THE VIRTUAL UNIVERSE:
Thought in a deterministic universe.
By James Innes

Intro

What does it mean to think? When we think about thinking, the first problem we encounter is the number of words we use for its different aspects, the synonyms and equivocations. We think, cogitate, imagine, decide and believe. We have thoughts, concepts and ideas. We think consciously and unconsciously. We are aware and not aware. What they all have in common, however, is that they all involve the manipulation of information in the brain. What I intend to do is to give an unashamedly physical and deterministic account of this process. However, the problem with such accounts has always been claimed to be the so-called "difficult" question, namely how can any physical process explain the subjective experience of thinking, what it is like to think? And who is this fellow, this "self", who appears to be having these thoughts? I suggest that these questions can be answered by using the concept of a "virtual" universe, one whose existence is implied by the physical status of the brain. Having explored this concept I will then aim to show how closely a hypothetical physical process seems to be mirrored by our own experience of thinking, whether in conscious or unconscious thought.

I therefore have five tasks. The first is to explore the idea of a virtual universe. The second is to explain how determinism creates information and stores it in the brain. The third is to suggest how the manipulation of that information can be itself a purely deterministic process. Fourth, I need to account for the fact that we are aware of our own thoughts, and that we have the impression that there is a distinctly subjective self, an intelligent homunculus if you will, who is having those thoughts. Fifth, our thoughts carry the distinct impression that they are making a difference to outcomes, and that we ourselves are exercising free will. In a deterministic universe, how can that be?

The virtual universe

The virtual universe is a very simple idea, grounded in the law of cause and effect. The law says that whenever there is an effect there is a cause, and vice versa. Therefore, whenever we see an effect, we can infer a cause, as a matter of logical necessity. Thus when information is physically encoded in the brain (the effect), this implies that the subject of the information (the cause) exists in the external universe. It is this implicit universe that corresponds to my "virtual" universe.

Of course, to anyone familiar with computers, the concept of virtuality is a very familiar one. It is of course the notion of "cyberspace", or the notional space created by a computer, to give it its dictionary definition.

How does this work out in practice? I will now indulge freely in pure scientism to speculate on the processes of thinking, and to point out how closely these seem to correlate with our own experience.

Information and the brain

Information can be thought of as a description of the universe, encoded in the brain by cause and effect processes. If we take the creation of visual information, as an example, we can see that it is straightforwardly cause and effect. Light is reflected from an object, enters the eye, and excites neurons in the retina. These send electrical signals down the optic nerve to set up a network of neural activation, implying the existence of the object.

Let's think for a moment about the question of *qualia*, or *quale* in the singular. *Qualia* are what we are immediately aware of in our conscious experience. For example, when we see a colour, we have a *quale* of precisely that colour. This is often considered to be not a physical attribute of the object itself, but an intrinsic property of the experience. This is thought to be a particular problem for the mind/body theorist. So how do we explain them in physical terms? In the case of let us say a green object, green sensitive cells in the retina become excited, causing them to send electrical signals to the brain. What we have recorded is not itself green (this is not mind/brain identity theory), but a signal implying green, what we might describe as logical green. The greenness itself, the green of the *quale*, can be thought of as occurring in the virtual universe.

The same can be said for other *qualia*, which also can be considered to be brain states carrying information. Thus pain is not itself physically identical with the firing of C-fibres, as was at one time suggested. Pain is instead the information that a specific part of the body is being injured, that this is a bad thing, and that it needs immediate attention. The firing of the C-fibres simply implies that this is the case and carries the information to the neurons of the brain as an electrical signal. Again, we can consider the sensation of pain as occurring in the virtual universe. Propositional attitudes are something similar, carrying information about the relationship between entities. Thus the propositional attitude that "I fear grizzly bears" is an expression of the information that grizzly bears represent an existential threat to me. Thus contrary to Daniel Dennet and others, *qualia* and propositional attitudes do indeed exist – they exist as information encoded in the brain.

In this way the brain creates an image or model of the universe, representing entities, their qualities, and the relationships between them, expressed in terms of patterns of neural activation. In this format, such images can then be manipulated by the processes of thought, but how can this be achieved in a deterministic manner?

The process of thinking

One theory, which echoes Wittgenstein's concept of consciousness emerging from chaos, is explained by Igor Aleksander in his book, "Making a Mind". Here he points out that the brain is a very large three-dimensional neural network incorporating the mechanisms of feedback. By this, I mean that when a neuron is excited and sends a charge to its neighbour, the neighbour itself becomes excited and sends a charge to its own neighbour, and so on. Eventually, a charge gets passed to the original neuron which started the sequence, thus forming a feedback loop. The brain contains billions of neurons and connections between them, and therefore there can be a very large number of such loops, each interacting with each other. Such systems, examples of which are to be found in global weather systems or ecosystems, are termed "chaotic" systems, not because they are random or uncaused, but because they are too complex to be predictable. Their behaviour is governed by Chaos or Complexity Theory,

which describes how they tend to settle down to states of semi-stable equilibrium known as "strange attractors". In the case of the brain, such a state would correspond to a new pattern of neural activation representing a new state of consciousness. Thus new information continually emerges from the mass of information already encoded in the brain.

This process is exactly what we are looking for. It is entirely deterministic. There is no discretion involved, no need for an intelligent homunculus to stand behind us to direct operations. When the charge in a neuron reaches a threshold, it simply discharges and sends a charge to its neighbour as a straightforward matter of physics.

Moreover it seems to echo the familiar experience of thinking. The way strange attractors can form and reform is like the way our thoughts and ideas seem to tumble out unbidden. Neural networks can learn and program themselves without the intervention of human programmers. Significantly, they can provide reliable answers even with incomplete data, something essential for human thought as the universe is so very large we rarely have complete information on any subject. The power of networks to recognise patterns and relationships in large amounts of data is astonishing. Google scientists, for example, recently announced they had constructed a neural network which was able to recognise images of cats, from a large number of photographs, without previously being told what a cat looked like, or even being asked to find one. The ability to find relationships in vast amounts of data, and to recognise patterns, is very much like the way human beings make sense of what they see, pulling together related objects. Perhaps this is the explanation of the phenomenon of emergent properties.

The awareness of self

So we have a deterministic way of encoding information in the brain, and a deterministic way of processing it, but how does this account for the apparent awareness that there is a subjective "self", an intelligent homunculus, if you will, who is having these thoughts? This is the difference between simple consciousness and a more complex self awareness. Consider the case of Nagel's bat. As we know, we can have no conception at all of what it is like to be bat, but it is my contention that neither does the bat. After all, why should it? Its sonar tells it all it needs to know about its target moth, in terms of position, speed and direction of travel, allowing it to predict where it will be in the next fraction of a second. The bat catches the moth, but does not shout "Yippee, I'm a bat". There are no existentialist bat philosophers asking what it means to be a bat! The reason for this is that, although the bat is clearly conscious, and has all the information it needs about the moth, it has no information at all about itself. It will have *qualia*, such as the sense of proximity of a moth, insofar that it has the brain patterns which imply that, but it lacks the first person awareness of having such *qualia*.

This is the way that bats work, and the way that zombies would work if there were such a thing, but it's not the way human beings work, at least not all of the time. Human beings differ in that they have the capacity for self awareness, the subjective experience that we are having thoughts, that things are happening to us. Now if consciousness involves the possession of information, then self awareness must involve the possession of information about our own thoughts. This raises two questions – why and how? The reason we have evolved this facility for introspection

is because it has enormous adaptive value for social animals. Indeed we could not be social animals without it. In order to assist, co-operate with, even manipulate our fellow human beings it helps to know what they are thinking. Here however we run into the problem of Other Minds, namely that we have no direct access to the thoughts of other people. This is hardly surprising since their thoughts are taking place isolated within their own skulls, from which we are physically excluded, with no direct means of communication. Therefore we have evolved the ability to replicate our own thoughts in similar circumstances, to empathise, and to allow us to predict how we ourselves would feel and act. We are able to look inwards to our own feelings and emotions as a means of understanding the feelings and emotions of others.

To do this we need the ability to extend our basic thoughts as new, higher order, thoughts. Thus we might have a concept A containing information "*a*", the trajectory of a bat, perhaps, encoded of course as a network of neural connections. We then need a concept A* which contains the information *"there is a concept containing information "a""*, again encoded as a pattern of neural connections. We might then enrich concept A* by adding the information *"...and it is true",* thus transforming it into a belief. In this way our very thoughts and beliefs can be considered to be objects in our virtual universe, with correlates within the physical brain.

We can find corroboration for this hypothesis in that this extra information could be expected to take up a large amount of storage capacity, and we can indeed see that the brains of social animals (humans, other primates, cetaceans etc) are very much larger than the brains of other species. We can also find ourselves not only being aware that we are thinking, but also aware that we are aware, but we can only carry on this regression just so far before we (presumably) run out of storage capacity.

All of this does not yet fully explain the phenomenon of first person subjectivity, but it points the way. Who is this "I" who is doing the thinking? The answer is that we are all citizens of our own virtual universe, and our own existence is implied by the structure of neural connections in the brain, as a representational model of ourselves. We might say that we are avatars in the cyberspace created by our brains, Lara Croft in our own game of Tomb Raiders! This does not of course tell us everything there is to know about ourselves, only what is useful from the standpoint of survival. Evolution does not burden us with the overhead of unnecessary information. Hence most of our mental processes are hidden from us and, we are aware only of what is adaptively advantageous.

Choice and freewill

This then leads to my last task. Does thought indeed make a difference, and do we really exercise choice and free will? The answer to the first part is clearly yes. We can even offer corroboration of this in the fact that, under the laws of evolution, we could not have evolved the capacity to think unless it offered adaptive value, in other words, did indeed make a difference. We should bear in mind that in a deterministic universe, thought is itself a cause as well as an effect. Although any decision might be inevitable under the circumstances in which it is made, once all those circumstances have been assembled, thought itself is part of those circumstances. Without thought, circumstances and therefore outcomes would therefore be different.

Do we really have a choice? Again, yes. At the point of decision, there are many logically possible outcomes. The brain uses a deterministic process as described to arrive at a decision. Inevitably, this is the one which is predicted to serve our best interests. Our subjective self, meanwhile, is aware only that a decision has been made, although it is aware of the various *qualia* and some of the other factors that have been taken into account.

Do we have free will and how do we exercise moral responsibility? What indeed does that mean? Free will, I would suggest, is simply the ability to make decisions in our own best interest. Ultimately that boils down to survival (although that is an idea which itself needs some unpicking). Morality, I would suggest, is the instinctive law of a social animal, on which our survival depends. This means that the sense of right and wrong, which many philosophers recognise as innate, is yet another *quale* for the brain to take into account in reaching its balance.

Conclusion

I have introduced the idea of a Virtual Universe, and suggested it is a logical consequence of determinism, or the law of cause and effect. I have suggested it offers an answer to the perennial "difficult questions" posed to physicalist theories of thought: how does a physical process explain what it feels like to think? Who is the "self" who appears to be doing the thinking? Can we really have choice and freewill in a deterministic world? I hope you think the idea has merit.

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