in human history.

Although it is not an explicit myth that we treat our brains like boundless computers, it is clear that our organisational practices seem to do so (Carmichael, 2015; Hallowell, 2005; Perlow & Porter, 2009; Waytz & Mason, 2013; Weller, 2020). Although brains have long since been compared to the technology of the day in the 17th and 19th centuries (Weller, 2020), the link between brains and computers is possibly best summarised in the present day by Barnard Psychologist Lisa Son. She highlighted that "technology has encouraged us to do everything faster. So when a process takes longer – like when we are grappling with a new concept – we assume something must be wrong" (Weller: pp 2, 2020). These levels of biological constraint and possible frustration might even be correlated with the higher rate of burnout seen in the workplace in recent years (Morris, 2019). To process or learn new information with the computer between the ears, we cannot simply upload new information as easily as we would with a regular computer. We cannot work longer hours to try to do so in the same way that we may install more RAM in our computers to increase the capacity. With the rapidly increasing demands of the workplace, we need to start treating our brains differently if we are to succeed in the new world of work.

3.3.1 What logic and evidence suggest that this is a misleading assumption?

To better process the information that we are bombarded with each day we need to pay attention to the limits of the human brain. Studies have long since shown that the human attention span is limited at most to 20 minutes at a time (Hartley & Davies, 1986). Two parts of the brain play out when we focus our attention. The dorsal attention network focusses our attention on our current intention or goal while the ventral attention network allows other stimuli to enter our attention (Corbetta et al., 2008). This is a naturally occurring function of the brain that has enabled us to continuously monitor threats in our wider environment while simultaneously maintaining focus on the task at hand. This interplay between the two brain

regions also allows each region to rest and refresh. Although we have fewer lions to worry about while we forage for berries in the modern workplace the interplay of these brain networks interferes with optimal attention when we need it most.

Different executive functions of the brain are used when we are balancing the interplay of these two systems. These executive functions can tire easily (Lieberman, 2009) and for optimum use of attention, we need to refresh our attention span every 20 minutes (Davis et al., 2014). Despite some individuals feel confident to multi-task, studies have shown that, although this can feel rewarding, our best learning is achieved with limited focus and breaks to replenish (Davis et al, 2014).

In a journal article, featuring one of the first integrative models to optimise learning with an understanding of the brain, Davis et al. (2014) outlines other functions of the brain that are worth understanding if we are changing the way we engage with our brains in the new world of work.

The AGES model (Davis et al., 2014) helps us understand four components of brain functioning to help practitioners in the new world of work – Attention, Generation, Emotion, Spacing. Attention, mentioned above, is the first part of the model which relates to the limited attention of the brain and the need to create novel ways to engage focus if information retention and learning are to be optimised. Generation is the second part and is the "act of creating (and sharing) your connections to new or presented ideas" (Davis et al, pp 5, 2014). Traditionally the focus in the modern workplace has often been on the information that we process, and not on how we process it (Catagnus et al., 2020). Often companies focus on ways to gamify or make information easier to download – where we should also be focussing on how the human brain processes or generates new thinking with this information. This component emphasises the need to take time and effort to connect new information to existing information to improve retention and processing. One of the first studies to do so displayed this technique to be significantly related to benefits in memory retention (Kornell et al, 2009) and its findings have been replicated and explored since (Grimaldi & Karpicke, 2012; Hays et al., 2012; Huesler & Metcalf, 2012; Knight et al., 2012).

The E in the models denotes the importance of Emotions in learning and processing information. Although some business practices believe a strong emotion may be the best in creating action in individuals, emotions have a more complex effect on the learning and processing of information (Davachi et al., 2010). Positive emotions are generally more useful than negative emotions and a measured amount of emotions is best to optimise learning (Davis et al, 2014). Too much and too little emotion prevent our brains from optimising the processing of new information in the same way that too little fuel and too much fuel in a tank may cause mechanical failure. Emotions create a state of arousal in the brain that activates the hippocampus – the part of the brain that reactivates neural circuits until a new memory is embedded. Emotions help activate this process but can also derail it if too much emotional arousal occurs.

The last part of the model reminds us of spacing or allowing our brains space to process information and is probably the most counter-intuitive in our present context. As referenced

earlier, we are increasingly expected to do more in less time in the new world of work (Waytz & Mason, 2013). This often results in individuals cramming to complete tasks (McCabe, 2011) and often feeling confident in doing so (Kornell, 2009). This is exacerbated by education and exam systems that reward this kind of short-term memory performance in exams and tests. Studies have shown that if our brains are to recall and integrate information in the long term we need to create spacing between learning overtime to do this effectively (Davis et al, 2014). As learning in the workplace is less congruent with the kind of learning needed for short term recall this brain-based approach may be more useful in the world of work. In particular, sleep is needed in-between learning as "sleep not only helps to strengthen memories but also to actively forget irrelevant information, thus optimising memory for what is relevant" (Davis et al, pp 9, 2014).

3.3.2 What are the ethical dangers of preserving this false belief?

But maintaining the status quo, and without a better understanding of the brain, we may be putting individuals and businesses at risk. When our brains are put under pressure to process information and we experience a high cognitive load, judgement, and performance decline rapidly (Eppler & Mengis, 2004). Ineffective processing of information can lead to high, and possibly preventable, cognitive loads that cause exhaustion and make it harder to self-regulate, make decisions, communicate with others, recognise others' emotions, interpret social cues and be inclusive (Carmichael, 2015; Park et al., 2016; Yudkin et al., 2016).

The increasing demands of the workplace can push employees beyond their brains' capacities to process information and lead to increased feelings of stress and anxiety. Employees can be prone to experience information overload and suffer negative consequences that affect their health and performance (Oldroyd & Morris, 2012; Roda & Nabeth, 2008). As new information emerges around the limits of the human brain IOPs have a responsibility to advance the status quo in a way that takes into consideration these limits, to optimise individual and organisational capacity.

3.3.3 Organisational Implications

Organisations can provide systemic changes that are in line with how the brain best processes information. Organisations can attempt to recognise limited attention but limiting the number of distractions and drains on attention that an organisation can create for their employees. Learning and information sharing can also be done in ways that allow for breaks in attention and allow new and novel ways to engage roughly every 20 minutes. Emotions can also be created in a way that optimise learning. Strong negative emotions can be limited by creating psychologically safe spaces for employees in learning spaces and environments where optimal processing is necessary. Psychological safety can buffer against strong emotions that can derail learning, but useful levels of emotions should also be used. Aligning initiatives to culture and purpose that are emotionally arousing are useful ways that this may be achieved. To create generation opportunities organisations should allow time for employees to deliberately process and integrate new information into existing thinking. This can be done with practices such as mindfulness and allowing for spaces for open questions or sharing to happen. Spacing should be provided by chunking learning initiatives from a few

long events into many shorter events as a means to encourage sleep and integration during the processing of new information.

3.3.4 Implications for individual practitioners

From an individual perspective, one can use an understating of the brain to best optimise how one processes and learns new information. One should limit all distractions when processing new information and be careful to take breaks and not attempt to focus for extended periods. One can also try to make use of different learning platforms or modalities for the same topic to create novelty and refocus attention. To create emotional arousal in learning or processing of information, one can practice by teaching the information to someone else or simply reciting interesting points to a family member or friend. This creates a level of emotional arousal in the brain that can optimise memory retention and integration into the longer term. To encourage further integration through generation, one should incorporate deliberate thinking to consider and reflect on existing understanding. This can be encouraged through individual mindful practice and social discussion. Spacing can be used by individuals to try and break down new information into smaller chunks, repeated and revisited over time.

As we continue to navigate the new world of work perhaps our focus should be less on the technology that has become the lifeblood of the modern office - the personal and laptop computers we use every day. Perhaps the focus should be on the computer between the ears that we use every day, a piece of technology we are still discovering more about.

3.4 NLP is a neuro-scientific methodology to change human behaviour patterns

An exhaustive overview of the foundations of neuro-linguistic programming (NLP) is past the scope of this section. However, an overview of the two basic tenets of NLP, as summarised by Passmore and Rowson (2019), might serve as a useful point of departure. In referencing Bandler and Grinder (1975), Passmore and Rowson (2019) indicate that the first foundation of NLP is the hypothesis that 'the Map is not the territory'. In this respect, individuals representation of the world may be distorted by past experiences (Bandler & Grinder, 1975). The distorted representations of the world are put together through a dominant use of one of five senses, namely visual, kinaesthetic, auditory, olfactory, and gustatory experiences (Bandler & Grinder, 1975). It is the professional's task to take clients along a journey to explore their representations of the world to expand awareness and hopefully produce more productive beliefs. A second claim made by Bandler and Grinder (1975) is that, by observing eye movements, cues can be obtained that illuminate the primary senses used to formulate representations of the world (Passmore & Rowson, 2019).

In the clinical setting, NLP has been lauded for decreasing depression, anxiety, and stress (Simpson & Dryden, 2011). Post-traumatic stress disorder is also purported to reduce through the use of a related technique called visual-kinaesthetic dissociation (Gray et al., 2019). In the organisational setting, NLP is purported to improve work engagement, motivation, and job performance (Abrams, 2004).

3.4.1 What logic and evidence suggests that this is a misleading assumption

Bandler and Grinder (1975) foundational ideas were derived from different therapeutic approaches. Even though their pursuit of an eclectic therapy that addresses the central tenets of different therapies was noble, Bandler and Grinder rushed to publish their ideas rather than programmatically build a scientific foundation for their claims. Witkowski (2010) postulates that the reason for this might be that Bandler was overly critical of 'traditional scientific methods' at the time. Similar to the lifecycle of myths, the premature popularisation of the ideas without sound evidence backing it might have become a hurdle for the responsible use of the theory. In this respect, the findings of a few experimental studies and meta-analytical reviews that contest the claims of NLP are outlined below.

1. A meta-analytical review conducted by Sturt et al. (2012) revealed that there was not enough evidence to support the use of NLP for individual health outcomes.
2. A meta-analytic review conducted by Witkowski (2010) indicated that the psychological effects of NLP is equivalent to a placebo effect and should be regarded as spurious at best. No evidence was found that supported the dominant use of different representational systems, and limited replications have been performed to equivocal support the purported inferences that can be derived from eye movements. Witkowski (2010) also indicated that the NLP database is very limited in that many of the articles included only cited keywords related to NLP but did not experimentally test the claims made by NLP.
3. Even though some support was found for NLP in the educational setting through a meta-analytical review (Carey et al., 2010), the authors warned that the quality of the research reviewed was lacking and, therefore, the findings should not be interpreted as support for NLP.
4. A meta-analytical review conducted by Kotera et al. (2019) challenges the methodological rigour used by existing studies in support of the claims of NLP.
5. In an experiment conducted by Wiseman et al. (2012), the claim by NLP that lies can be detected from eye movements was experimentally tested. No significant effects were found, and the authors concluded that there is lacking support for the claim that reliable inferences can be made from eye movements.
6. Sharpley (1987) reviewed the use of NLP in the counselling domain. In a set of 15 studies, Sharpley (1987) concluded there was little support for the use of NLP in therapy. Sharpley (1987) commends the integration of various existing therapeutic approaches to derive a framework such as NLP but indicates that NLP does not offer much in addition to existing therapeutic frameworks.

3.4.2 What are the ethical dangers of preserving this false belief?

A question raised by Witkowski (2010, p. 64) most eloquently addresses the problems associated with the use of NLP, namely: 'Is using and selling something non-existent and ineffective ethical?' It is estimated that over 100 000 individuals have attended NLP training courses in the UK alone (Kotera et al., 2019). The widespread adoption of a theoretical framework for its popularity among practitioners, rather than its scientific rigour, could have several dangers. Firstly, if it has no real positive change for clients, then several practitioners have incurred costs for training on something that does not work (Kotera et al., 2019).

Secondly, the failure to produce data that support the theory could relegate it to a body of knowledge that has been discredited and inconsistent with neuroscience theory (Sharpley, 1987). Grant (2019) further indicates that, given eight years of university-level training, he found the omission of any discussion regarding ethical or moral issues with regards to the use of NLP to diagnose and treat mental disorders disturbing. On the contrary, it seems that CBT has a much stronger evidence base than NLP (Hofmann et al., 2012).

3.4.3 What should a practitioner do given their knowledge of this myth?

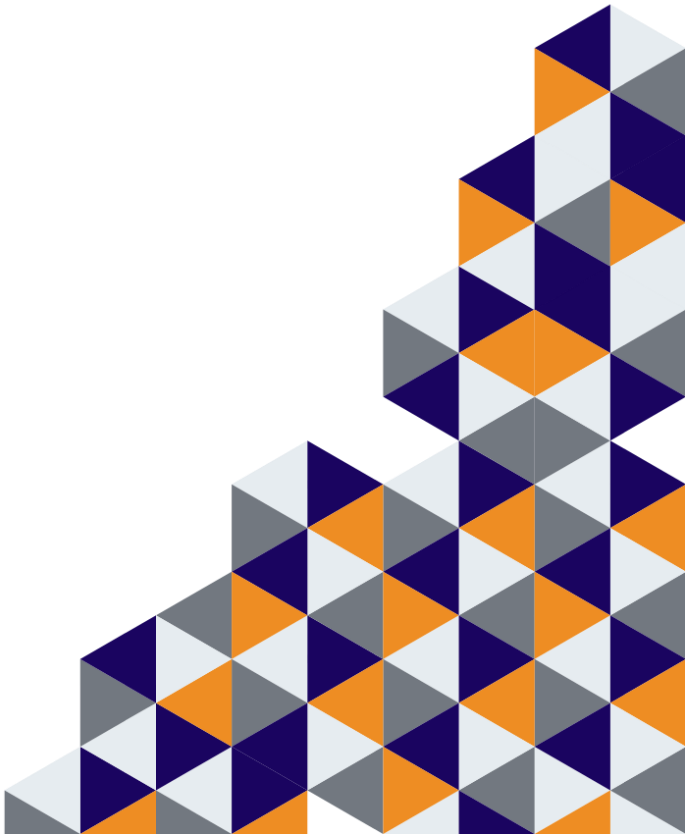
Grant (2019), after reflecting on the personal tensions experienced with NLP, caution practitioners to remain firmly grounded in an evidence-based approach. In this respect, Grant (2019) also emphasises the importance of practising critical thinking and open-mindedness to be vigilant against "guruism". Practitioners interested in NLP are encouraged to critically review the evidence in support of NLP to make an informed decision about the use of its principles in practice. The onus falls on the practitioner to ensure that a reasonable degree of professional accountability was taken to assist clients. Grimley (2019) further indicates that NLP should spend more time on clearly defining the constructs on which it is based and provide a more standardised certified training route to prevent the field from further sinking into a theoretical morass. At this stage, it might be more reasonable to opt for a cognitive-behavioural based approach (Hofmann et al., 2012).

CONCLUDING REMARKS

The interest of organisational psychologists in using neuroscience-based approaches to organisational development is escalating. The number of providers of brain-based training and development has also grown significantly in recent years and raises the question of legitimisation and validation. As prof Rodney Lowman (2002) rightly put it; an organisational consultant often does not have adequate data to determine unequivocally which solution is likely to work best: "In the context of human systems and their complex, highly interactive nature, many different paths can lead to the same result" (p. 90). Neuroscience is one such path that is increasingly being claimed as adding scientific rigour to psychology.

Neuroscientists, IOPs, and brain-based organisational consultants are being challenged to translate key research findings into robust organisational development solutions. However, before such translations can happen, new approaches or frameworks must be validated through evidenced-based empirical studies.

This review is a small contribution to evidenced-based research to debunk neuro-misconceptions and neuro-myths relating to human behaviour. We believe this review has provided encouraging proof that organisational neuroscience is an emerging research discipline, and as such, is prone to anecdotal evidence to explain complex behavioural constructs. We hope that industrial and organisational psychologists will incorporate this information into their knowledge systems and workplace applications to further raise the neurosciences' visibility, legitimacy, and validity as an important complementary and relevant lens to understand human behaviour at work.



THE MYTH BUSTERS' ARMOUR: A REFERENCE LIST

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ADDENDUM A

Use the statements in Table 1 to reflect on your community of professionals' adoption of an evidence-based approach to practice.

Table 1
Key characteristics of evidence-based practice in industrial psychology

1.	Do your community of practitioners know what is meant by evidence-based practice?
2.	Do your community of practitioners access the latest research findings and summaries?
3.	Do your community of practitioners' continuously review primary and traditional literature?
4.	Are fashionably new ideas treated by your community of practitioners with healthy scepticism?
5.	Is there a demand from your clients and customers for evidence-based practices?
6.	Are decisions made by professionals in your community based on the four sources of information, namely practitioner expertise and judgement, critical evaluation of best available research evidence, evidence from the local context, and perspectives of those who may be affected by decisions made?
7.	Does your professional community embrace an evidence-based approach in training and continuing professional development (CPD) exercises?

Obtained from "Evidence-based I–O psychology: Not there yet" by R. B. Briner and N. M. Rousseau (2011), *Industrial and Organisational Psychology,* 4, p. 9.