

We live in an incredibly rich world, full of stimuli that fall in and out of the boundaries of our senses. What we see of the world is limited to what we pick up from it, leaving a plethora of regularly occurring events going by unnoticed. This may sound restricting at first, being unable to experience the full spectrum of everything that exists, but it is actually of utmost importance. It is essential for navigating and interacting with the world around us, and utilising it for our benefit.

Without these limits, we'd be overwhelmed with stimulation. We need things to exist within the spectrum of what is useful for us. Imagine being able to see the radio waves emitting from your mobile phone, or feeling the x-rays as they travel through your body. It would be distracting, and unnecessary. What we filter out from the world is just as important as what we take in, and has an important role to play in our survival.

This filtration process is complicated. Not only is there a natural filter imposed on us by the limits of our senses, our brain actually filters out the information we do receive to give us a more refined, sharpened, and practical image of the world around us. This is equally important for our survival, and problems with this process can lead to overinclusion of information in our frame, which has its own detrimental implications for our functioning. The brain here works almost like a sieve, filtering out whatever we don't need to make us even more efficient. We can't possibly pay attention to everything that's happening all the time. That would make ticking clocks unbearable!

But what if we were to take this one step further? What if we were to consider the brain having a more active role in this filtration process rather than just a passive sieve for information, what would that look like?

This is what many scientists believe to be the case, and the way it works is fascinating. The idea is that the brain essentially wants to maintain balance, stability, equilibrium. We are self-regulating creatures, and just as our bodies regulate body temperature, blood sugar levels, hormone levels, and all sorts of other levels to keep the body stable, the brain does the same thing. The main motive is to minimise surprise and unpredictability, and to maintain a relatively stable world view so that we could navigate the world with ease.

But how does the brain do this?

The exact mechanism is still under investigation, but the current theory goes something like this:

It's all about templates. From the day a person is born, their brain starts to collect information. All sorts of different information, and uses these to make associations and learn about the world around them. For example, a crying baby met with care will learn that their distress can be contained and will continue to cry when in distress. On the other hand, a crying baby that is neglected or abused might stop crying, as it learns that it produces an unfavourable outcome, or no outcome at all. From day 1, information is collected and data is stored as we learn about what's happening around us.

As this happens, the brain starts to recognise patterns, and consequently develops expectations of what it may encounter in the future. It then receives information through the senses, compares it against these expectations, and adjusts the information accordingly, giving you the final image. For example. Imagine being in a room when a small object comes flying in erratically, bumping into the wall and going towards the light. You automatically register that this is a moth based on what you know about moths, and how this particular one stumbled its way into the room. But if this object comes a bit closer, and you start to notice that actually the wings have a bit more colour, and it's not as clumsy anymore, you might change your initial view and start to notice that it's actually a

butterfly. Here, the initial prediction depended on the characteristics shown that you equate to moths, but then changed when the sensory input changed and more characteristics became noticeable.

In other words, the brain uses information it collects over the years to make predictions about the world, and constantly compares it to the input coming in from the senses day to day. Any discrepancies between what is expected and what is happening is corrected, either by the learning, where expectations are altered to make them more accurate in the future, or, more interestingly, by the actual input being changed to match the expectation. This means that the brain can actually change the way we read what's happening around us, to match with what it thinks should happen.

Let that sink in for a minute. The brain can literally change the world around you to match with what it believes to be true. It can also direct your attention to certain things that confirm your belief, and reinforce it. If the brain is certain that the world is a negative, unwelcoming place, then it will paint all the information it receives with that brush, and ignore any information that says otherwise. A brain which is certain stops correcting itself, and stops adjusting its expectations. It knows what it knows. This is really something to think about. A brain that thinks it knows what is going on will stop trying to correct itself, and will ignore any information that challenges its world view, ultimately getting stuck in a spiral of negativity.

Soo... Why is this important?

Well, a deeper understanding of how our brain works is always useful. It can have great implications for patients with mental health problems, and can direct our attention to study certain aspects of its functioning we might have missed. For example, some studies have attempted to investigate the effect of depression on people's perception, particularly of other people. They tried to do this by showing depressed patients a series of different faces with different facial expressions. Interestingly, they found that they are more likely to notice faces with negative facial expressions than positive ones. What is even more interesting, is that other studies investigating the same thing found that this changed after a single dose of an antidepressant, where these patients recognised less negative faces. This change correlated with an improvement in symptoms of depression later on.

And this wouldn't be just for depression. The same could be said about what is sometimes considered the opposite of depression, mania. If we apply the same concept, where the brain thinks everything is happening around it is good, it will ignore any stimuli challenging this, and will get stuck in a different cycle.

Could it be that illnesses such as depression or mania all have to do with templates and expectations we have about the world? Is it possible that antidepressants change this, and it is actually this mechanism that can lead to symptom resolution? Is there space for another medication that shake these templates up a little bit, and gives space for a different perspective?

Who knows?

One thing we do know though, is that we cannot take our beliefs and ideas about the world for granted. Because ultimately, we do not see the world as it is, but as we are.

Written by Mourad Wahba