Manuscript for The Diversity Charta – "Dossier Unconscious Bias"

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The Brain, Decision Making and the Unconscious

Introduction

That unconscious bias exists is clear amongst researchers and many practitioners alike. Various forms of how the brain operates unconsciously have been around for more than a century. Neuroscience has given us a clear insight into how unconscious bias manifests and the neural mechanisms that control it. We can see that brains develop patterns and that emotions will always guide thought processes – these out of necessity for efficient brain functioning, lie below our level of consciousness. The message is clear when fighting unconscious bias we are not fighting a "psychological" phenomena we are fighting hard-wired biological mechanisms. When it comes to leadership this is important to realise because this will affect decisions day in and day out – we also draw attention to the basic human needs which form the strongest unconscious pull on human beings in any context.

The Brain

The brain is a collection of around 85 billion brains cells, neurons, each with at least a thousand connections, synapses, creating a huge interconnected network of regions and areas controlling all of human thought and cognition. This has drawn our fascination in recent decades as the research has thrown more and more light onto the structures and processes that take place in this 1.3 kg lump of matter packed in our skulls.

But the brain is hugely complex and that it baffles many researchers is not in doubt. For that reason a brain research project drew the largest ever scientific grant last year of over €1b for the Human Brain Project in Switzerland which is aiming to build up a virtual model of the brain from the single neuron level upwards – an ambitious project indeed. But something the grant givers thought was worth financing - so large is the desire to shed light onto what some consider one of the final frontiers of science.

Here we will introduce you to the brain in two steps firstly of the triune model of the brain which is useful if not over simplistic description and secondly by thinking in terms of regions.

The triune model of the brain was proposed by the illustrious brain researcher Paul D. Maclean. He developed the theory over many years but formally published it in book form in 1990 (MacLean 1990). Maclean proposed a model of the brain drawing on evolution and comparative neuroanatomical research and proposed three meta regions with seductive names that have since become popularised:

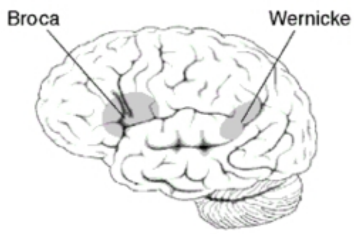
1. The Reptilian Brain: the brain stem where our instinctive reactions to the world around us sit. Present in all animals and the most primitive of brains.

2. The paleomammalian brain: also known as the limbic system (a term which Maclean coined) and is involved in the emotional and motivational components of behaviour. The more advanced the life form the more pronounced is this area.

3. The neomamallian brain: also the neo cortex that outer layer of brains found in only the highest mammals. This is considered the seat of higher functioning and reason.

This serves as a model to clarify our representation of the brain. When spoken about in many contexts many observers talk of the influence of the reptilian brain and the limbic system. It is important to note, however, that all three of these systems operate together to make decisions and drive the organism. Decision making in the brain is driven from the bottom upwards i.e. all sensory stimulus (our connection to the outside world) is directed straight to the thalamus in the brain stem which then connects to the limbic system and higher functional areas. This is, of course in sharp contrast to Cartesian thinking whereby we assume the higher functional and logical centres control our thought.

The second way to think of the brain is by its regions - by this we also mean structures. For example we can see that there are clear distinct structures in the inner of the brain. Some that are well known are the *hippocampus* which is implicated in memory consolidation and the *amygdale* strongly associated with fear. In the outer cortex we can see that certain regions process certain functions. This knowledge dates back to a French doctor and German doctor in the 1800s, Broca and Wernicke. Both had patients who had lost part of their linguistic faculties. In the case of Broca's patient it was speech production and in Wernicke's patient it was in language comprehension . On autopsy of their patients after they had died brain lesions were found in specific regions which led to the localisation theory of brain function in the case of speech



production in the inferior frontal gyros and in the case of comprehension the superior temporal gyrus. Brodmann in the early 1900s gave us a map of the outer cortex of the brain and his regions are still used decriptively today (Loukas et al. 2011).

This localisation has led to descriptions of the brain and regions classifying certain areas as, for example, "the language centre", "the memory centre", "the fear centre", etc. This is unrealistic as most brain areas are involved in multiple functions and many human behaviours are complex - that of speech production we mentioned above being just so. It includes multiple brain regions from syntax, vocabulary, intonation, and bodily movement.

What we must also stress here is that the brain is very interconnected and operates at a system level. The analogies to a computer are unrealistic as the brain is biological and ever-changing and many regions have multiple roles. Crucial for us to understand here is that the brain grows, based on our experiences, and that the brain is plastic and ever changing. For those that are unfamiliar with the brain this may seem surprising. Concretely a stimulus in a neuron if strong enough or repeated enough will stimulate excess chemicals which in turn will stimulate growth of more synapses, connections between brain cells (Bower 1990). Hence stimulation in the brain, and particularly emotional stimulation stimulates growth in various regions (this growth is minute not to compare with our muscles growing or shrinking). One of the first to point this out was Hebb who gave us perhaps the most famous neuroscientific quote of all time: "What fires together wires together" (Hebb 1949).

The final point to note is that the brain strives for efficiency, energy after all is limited resource, and hence the brain preferentially draws on predefined and learnt processes to operate. We in reality rarely use our cognitive capacity because it is so effortful. Consider this exercise: first try counting upwards in steps of 2 (2,4,6,8, etc.). You will find this easy and you can keep a quick rhythm. Now try counting upwards in steps of 13. When you try this you will find that you can do it but you will start to slow down after 39 (many of you will not even have started because it already *feels difficult* to do). Now try counting backwards from 267 in steps of 18. You will likely not even start the process because of the perceived difficulty - your brain is already resisting the cognitive stress and if you do start you will have to use cognitive resources to do this. At the same time your pupils will likely have dilated slightly and your heart beat also increased not to mention a certain narrowing of your field of vision (for those of you who can do this rest assured on the scale of cognitive processing this is but a simple task).

This efficiency also lies on the ability of the brain to build associations – the brain is a great pattern detector and also a great pattern former. If I say the word "Switzerland" I will automatically think of certain associations. These may be clichés such as chocolate and mountains and cows. They could also be my personal associations of the region I spent my holidays in my childhood. This is true of any word. Daniel Kahneman (whose work we will look at in a few paragraphs) uses the example of "apple" and "vomit" each stimulates a slightly different set of images and associations which give a different feeling. These are in other contexts known as somatic markers first proposed by Antonio Damassio who with his book Déscartes' Error in the 1970s (Kahneman 2011) helped break the myth of the rational mind and highlighted how emotions are involved in decisions but are anchored in associations and hence anchor these situations emotionally. This is absolutely core to the context of unconscious bias and diversity. We have a set of associations that are built up and stimulate an automatic emotional response.

To summarise the brain is an interconnected set of regions that works bottom up, is forever changing and works using unconscious, predefined processes with as little effort as possible. This is the core of unconscious bias in the brain – more sceptically we could say that unconscious bias is a core feature of the brain!

Decision Making

We like to think of the human brain as a higher-functioning massive network of neurons operating at a level far more advanced than any animal. And that may hold true. It is also true that the vast majority of neurons in the brain deal with living functions, bodily movement and sensory processing. It is also important to understand that the brain is, as mentioned above, an interconnected network.

That our brains have evolved to ensure our survival is not so controversial. We obviously aim to protect our lives and develop strategies to live and live more comfortably. This is an important realisation because it gives the direction and colour of all of human thought and decision making. This is also what defines our rationality – our rationality is human rationality. Obviously.

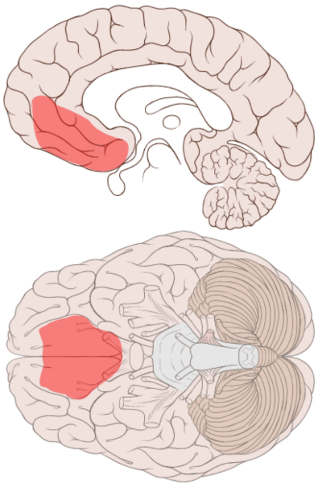
How does the brain make a decision? First to note is that most of the brain's decisions are instinctive or associative. Daniel Kahneman, who won the Nobel Prize in Economics for his work into decision making in economic situations (Kahneman & Tversky 1979), describes the brain as two systems: System 1 and System 2 (Kahneman 2011). System 1 is the automatic instinctive and high-speed decision-making circuit. System 2 is the slow and effortful system – the one that was active if you tried to count backwards from 267 in steps of 18 in the previous example. That is how System 2 feels like – slow and effortful. It goes without saying that we do not activate System 2 very often. Our average thought process is a System 1 response – this has been refined, of course, by our learning – which we all know has at times been slow and effortful. Consider a tennis player: each time a tennis player hits the ball they do not do a series of slow and effortful calculations of the type of ball, velocity, height of ball flight, curve trajectory, likely to bounce at coordinates X + Y, influenced by it's top spin, etc. The tennis player sees the ball approaching and in a fraction of a second responds with their body to return the shot. In that fraction of second a whole network is activated that has been refined through learning and practice. It is not a System 2 process. And so it is with our everyday actions. We give little conscious effort to our actions and decisions.

However, we do know that the brain brings decisions to the consciousness we do say "I have decided to" but what do we mean with this and what is happening in the brain?

What we normally mean is my feeling tells me this. What is clear is that there is not enough time for most decisions to be carefully balanced. However, balanced is what they are – but in a different way than what we consider in our intellectual arrogance. To understand this we need to look to the prefrontal cortex which is considered our executive centre – it is this part of the brain which is so different to other animals. Human beings have a huge prefrontal cortex.

The prefrontal cortex consists of many regions that have specific functions such as short-term memory (Miller & Cohen 2001). But the part of the brain that is most implicated in decision making is an area called the orbito frontal cortex (Morgane et al. 2005). This area sits over the eyes and is connected to the emotional centres in the centre of the brain and to the more rational centres and processing centres at the front of the brain.

The orbito frontal cortex or more specifically the ventromedial prefrontal cortex can be considered a balancing centre (Bechara 2000; Paulus & Frank 2003; Clark et al. 2008; Zald et al. 2002). It receives input from the reward centre of the brain; the amygdale (processing fear, threat and emotional salience) (Sokol-Hessner et al. 2012; Gupta et al. 2010; Urry et al. 2006; Bechara et al. 2003), the anterior cingulate cortex (processing conflict) and the hippocampus (memory consolidation and retrieval). This information is then balanced and then if the balance is positive it will send the information further to generate action. We can therefore see that changing any one of those parameters will affect the decision one way or another. Change short-term memory e.g. something relevant and recent such as a high profile plane crash will influence our decision to fly a plane (or at least our feelings of flying). Change long-term memory i.e. experiences, change emotions or change conflict and a different decision may emerge. But importantly this is processed not as a sequential balancing but rather such as mixing everything in a pot and the colour of the "soup" will give our direction of thought and decision. Another way to think of it is like an accountant balancing figures: too many negative figures and we have a negative answer (this is not actually rational because emotional salience plays a large role – as we will see shortly). Decision-making is therefore not a rational process but rather a balancing of emotions, memory and habit in the brain. This is processed almost completely below our level of consciousness – as when a tennis player hits a ball. This is where unconscious bias is processed - we will not notice that a whole list of emotions, habits, associations are formed and instantaneously processed giving us answers for or against a person, a gender, and a race.



Emotional Decision Making

When we consider emotions we often think of being emotional. We think of those wide varying range of emotions from happiness, to lust, to sadness to elation. Yet emotion in the brain is much more subtle than that. The majority of chemicals in the brain involved in transmission of any sort are also involved in emotions. As Douglas Watt said "Emotion binds together virtually every type of information the brain can encode…[it is] part of the glue that holds the whole system together…" (Watt 1999).

For example, it has transpired that elation and reward is linked to the neuromodulator dopamine first discovered in 1954 by Olds and Mills (Olds & Milner 1954). Dopamine is directly stimulated, for example, by cocaine. Yet further research shows it is not this easy: dopamine is more than anything a motivation molecule a molecule defining the *wanting* and not necessarily the *liking* (dopamine is also associated with attention and many ADHD drugs target the dopamine system) (Angier 2009; Wise 2004; Nieoullon & Coquerel 2003). So it is with other transmitters in the brain: serotonin implicated with mood, aggression and general well-being is also a key molecule in learning and information transmission (Duman & Canli 2010). It also becomes clear that thinking of emotions and rationality from the view point of the brain is difficult – emotions are implicated in just about every brain process there is particularly conscious brain processes. What we normally mean when we speak of emotional decision making is high emotions.

Consider also the model we have proposed in our book *Neuroleadership* (Ghadiri et al. 2012) of SCOAP the five basic human needs. Drawing on the work in neuropsychotherapy and particularly Klaus Grawe (Grawe 2007) we can see that five basic human needs drive mental well-being and performance: S=Self-esteem (feeling valued); C=Control (having freedom, autonomy and influence); O=Orientation (understanding the world and what we have to do); A=Attachment (relationships with others); P=Pleasure (pleasure and satisfaction). We all aim to fulfil these basic human needs i.e. feel little bit more valued, have more freedom and control, understand the world a bit better, have better relationships, and have more pleasure in life. We also know that these stimulate reward centres if fulfilled and cause negative emotions if violated. This in extreme cases can also lead to impaired neuronal development (particularly in children) (Shonkoff & Garner 2011; Iglesias & Villa 2006; Zhang et al. 2002). Our work in business and leadership contexts shows how these are represented in business systems and how leaders will guide their decisions. These are unconsciously driven.

Work on so called hot and cold reasoning also highlights the specific brain regions that activate in decision making that involve emotions (hot reasoning) or less emotions (cold reasoning) (Read et al. 2007; Goel & Dolan 2003). Hot reasoning is when emotional constructs are involved and cold reasoning is with absence of emotional constructs. What we can see in experiments is that the cold centres, the more reasoning centres of the brain are further at the front and higher up in the prefrontal cortex namely in an area called the dorsolateral prefrontal cortex (DLPFC). Those more emotional constructs, "hot" reasoning, are processed more in the ventromedial prefrontal cortex while at the same time the DLPFC is suppressed. Ziva Kunda has done extensive work on this (Kunda 1990). Consider whether the following sentences are true or false:

1. *Some rock stars are guitarists*
2. *Some doctors are rapists*

We can see that the responses activate different circuits. The first is more neutral and we respond quicker with more certainty and activate different brain areas. The second sentence activates more emotionally because of its emotional salience the positive words of doctor with the particularly negative word rapist.

Hence emotions are inherent in decision making, operate uncsocniously and emotional salience affects how it is processed in the brain.

Measuring Unconscious Bias

That these emotional processes are unconscious should be clear by now. In *Neuroleadership* we also talk about consistency: that is the brain tries to create a consistent view of the world, primarily through our basic human needs (SCOAP) and through tying our conscious and unconscious processes together. We will come back to this shortly. But more interesting is what is actually happening in the brain when it comes to unconscious bias and can we actually measure it?

We mentioned hot and cold reasoning above end the difference in brain activation and the work of Drew Westen is also relevant for us. Drew Westen in his book *The Political Brain* (Westen 2007) illustrates his work on decisions and opinions in political partisans – those who are for or against a particular political party (Democrat and Republican in the USA). The results replicate the results in hot and cold decision: when deciding for their own political candidates the more emotionally linked part of the prefrontal cortex was active in comparison to deciding on opposing candidates. Drew Westen notes that when emotions collide with reason emotion invariably wins. These are not conscious processes - the partisans genuinely believed their opinions to be better and more reasonable and supported by evidence (it wasn't).

The mother of unconscious bias testing is, however, the Implicit Association Test orignally developed at Harvard University (Greenwald et al. 2009; Greenwald et al. 1998) and now run independantly under the name of Project Implicit. The test measures how quickly we respond to a stimuli. The theory states that if you have strong association of, for example, *men* and professional careers you will respond much quicker to the association than, for example, when given an association with *women* and professional careers. The IAT has given us a vast quantity of data on different associations and from gender, to political to race to other, sometimes more light hearted, such as film stars and marijuana. The results are dramatic and show just how biased we as average people are and how different groups of people have different biases – for example we prefer members of our own race.

Most people explicitly say they are not prejudiced against women but the IAT shows just how strong that implicit prejudice is. …showed that the difference between explicit and implicit bias is sometimes large.

What is happening in the brain in these cases of implicit associations? Indeed the research of Stanley et al. (Stanley et al. 2008) showed an interesting pattern in the brain: the amygdale activates stronger to pictures of faces from a different race (black and white in this particular study). The amygdale is considered crucial in processing fear and threat (but it is also involved in many emotional constructs and can better be considered a centre for processing emotional salience). That the amygdale activates more strongly to racially different faces is interesting but we can see an even more interesting pattern when this is presented subliminally because this activates the amygdale even stronger than when presented consciously. In addition when presented consciously the dorsolateral prefrontal cortex is also active with lower activation of the amygdale suggestin gthat this region is helping to regulate the amygale You will remember that the dorsolateral prefrontal cortex previously menitoend is considered a "cold" rational centre of the brain. It therefore seems that consciously we try to moderate the instantaneous unconscious reaction of the brain.

We do know that the prefrontal cortex has a two-way connection to emotional centres so, thankfully we do know that we can regulate to a certain extent our unconscious bias…but only to a certain extent.

More recent research has shown just how deeply embedded this bias is – work at the child lab of Yale has shown in-group bias in children as young as 3-months old (Mahajan & Wynn 2012; Hamlin et al. 2013). This in-group bias can be something as random as preferring someone (in this experiment it was preferring a cuddly toy) that likes the same type of food as we do – this may not be surprising, what is surprising, however, was that there also seemed to be forgiveness for transgression for the in-group teddy and enjoyment for punishment for those in the out-group!

This suggests that unconscious bias is deeply ingrained and "hard-wired".

The Brain Believes Itself

This may have shed more light onto the unconscious processes in the brain and therefore we may believe that if we know this we may be able to counteract it. Apart from the difficult point that what is unconscious is unconscious and hence hard to explain (only in terms of the IAT can we get some insights into these processes). As we saw above even subliminally presented faces can generate stronger reactions even though we are not even conscious of having seen them let alone in the context of our bias. Our justifications are hence also suitably off the mark – we tend to rationalise these biases and often come up with very good reasonable explanations as to why they exist. We noted above that the brain strives for consistency between its actions and its perceptions hence the brain aims to justify how it has decided.

The first work done on rationalisation was the famous rope experiment by Norman F. Maier in 1931 (Maier 1931). 61 people were asked to solve a problem of tying two ropes together in a small room by using various tools (the ropes were too short to be tied together without any help). The first two solutions to this problem were obvious and easy (use an extension rope and tie the rope to a chair). The third solution was less obvious and all candidates failed to immediately find the solution. The researcher in the room then gave a subtle unconscious hint by gently rubbing against one of the ropes and setting it swinging (which was designed to stimulate the person into finding the last answer to this particular problem of using a weight to make the rope into a pendulum). After the subtle hint was given, on average, 45 seconds later, the candidates came up with the solution. But how did these people explain their answers given that we know it was stimulated by subtle hint?

Of the 61 who took the experiment only one gave the correct answer and the others gave sometimes fantastical explanations as to how they had come to the answer – some of these were highly educated people. A professor, for example, proudly told how he had imagined sitting on a swing as a child. 60 people hence gave perfectly reasonable reason as to how they had come to a solution and only one gave the correct reason.

There has since been much work into, so-called, motivated reasoning. Richard Nisbett's classic paper in 1977 "Telling More Than We Can Know: Verbal Reports on Mental Processes" (Nisbett & Wilson 1977) gives an extensive explanation how wrong we are when reporting on our own mental processes. Ziva Kunda who we mentioned in Hot and Cold reasoning has done extensive research here also (as have many others).

What this shows is that the brain believes itself and will find perfectly reasonable and rational reasons to support unconscious stimuli and bias.

Hence we all view the world through our biased eyes and we are all very good at rationalising and justifying our unconscious biases - we do not like to think we are biased. We are – we must be for our brain builds associations based on experience and this experience will be emotionally anchored and draw our attention again and again creating a viscous circle of self justifying unconscious beliefs. On a final (worrying) note we may assume that education can help break through this bias – that it is so we would all hope. However Nisbett showed in in one experiemnt 1977 knowing of a bias does not necessarily help against it. Moreover a more recent study has shown that the more educated the person is that not that there is less conscious bias but that their reasoning and explanation of their decision are more refined and eloquent and if anything there is more pronounced cognitive bias (West et al. 2012)…and less likely to change their opinions.

Impact on leadership

This bias of the mind will affect every manager and business leader in whatever position and level of seniority. Ironically as we mentioned have just mentioned senior leaders may be even less likely to be aware of their bias and the faults in their reasoning.

These unconscious biases are biological pathways that are deeply anchored in the brain. These are built up through our socialisation process: our interactions with the world around us. In short: our life and experiences. Once we have built a bias we often get drawn back to it and it becomes reinforced (the "Confirming Evidence Trap"). This means we have instinctive unconscious biases built in and they will directly impact our view of diversity – or rather they will draw us along certain pathways. We have more male role models of male leaders and hence will unconsciously be drawn to male leaders and not female: we have a preference for our own race and hence will unconsciously prefer our own race. This is not to confused with racism or sexism but its manifestations can look a lot like it. It is simply the experiences wired in our brains drawing quick and efficient decisions (from the brain's persepctive, that is). We cannot even access this and will even fail to believe we have a bias.

This is the biggest impact on diversity issues there is – and it is biological pathway we are fighting against and not simple psychological issues that can be changed with a bit of education. Changin uncsoncious biases is a lot harder – we are changing brain pathways. This can be done for an individual – but for a whole population the challenges are not to be underestimated.

There is also no question that quality of decision making is crucial to any business – this was pointed out by seven traps in decision making by Hammond, Keeney and Raiffa punted out in an article, *The Hidden Traps in Decision Making*, in the Harvard Business Review in 2006 (Hammond et al. 2006). These traps in decision making have become well known and business now tends to deal with some of these well. Kahneman's recent book *Thinking Fast and Slow* has become popular with senior leaders and behavioural economics is on the march forward. However, when it comes to unconscious bias and diversity there is a huge gap – there is a realisation that diversity issues are important. There is even acknowledgement of the economic value of diversity but implementation will always be fighting against the ingrained processes in the brain. As we have illustrated in this article there are numerous processes happening at a biological and emotional level that will hinder leaders from overcoming their unconscious bias. This is not to be underestimated.

The ability of the brain to rationalise and justify its unconscious bias makes it hard to deal with this in senior leaders. Tests such as the IAT are, however, very useful tools to illustrate this unconscious bias, as is the SCOAP-Profile which we have developed which shows how our basic human needs are balanced and whether we have proactive or defensive motivational schema activated.

When we talk about diversity we may think it is a rational issue or an isue to do with education. It is not: we have been able to show for a long time the value of diversity to business success. There are vast numbers of studies that show the economic and financial benefit of diversity. Business leaders do not implement diversity policies at all levels for the simple reason that their brains hinder them in doing so.

Fortunately because we know this we can begin to intervene. We can know show where unconscious bias manifests, how it is represented in the brain and armed with this knowledge we can hence develop strategies to counteract them and not just help companies to become more diverse and equal but help leaders and corporations to make better decisions and become more successful.

We just hope that the brains of leaders will allow us to intervene in the first place.

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