

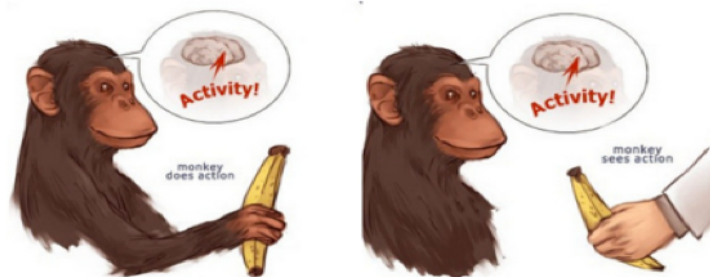
How the mind works

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What are we going to talk about today?

- Lots!
- How an understanding of how the brain works will improve our understanding of our clients and our ability to support them into the next stage of their lives
- From mirror neurons to the seven c's of change, we will use neuroscience to demonstrate how the brain works and what we can do about it 😊

What are mirror neurons



Remember when we say to our clients, *Let's have a look at the brain - this is the bit you know as you. It is your conscious part. The part that interacts with the world. The part we are using to be aware of our interactions together.*

This is where your mirror neurons are. Mirror neurons are a subset of something called motor command neurons.

Pick up stretchy ball and play with it!

So one set of motor command neurons fire when you reach for a cup of tea, another set of motor command neurons fire when you reach for the gear stick in the car, another set of motor command neurons fire when you hit a nail with a hammer, there are many many motor neurons in your brain. The motor command neurons fire a response to activate the precise muscles you will need to carry out the task – picking up the cup of tea, changing gear in the car, banging in the nail with the hammer with accuracy!

However, what is really interesting is that we have something called mirror neurons which fire when you watch someone reach for a cup of tea, reach for the gear stick,

hit a nail into the wall. How often have you been a passenger in the car and 'braked' at a roundabout or checked left and right before the driver pulls out of the junction?! How is it that we know that we can drive better than that person, hit the nail with greater accuracy, how do we know that the person reaching for the cup of tea is likely to miss?

All your motor neurons are now firing watching me play with this ball, you desperately want to play with it too.

Tough

What your mirror neuron network is doing is creating a virtual reality version of action. They are putting together a theory of your mind, a theory of your intention. And being able to see and understand intention is vital to successful interaction.

Let's play a game to see if we can detect intention in others.

Stand in a circle, throw soft ball to each other. How do you know the person is going to throw it to you?

The ratio of mirror neurons to motor command neurons is about 1:10

When do mirror neurons develop?

<https://www.youtube.com/watch?v=apzXGEbZht0>

<https://www.youtube.com/watch?v=1ctP9cLRbnE>

<https://www.youtube.com/watch?v=JmA2CIUvUY>

Early!

Look at this very sophisticated example of mirror neurons at work. First, matching each other's mood and behaviour, copying and interacting.

Then, see what happens when the interaction stops, watch what the mother does and what the baby does to reintroduce the interaction.

Look at the reunion behaviour, how does the mother calm the baby? Mirror neurons!

Mirror neurons are how the baby learns about her social environment.

Second clip

Mirror neurons help us to learn language, the baby is learning to make the sounds her mother is making.

Now, watch these children talking to each other! See how they mirror the sounds and movements the other makes!

Third clip

Mirror neurons and social interaction



So mirror neurons enable us to communicate with each other, to determine what each other intends to do, and they can also help us empathise with others.

Have you ever felt the pain of another? Someone stubs their toe, hits their thumb with the hammer, have you ever felt it?

Pain is experienced in the anterior cingulate. The agony, the painfulness of pain is held in that part of the brain.

If I trap my thumb in the door, I will feel pain and the painfulness of it, the emotional experience will be processed in the anterior cingulate, just behind the frontal lobes of the brain.

If you see me trap my thumb in the door, mirror neurons will fire, but only a small subset of the pain mirror neurons, so that you may feel at least some of the pain that I am feeling and your response may be concern.

You have developed empathy. In order to truly empathise with your pain, I need to experience it for myself. My mirror neurons activated sufficiently to give me the

sensation of pain that I can empathise that you are in pain – and then of course, I can activate a caring or healing response.

This all ensures our survival.

Mirror neurons need focus to work



Sit opposite someone. Maintain neutral face. No smiling, no winking, no crying, no frowning. How hard is that?! Who broke first?! Was it with a smile?! Why do you think that is?

Stressful situation can be dissipated with a smile – maintaining neutral face was stressful because we couldn't understand each other, couldn't understand each others' intentions. We had to break it with a friendly smile and calm the situation down.

How can you use this information with your clients?

Meet and greet, calming an emotional story, using humour in our work

Problems with mirror neurons

- If our mirror neurons don't work, how can we predict people's behaviour, intentions and motivations?
- Autism?
- Smarties task

Some evidence that impairment of mirror neurons can explain at least in part the expression of autism.

Tube of smarties!

Mirror neurons and false memories: a study

- people with OCD were monitored for levels of disgust and brain activity when watching a film of an experimenter get his hands dirty and then again when they watched the experimenter wash his hands.
- Levels of disgust rose when the experimenter's hands were dirty and then fell and were replaced with feelings of relief when he washed his hands.
- BUT LOOK - when the people with OCD got their hands dirty, watching the film of the experimenter washing his hands gave them relief!
- The mirror neuron system activated the feeling of relief through seeing someone else wash their hands.

How do we create false memories?

The false sensation of relief via watching the experimenter wash his hands can also partly explain how we construct false memories.

Think about all the times you find yourself surprised that you have not done something even when you are sure that you have, because you remember thinking that you were definitely going to do it! It could be answering an email, switching on the oven, picking up the dry cleaning, **often if we think that we have done something then we can convince ourselves that we have done it.**

If you think about it, if we can activate the part of the brain that is responsible for an action simply by *imagining* doing that action, then we can also create a false memory of that action.

As we know, the brain treats real and imaginary events as one and the same, and the mirror neuron system is at least in part responsible for this.

Seeing someone do something can create a false memory of doing that thing yourself.

The mirror neuron system activates the appropriate part of the brain and prepares you for action so well that you may well think you have actually done it.

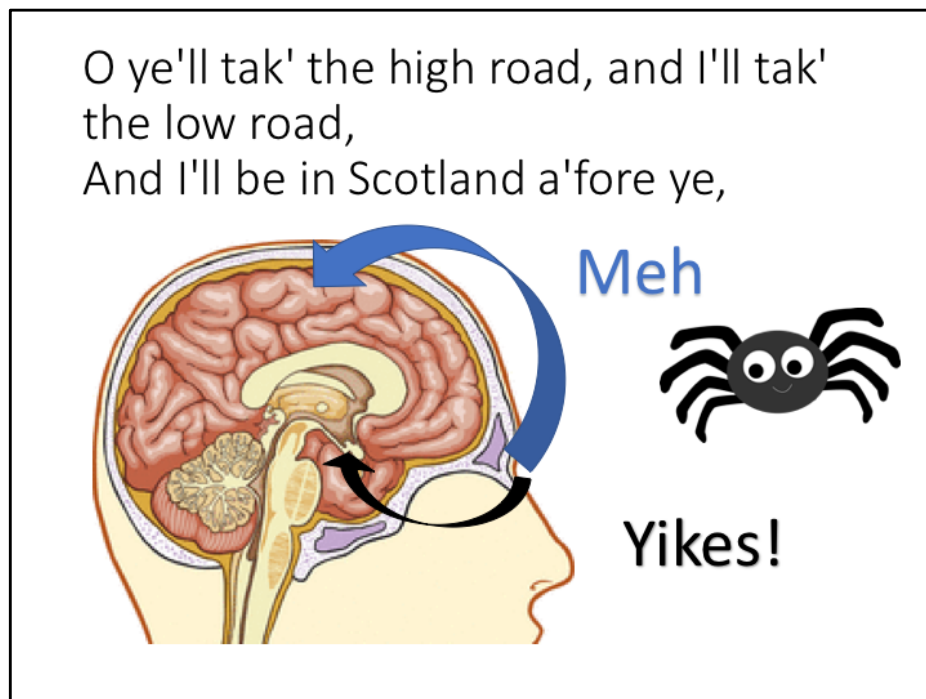
This can be useful in practice, how?

e.g. miracle question

Damage and rehabilitation

- Damage to frontal lobes results in:
 - Inability to coordinate movements
 - Inability to copy someone else's movements
 - Inability to recognize someone else's movements
 - Inability to understand the meaning of the movements of others.
- Rehabilitation
 - you can improve a person's ability to walk following stroke by the combination of repeated walking practice **and** the visualisation of walking
 - activates the motor planning and learning areas of the brain, encompassing the mirror neuron system, leading to an improvement in the person's ability to walk





Jonathon Cohen's paper in 2005 on the high road and the low road of emotional processing has been pivotal in directing research into why, when we are under stress, our reactions become less rational and more emotional.

Pessoa in 2008 argued that our brains are more complex than Cohen's description

we have areas of the brain called 'hubs' where both the cognitive and emotional pathways interconnect.

These hubs are critical for regulating the flow and integration of information between the two regions.

This argument seems to not actually dismiss Cohen's paper but really to support a more complex depiction of our brain.

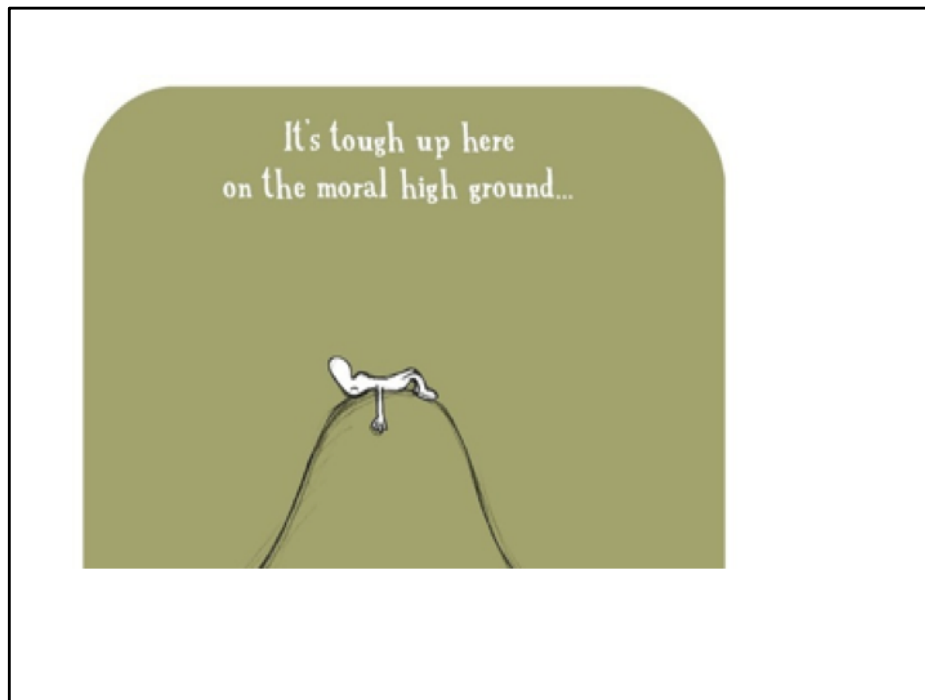
We acknowledge the role of the anterior cingulate, the secretary that makes the decision to use the intellectual brain or whether the primitive brain can just do its job and prepare us for immediate action.

You could argue that Pessoa's hubs are extensions of the notion of the secretary, that for most of the decisions we make, the information is passed through busy hubs which regulate our emotional or intellectual response.

Are primitive responses necessarily wrong?

Zizzo argues that the short cut to the primitive response of anger is not necessarily an irrational choice based in our ancestral heritage but is actually a much more **sophisticated emotional response that is tied to context.**

Rather than seeing the primitive responses as 'caveman-ish' and irrational, Zizzo sees **anger in the right context as rational and functional**



Is it always better to use the intellectual mind? Is the high way the morally superior route?

A woman is near death from a particular form of cancer. There is one drug that the doctors think might save her. It is a form of radium that a pharmacist in the same town has recently discovered. The drug is expensive to make and the pharmacist is charging ten times what it cost to make the drug. The pharmacist paid €200 for the radium and is charging €2,000 for a small dose of the drug. The sick woman's husband, Heinz, tried to borrow the money from everyone he knew but was only able to raise €1,000, half of what he needed. He told the pharmacist that his wife was dying and asked him to sell the drug to him cheaper or even to let him pay the remainder at a later date. The pharmacist however refused. Heinz was desperate for the drug and broke into the pharmacy to steal the drug for his wife. Should he have done that? (adapted from Kohlberg, 1963)

How many moral decisions do we make every day? How many of them are like this one? Most decisions we make are small and actually, the primitive brain is really good at those.

Moral judgements made using the low road are more likely to be taken when we are under stress and are more likely to be self-serving. Is that a bad thing?

The primitive brain holds a lot of our emotional thinking, the amygdala holds memory and emotion and tells us when we are safe and when we are under threat. When our primitive brain is in control we talk about our opt-out clauses of anger, anxiety and freeze. We hold these emotions responsible for activating our sometimes inappropriate behaviour via the hippocampus.

actually the most serious problems of the world are caused by a lack of emotion. Our inability to activate anger for instance creates apathy for human suffering.

The high road is more easily travelled when trouble seems far away and we feel unable to do anything about it. We can intellectualise, politicise and ultimately dismiss threat when it seems too big to do anything about. Perhaps this is the depression clause? Perhaps when we think about the problems of the world we retreat, pull the rug over and wait it out.

How does this relate to practice?

Creating the session where client is able to intellectualise their problems

The prefrontal cortex

Your anger gives you great power.
But if you let it, it will destroy you..

- Batman Begins 2005



All your emotions: sadness, happiness, anger, anxiety, depression are stored in the prefrontal cortex.

If you see an angry face your RIGHT prefrontal cortex lights up

If you look away from an angry face your LEFT prefrontal cortex lights up

Anger is interesting

People who describe themselves as typically angry show increased left prefrontal and decreased right prefrontal activity

whilst those who are rarely angry, when they are made to feel angry activate the right prefrontal cortex

Understanding the difference between the right prefrontal cortex and activation of anger and the left prefrontal cortex in maintaining a general state of anger is important.

We know that people with more right-side activity in the prefrontal cortex are more prone to seeing events as upsetting and so we would expect to see them turn to anger under threat, the anger making them strong and ready to respond.

However, being strong has such a powerful evolutionary advantage over and above responding to immediate threat that the picture is necessarily more complex for the brain.

Stronger people are more likely to survive, to mate and create a successful society

so the angry person may not be a person who is out of control but a powerful person fully in control of their anger and channeling that emotion effectively into social success.

So what?

- We need to be able to use both sides of the prefrontal cortex if we are to judge the emotional state of others
- We also use the prefrontal cortex to pay attention and remember events of the past, potentially creating context for understanding the emotion of others
- The prefrontal cortex is also busy when we are trying to remember happy and sad events in our past

So what does this mean when we are working with clients?

Psychopaths

- Lack empathy, 'cold-hearted'
- Shallow emotions, rarely experience shame, guilt or embarrassment
- Blame others for things that are their fault
- 'charming', insincere speech, lie
- Over confident, boastful
- Extreme focus of attention, cannot change what they are doing if new information appears
- Selfish, ego-centric, incapable of love for others
- Unable to plan for the future
- Violent, low threshold – frustration, irritation, aggression when things stop going their way

Cannot detect fear in the faces of other people

Do not experience strong emotions

Focus of attention, if we present words of colours in the colour they are e.g. red, yellow, blue, green, both normal and psychopaths do well. If we change the colour of the ink that the colour words are written in, normal people falter and find it difficult due to the conflicting information, psychopaths do better than average in this task – they can maintain focus.

Birbaumer et al., investigated the neural state of psychopaths during emotionally active events and found that they showed **no increased activation of the prefrontal cortex** at all.

The psychopaths showed no increase in skin conductance tests (and would thus pass a lie-detector test) and they reported **no feelings of fear**.

The researchers conclude that the **lack of activation** in the emotional circuitry in the brain may explain why psychopaths have **no fear of consequences** of their actions

and why they **do not experience the same social inhibition** for their actions as the rest of us.

So, can we train our brains?



Or is this it, the start of the decline?!

Exercise is key – the physical stuff, you can't sit around imagining it...

Happiness

Scientists from Yale University wrote in the journal *Nature Medicine* that regular exertion affects the hippocampus, the area of the brain responsible for mood.

Tests on mice showed that exercise activated a gene there called VGF, which is linked to a "growth factor" chemical involved in the development of new nerve cells.

Tests show that this brain activation lifts a person's mood.

Participants in one recent German survey were asked to walk quickly on a treadmill for 30 minutes a day over a 10-day period.

At the end of the experiment, researchers recorded a significant drop in depression scores.

Stress

We respond to stress in the same way our ancestors did -- by adopting a "fight or flight" response.

Adrenalin and other hormones are released into our bloodstreams and our muscles are primed for response.

The results can be good; the cardiovascular system is accelerated and we can work harder (for a while, at least),

but others are not so good; stress slows down the gastrointestinal system and reduces appetite, and can overexcite the brain, fuzzing our thought.

By responding to or anticipating stress with fight (kickboxing or judo, say) or flight (30 minutes on the treadmill, say, or 50 lengths of the pool), blood flow to the brain is increased, allowing the body to purge the potentially toxic by-products of stress.

According to Ratey, exercise also helps in the long term. "It builds up armies of antioxidants such as Vitamins E and C," he says. "These help brain cells protect us from future stress."

If I go to the gym, will I be...

- Smarter?
 - Meh, exercise doesn't make you smarter, but the increased blood flow does help with memory
 - Exercising into old age helps you keep your memory and skill
- Less aggressive?
 - Yep, it's not that you are burning off energy but in fact, exercise inhibits the aggressive feelings developing in the first place
- Quit smoking?
 - Five minute brisk walk reduces nicotine withdrawal symptoms
 - Stimulates the release of dopamine which replaces the need for nicotine

Pupils at Naperville Central High School near Chicago, for example, start the day with a fitness class they call "Zero Hour PE". Equipped with heart monitors, they run laps of the playground, and teachers say exam results have soared since the keep-fit initiative kicked off.

People assume exercise reduces aggression by burning energy. In fact, exercise changes your brain so you don't feel aggressive in the first place.

Doesn't' have to be a lot of exercise, a 30 minute walk each night after dinner will have a huge effect on your well-being. Why do people in the Mediterranean seem happier? Think about that evening walk they all do.

Now it's time for our lunch and a little stroll, refresh the brain for this afternoon where we shall daydream and trance...



Daydreaming is good for us!

- https://www.ted.com/talks/manoush_zomorodi_how_boredom_can_lead_to_your_most_brilliant_ideas/transcript?language=en

- Daydreaming is real, deliberate activity of the brain
- The daydreaming Raichle refers to is not fantasy based but reality based.
- has a very useful evolutionary function.
 - By reflecting on past events, we learn important lessons from them, learning not to do it that way again or reminding ourselves that what we did is the best way to accomplish something.

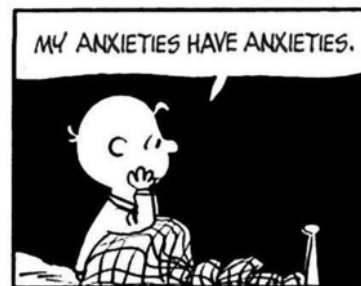
When we do not have the time to daydream, we start to feel frazzled, that our work is getting on top of us and we start making mistakes



Daydreaming how you effectively trapped a wild animal last week prepares you to use the same method and hunt again, which is useful next time you are hungry.

Anxiety and the default mode network

In anxious people, the DMN does not activate fully, suggesting that the person is perhaps left disadvantaged and unable to play out the options available to them, make sense of them and choose an outcome that does not activate the fight or flight response.



With a limited capacity to happily daydream, the anxious person is left unable to predict a non-threatening outcome to the situation, resulting in them seeing all or most events as fearful and danger-based.

Depression and the default mode network

- the daydreaming function in the depressed brain does not seem to want to switch off
- 'hooked' on negativity
- the brain does not seem to want to come out of the daydream
- By remaining in the daydreaming state, the depressed brain is unable to move its focus away onto positive events and thus struggles to regulate mood

the daydreaming function in the depressed brain does not seem to want to switch off.

The depressed brain seems 'hooked' on negativity, when looking at pictures of negative events, the default mode network continues to activate, encouraging the depressed person to reflect on negative events in their lives.

Raichle suggests that the reason depressed adults find it difficult to bring themselves out of their introspective, negative mindset is because the brain does not seem to want to, it does not respond in the same way as a healthy brain.

By remaining in the daydreaming state, the depressed brain is unable to move its focus away onto positive events and thus struggles to regulate mood. The depressed brain finds it extremely difficult to work its way out of a negative daydream state and into a positive, focused, active state of mind.

Is daydreaming the same as trance?

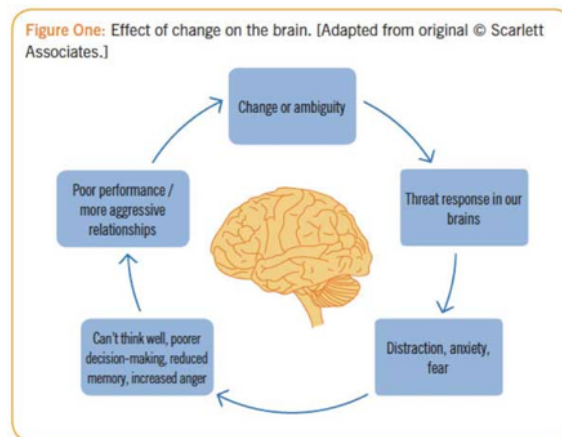
- Are we, by putting our clients into trance, creating a state of daydreaming?
- Two types of trance:
 - Self-hypnosis is self-created
 - Hetero-hypnosis is created by another person
- A motivated state, perhaps triggered by the miracle question or by the words we use in trance
- Trance associated with an increase in activity of the parasympathetic nervous system
 - Calm, relaxed, coping better with pain
 - Reduced anxiety and fearfulness
- Effects of daydreaming may last a few hours, effects of trance can last for a year or more

Evidence

Boselli's 2017 study brings together and confirms the positive effect of hypnosis on a person, trance is real and has a measurable, physiological effect on the body. Although Boselli's team demonstrated the immediate effectiveness of trance, it is important not to forget the long-term positive effects of our work on the wellbeing of our customers.

A second study published in 2017 by Sell, Miller and Taubner reports that the effects of hypnotherapy are significant in reducing distress in a psychiatric outpatient group of 300 men and women, both in the few days after receiving hypnotherapy but also at one year later. Evidence therefore of the powerful effect of our work.

The challenge of change



1. *Change is painful – or requires special effort.*
2. *When people are given a new instruction or are faced with a new piece of information, the brain may well activate the part of it that notices change as an 'error', which is the more 'primitive' part of the brain, causing us to go into defence mode.*

two 'big ideas' that will help us cope with change

first, that our brains are exceptionally well-designed for a reality different from the one we live in

Second, we can change our brains

we can make changes in our brains, learning new ways of thinking and doing things through adopting positive thinking, positive action and positive interaction

our brain cells are continually forming new connections and restructuring our perceptions and physiology over time. This process of neuroplasticity happens thousands of times a day, giving us enormous potential to change.

If prolonged anger, anxiety and depression are examples of learned behaviour, then we know that we can change the response of the brain through the use of solution-focused questioning.

It is not easy. Our brains really like to keep doing the things they are used to doing, but with practice we can produce change.

The 7 C's of change

Clarity

Continuity

Certainty

Consistency

Cooperation

Confidence

Communication



How can we help our clients through the process of change?

The 7 C's of change

Clarity

- make clear goals that are specific and measurable (the use of scaling and the miracle question).

Continuity

- information is forgotten quickly, repeat the message and maintain a continuous pathway through the change (the use of revision and explanation in all of our sessions with a client).

Certainty

- change will occur and you will continue to succeed (trance is of course very effective, you will see change).

Consistency

- change comes easier when it is done consistently and in small doses (this will take 8, 9, 10, 11, 12 sessions).

The 7 C's of change

Cooperation

- people find comfort in their relationships with others (positive action and positive interaction).

Confidence

- anxiety occurs during change when you lose confidence that you are able to cope with it (negative forecasting, negative introspection, etc.,).

Communication

- people want to feel that they have a voice and that it is being heard, to be a part of the change as much as possible for it to be successful
- in SFH our clients lead the session, they learn to detect change through the use of the 'what's been good about your week?' and deciding where they want to see change and how through the use of the miracle question.