WHAT IS A MIND?

UNIVERSITY OF CAPE TOWN

WEEK 4 – ASK MARK, QUESTION 1

Hello, welcome to the week four Ask Mark session. As you will all know, we had a technical problem last week, and so this is a retake of those questions, of the questions for week four. Here they go.

The first question arose from a complicated to and fro discussion over the question of consciousness. The main issue seemed to be a sort of incredulity around the claims that I was making about such a lowly, primitive brainstem structure being the font of consciousness, and then that discussion culminated in this question which was chosen by the mentors, and the question goes like this. If the periaqueductal gray is the seat of feeling and consciousness – that is to say, the PAG produces consciousness in a way that oranges produce juice – then is there something remarkably different in the physical structure of the PAG, compared to other parts of the brain, and, if so, what?

So I'm going to answer that question, but in the way that I answer it I'm going to bear in mind the discussion that I referred to about the question of consciousness and the brainstem more broadly. So to begin with, yes, the PAG does have properties which relate to its function regarding consciousness, but there's nothing magical about those properties, and they're also not entirely unique to the PAG.

We must remember that the PAG is just one in a network of structures in the upper brainstem, all of which are involved in generating consciousness. So what I'm going to say first of all applies to all of those structures. They are nuclei in the upper brainstem which send long axons into the forebrain, into the higher brain structures, and those long axons project diffusely in the forebrain. And if you think about it, this makes sense in relation to what they're doing because what they're doing is activating the whole of the forebrain. So they need widespread access to forebrain neurons, and that's exactly what they do.

Then, secondly, there's also a lot of projection back to those arousal structures from the forebrain, and this applies particularly to the PAG. The PAG has massive inputs from all over the brain, and very interestingly, is right next to the PAG in a structure called the tectum, which is just behind it. There is, by dint of these backward projections, these projections back down from the forebrain, there is a little map, a complete map of the body. This is a crude map, much more rudimentary than the beautifully detailed maps that we get in the cortex. This seems to be a sort of precursor, a brainstem vertebrate equivalent of what will later, when the cortex evolved, what will later become these detailed precise representations of all of our sensory modalities.

Why this is important is that the PAG is not just a structure which generates consciousness, affective consciousness, it's that that consciousness guides behaviour. That's in fact what it's there for. And so the PAG has direct access to this primitive little homunculus, if you will, this little manikin in the brainstem which is in turn connected to the body. So the PAG is also a motor structure. It also has these parentory effects on our actions, on what we do.

Now, as I said, none of that is magical. It makes sense that the upper brainstem should be broadly connected to the forebrain, and this is because it activates the forebrain. Now we come to the question of, you know, does it... am I really claiming that consciousness can be reduced to the activities of those structures? So now I'm changing gear, and I have to make a very fundamental point. The whole purpose of this course, What is a Mind, is we're trying to identify the most fundamental properties of the mental, of the mind. In other words, I am indeed trying to reduce things down to their most basic level.

That's not to say that in us, much more complicated creatures, that that's all that the mind consists in. By reducing it to the basics, I'm trying to find what criteria can we use for determining whether a mind exists in any sort of creature, indeed in

any sort of thing. And it's in this sense that the upper brainstem arousal structures, generally known as the extended reticular-thalamic activating system or the reticular activating system for short, that these structures are the, sort of, absolutely necessary and sufficient condition for consciousness. If those structures are there, then we have every reason to believe that consciousness in its most rudimentary form exists in that creature. All the evidence points to that conclusion. In other words, every prediction that we make from that hypothesis is confirmed experimentally.

So in that sense I'm saying, consciousness is generated by the upper brainstem, the PAG being the most dramatic instance of that network of nuclei, but that does not mean that that's all that consciousness consists in. So let me first of all be clear again about what sort of consciousness is generated at that level. It is an affective state, a feeling state, a sort of presence of a mind in its most basic form is just feeling. Feeling in this sense is the medium of the mental, raw feelings with no ideas necessarily attached to them. So it's a sort of a subjective state which has a particular affective quality – it's pleasant or it's unpleasant – and this feeling guides the animal. Think of a fish in a pond. It moves toward what feels good and it moves away from what feels bad, but it has no idea what those things are that feel good and feel bad. It's a kind of raw feeling state which governs the movements of the animal, and nothing more than that.

Later on, in higher brain regions when they evolve, and once there's the possibility of cortical mappings, cortical representations of the images that are derived from our sensory organs, which are not in themselves conscious – that's the important thing to remember, that a fish can receive information from its eyes; it doesn't mean that it has a visual image that it can hold in mind, because it doesn't have the cortical machinery to be able to hold a visual image in mind. So the visual information guides its behaviour on the basis of what it makes it feel like.

But once you have cortex, then you have an image and you don't only have feelings, you say, if you could speak, you would say, I feel like this about that, and the consciousness is then extended onto the images, and this is a radically different form of consciousness. The crucial thing to recognise is that it is not possible to have that higher form of consciousness, what we call cognitive consciousness, where you can have conscious images of mental solids of objects, it's not possible to have that sort of consciousness without the affective consciousness contributed by the brainstem.

So it's in these two senses that affective brainstem consciousness is primary. It's primary in the sense that it comes first in evolution. The dawn of consciousness is a dawn of feeling. And then, secondly, it's more... it's hierarchically prerequisite for the higher forms of consciousness. You can't have the higher forms of consciousness unless they are generated from below. The activating of those cortical structures has to come from below.

So consciousness, of course, as we experience it, involves both of those things, the feeling and what the feelings are about. Then in the case of humans we have a third order of consciousness which is provided mainly by language, which is our capacity to then reflect upon the objects in our consciousness. So it's not just having thoughts in consciousness, but being able to think about the thoughts in consciousness and organise them, and in this symbolic abstract way to plan our behaviours in the way that we do. Most of our cognitive consciousness as humans in fact takes the form of a sort of inner speech – sort of, now I'm going to do this; first I must do that; if this happens, then I will do the following, and so on.

This is of course the way we experience our consciousness, but we would be misled if we start our explorations as to how consciousness works with the human version of it. These mental solids hide all else from view. One is reminded of Plato's Cave. It's very misleading, and it's only in that sense that I'm saying that consciousness is produced by the brainstem.

Now, I need to make one further point. When I say produced by the brainstem, I don't want to get lost in philosophical complexities, but you must remember it is not produced in the same way as an orange produces juice. Consciousness, when you look at the brainstem as a physical structure, the way it's represented from the outside, you can't see the consciousness being excreted. All you see is neurotransmitters being excreted, because that's what it looks like from the outside. Consciousness is embedded within subjectivity. It can only be experienced from the inside.

So when I say the upper brainstem produces consciousness, what I mean is that if you are an upper brainstem, then you feel consciousness when the upper brainstem is doing its thing. From the outside, when you look at it with your eyes, what you see is physiological processes. From the inside, what you feel with your feelings is consciousness, and it's that same stuff, that feeling stuff, that then extends on to your representations and enables you to feel your perceptions. That's how they become conscious.

So I hope that that clarifies to some extent this question of consciousness which has so exercised you in the discussion

forums.