WHAT IS A MIND?

UNIVERSITY OF CAPE TOWN

Week 6 Answer to Question 4

Step 6.8 Ask Mark

Alright, now we come to the last question for today, which is also the last question for this course, and this is the last "Ask Mark" session that I'm ever going to do, so this really is the last question. Let's see what it is. Well, it's quite a long one. It says:

Question 4: I would be very grateful if you could share your view of the brain architecture and how it fits the mind models and mental processes. You explain to us very clearly what the difference is between upper brainstem and cortex structures, also what the difference is between the left and right halves of the brain. But what is ventromesial frontal cortex doing? And what is dorsolateral prefrontal cortex doing? And are there other mind-brain correlates which you find important to mention?

Well, that is a very apt final question, because if I may translate it in summary form, the question is saying: just tell us again how the whole thing works! So, it's a kind of recapping perhaps of everything that I've said to you. But let me first of all answer it more literally and more concretely. The questioner asks three things.

They say, first of all, what brain structure is left out when - they say, I've spoken about upper brainstem in relation to cortex, I've spoken about left half and right half of the cerebral hemispheres - what other brain structure is important? I would say that the important structure left out in that enumeration is basal ganglia. The basal ganglia - they're a very important part of the brain, and I'll say something about them in a moment.

The second question was - second part of the question was - what are ventromesial frontal cortex and dorsolateral frontal cortex doing? Well, the answer to that is the following. The ventromesial frontal cortex inhibits stereotyped responses. By stereotyped responses, I mean instinctual responses, or habitual responses. These are overlearned, automatic response patterns. Ventromesial frontal cortex inhibits those. Why it does that is because it opens up by not acting - by not acting stereotypically, by not acting automatically - it opens up the possibility of thinking, that is to say, a flexible consideration of all the possibilities, only becomes available if you are not compelled to act stereotypically - that is to say instinctively or habitually. So I'm not going to

do what I always do, I'm not going to do the automatic thing, I'm not going to act, instead I'm going to think. And thinking which is reflexive cognition - with reference to the first question, the earlier question in this series - thinking is virtual action, it's not real action. And that is done by the dorsolateral prefrontal convexity. So to answer your question, what does the ventromesial frontal cortex do? In short, what it does is it inhibits stereotype compulsive response patterns. And that, in turn, makes possible flexible, creative, reflective thinking. And then once you thought up the right solution, then you have voluntary action, considered action, deliberate action, as opposed to automatic action. That's the role of thinking. So that answers that part of the question.

And then the last part of the question, you know, something about what else do I want to tell you, or how does the whole thing work? Let me now summarize, and in so doing, I'll explain why basal ganglia are the structure that is important not to overlook in this very basic overview of how does it all come together? It works like this.

First of all, you have needs; secondly, you have to meet those needs in the world - and the brain straddle those two poles, those two beginnings and ends of what mental life is for. Needs are felt in the form of affects. The outside world is perceived via the perceptual systems, and acted upon via the motor systems, and the whole of the mind is what fits between those two things. Given that I feel this, given that I have this demand upon me to perform work, and given that that is the state of the outside world, what must I do to meet these needs, in that outside world? The needs themselves are registered in upper brain stem, and closely connected structures in the diencephalon. So there are need detectors in the - I don't want to list all the structures - but there are needs that are registered, that needs of the body, and these are called drives, and those drives give rise to arousal states which we call affects. That's in the upper brainstem - that's where it happens.

Then you have instinctual response patterns. You have built-in ways of responding to those needs. And those are limbic structures - the limbic system. So they start in the upper brainstem - the limbic structures - they're all connected to these upper brain stem body regulating structures, but they are built-in ways of responding. When this happens, this is what I do. They are tools for living for survival and reproductive success. Now as grateful as we are for having those instinctual tools, those hardwired, non-learnt ways of responding to and meeting our needs in the world - as grateful as we are to have that, it's not enough, because the world is very unpredictable, changes all the time, new things happen, you find yourself in a completely different environmental niche from the next person. And so you have to also learn, you have to build upon those instinctual responses, and you have to learn, nuance them, combine them, supplement them through learning from experience. Now how that is done is through the representation of the outside world, through those perceptual systems that I spoke of - this is the

other end of the mind, the cortical systems. Corticothalamic systems represent the state of the outside world - not for its own sake, but so that you can learn how to meet your needs there - and this is where memory comes from. So corticothalamic memories are representations of previous perceptions, connected with what worked in terms of motor action, in terms of meeting your needs. And cortical representation of these things is thinkable. This is where you're actually able to represent in pictures in your mind - this is the thought processes that I spoke about earlier that were especially in relation to the dorsolateral prefrontal convexity - that's where you think your way through life's problems. Once you've done that, you don't need to think your way through it all over again. You know, you don't need to keep on reinventing the wheel, and there's limited space in conscious thinking. So what you do is, as you find solutions, so you automatize them - you don't need to think them anymore, you do them automatically - so they become stereotyped response patterns, just like the instinctual ones were that happened automatically. And this is what we call habits. And that happens in the basal ganglia, which is why I said that's the part that's left out. All of this corticothalamic, top end of the brain is doing here-and-now, current work, but once the problems are solved, they get chunked down into basal ganglia, and they become habitual, stereotyped, automatic ways of responding, supplementing the instincts, which in turn are built over the need states, and there you get to the bottom of the brain.

So that's how the whole thing works, in its simplest - in a very very simplified description. That's how all the different parts come together, and that's what the mind is for. It's for meeting your needs in the world. The way we experience it is - it's for managing our feelings. You know that things are going well when you're not overwhelmed by feelings anymore. Psychiatric patients suffer mainly from feelings. So that brings us to the end. Thank you very much for your interest. I have, as I think I keep saying, really enjoyed these question and answer sessions, but all good things must come to an end. Bye bye!