

The challenge of consciousness with special reference to the exclusive disjunction

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The theory of evolution makes sense of the emergence of consciousness. Reduction is not wrong as such, but must not be totalised. The fact that we are star stuff does not preclude the novelty of consciousness. Materialism is naturalism, but naturalism need not be materialism. Neural pathways are relevant but are not the total picture. The central thesis is about David Chalmers's philosophy being based on an exclusive disjunction. An inclusive disjunction is, when explained, more appropriate. Functionalism is appropriate. Thomas Nagel's philosophy on first person ontology can still be maintained. Quantum and complexity theories' hypothesis on consciousness is more compatible with freedom of decision than classical theories.

Introduction

This issue of consciousness is not only limited to philosophy of mind and philosophical anthropology:

In the 1970's and 1980's there were two multidisciplinary fields studying the mind/brain without much interaction: cognitive science and the neurosciences ... Both acknowledged the importance of the other in principle, but for both there were reasons for not taking research in the other all that seriously ... the major successes the neurosciences had been at the cellular and molecular levels but there were no techniques for studying higher cognitive processes other than the classical neuropsychological ones. (Von Eckardt & Poland: 2004:976)

This has changed considerably with the emergence of new technologies, like Positron emission tomography (PET) (Von Eckardt & Poland 2004:976). In the mind-body problem then, today, certain questions are neuroscience specific, 'and is there a way for biological naturalism to make sense of mental causation so as to avoid epiphenomenalism?' (Burton 1995:164). This is also a philosophical problem. The article examines anew the attempt (in explaining consciousness) to reduce consciousness to the physical-material brain – neural pathways. The strong reductive physicalist claims as to consciousness is the context of the problem of this article. Why is there an ongoing debate on this?

I use *consciousness* and *mind* interchangeably because their referents are the same. The word consciousness derives from a conjunction of the Latin '*cum*' [together] with '*scire*' [to know]. Self-consciousness is to be aware that you are aware. Furthermore, to be conscious is to have qualitative auditory, visual, tactile and emotional experiences (Chalmers 1996). Phenomenal experience is itself the most central and manifest aspect of our mental lives (Chalmers 2001).

Within phenomenological philosophy Edmund Husserl (and his precursor Brentano) founded the idea of consciousness as intentionality: Consciousness is intentionality, directness and aboutness as to the world. Consciousness is *consciousness of something*. It was developed further by Max Scheler, Heidegger (*Da-sein*), and Meleau Ponty. Contemporary philosophy of mind claims something very similar: Consciousness is about things in the world (David Chalmers 1996), Thomas Nagel (1974), John Searle, Frank Jackson and Saul Kripke developed this in their philosophy of mind theory.

This article's theoretical approach is both that of phenomenological anthropology as well as philosophy of mind (I follow the Husserlian ideas of intentionality and *Lebenswelt*, but not his philosophy of fixed static essences). In my view these two approaches are not only compatible with each other, but there are substantial convergences.

The intention of the article is to look anew at consciousness, not in general, but more specifically at the linkage to the brain. Much has been written and published on this, but this linkage remains an unsolved problem.



The context of the problem is the strong claim made by physicalism-materialism namely that to explain it fully, is to explain it in terms of physical science and that any other claim must be vindicated by physics. This leads to the problem of reductionism, which is addressed. The author intends to argue that reduction is not wrong per se, but will question the totalising use thereof. It will attempt to understand why consciousness is a hard nut to crack. Causality plays an important role in the explanation, but need not be limited to invariant causality important as the latter is.

To achieve the above, the article examines whether neural pathways, neurons and synapses can be regarded as comprising the total and sufficient picture. This is done by comparing water – H₂O on the one hand and brain-headache on the other. It accepts the linkage of consciousness to the brain as necessary without regarding them as identical.

Chalmers's view that the physical world is causally closed is discussed. Its implication for consciousness will be given account of. I interpret this view as an exclusive disjunction: It is the central thesis of the article. It is argued that an inclusive disjunction will be more appropriate. Therefore I opt for John Searle's view that consciousness is a biological phenomenon.

Searle's view that Chalmers use of functionalism is inappropriate will be questioned. Multiple realisability is useful.

If humans are like others made of star stuff, how can consciousness be novel? It is argued that Thomas Nagel's view on first person ontology can still be maintained. Thus it will be argued that in spite of intensive research on brain physiology and neurology, only direct experience will yield first person knowledge.

The article will question Chalmers's scepticism about 'new physics'. It will be argued that he does not take the radicality of non-linearity in quantum and complexity theories seriously enough. I concluded that though quantum states are not the same as consciousness and free will, it is more compatible therewith. It thus brings us nearer to an explanation of consciousness. The scientists Penrose and Hameroff's views are taken account of.

Consciousness challenged – the 'ladder of explanation' and reductive explanation

In contemporary physicalist reductionism Ockham's razor plays a strong normative role. Is this a watertight procedure?

Philosopher Daniel Dennett on the one hand is vigorously opposed to dualism (consciousness/brain or body), but on the other hand, '[h]e does not follow a rigid determinism/materialism' (Antonites 2010:305). In fact he cautions that we now have physicists who tell us that their science can do it all for us – that there is no area that is in need for natural

selection. The laws of physics unaided can produce and explain everything worth knowing about organisms. Even the new areas of inquiry in biology can be reduced. Likewise cognitive science is getting into the act (Dennett 1995).

These views normally depend on the assumption that to explain something fully, it is to be explained in terms of physical science; that sciences other than physics must have their scientific credentials vindicated by physics – all science must be reducible to physics. This means that the content of sciences other than physics must be reducible or derivable from physics and bridge principles linking physical concepts to non-physical concepts. Therefore everything that is explicable by any science is explicable in terms of physics (Crane 2003).

Dennett does not walk over issues with a slogan of strong reductionism: there is reductionism and reductionism. They cannot be equated. Thus his distinction between bland and preposterous readings of reduction is useful. According to the bland reading it is possible and desirable to unify chemistry, physics, biology and even the social sciences (Dennett 1995). His argument is that all societies are composed of human beings who, as mammals must fall under the principles of biology that covers mammals:

Mammals in turn are composed of molecules, which must obey the laws of chemistry, which in turn must obey regularities of the underlying physics. As opposed to the bland reading, the preposterous reading of reductionism wants to abandon all the principles, theories, vocabularies, theories, and laws of higher-level sciences in favour of the lower level terms. A reductionist dream, on such preposterous or greedy reading, might be to write 'A Comparison of Keats and Shelly from the Molecular point of view' or 'The role of oxygen atoms in Supply-Side economics'. (Dennett 1995:81)

One view is to see reductive explanation wholly in terms of simpler entities. To reduce is simply to explain higher-level phenomena in terms of lower-level phenomena (Burton 1995). This is one way to view reduction. It is argued that the basic phenomena themselves will eventually be reductively explainable in terms of something still more basic; complex phenomena like consciousness can be explained by or eliminated in favour of a few or even basic mechanisms that:

[M]ake them work ... If all goes well, biological phenomena may be explained in terms of cellular phenomena, which are explainable in terms of biochemical, which are explainable in terms of physical phenomena. (Chalmers 1996:42)

It is called the 'ladder of explanation'.

The strongest version of materialist or physicalist reduction of consciousness is the Identity Theory. Consciousness does not only accompany brain activity – it *is* physical or material brain activity. It thus involves an ontological reduction of consciousness or mind to brain states. Identity theorists hold that mental goings-on are not merely correlated with material goings-on in the brain, they *are* brain processes – they are not over and above them (Heil 2004). Ockham's razor



with its parsimony is applied: 'If we can account for mental phenomena solely by reference to brains and their processes, why follow the dualist in envisaging an independent realm of minds and properties?' (Heil 2004:73). It is well known that if someone's brain is damaged by whatever cause, his or her memory is damaged. So, why then question reductive physicalism?

I do not have a problem with physico-chemical or reductive explanations as such. They are relevant, functional, important and useful in science. Along with simplicity and autonomy of the lowest level, explanatory connections between the sciences ought to be possible in principle (Chalmers 1996). My problem is the totalising use of these explanations. Reduction can be part of an explanation, 'just that it is not the only kind of explanation' (Crane 2003).

Reductive explanation is not the be-all and end-all of explanation. There are many other sorts of explanation, some of which may shed more light on a phenomenon than a reductive explanation. There are historical explanations, e.g. explaining the genesis of a phenomenon like life, where a reductive explanation only gives a synchronic account of how living systems function ... Reductive explanations should not be seen as displacing these other sorts of explanation. Each has its place. (Chalmers 1996:43)

This however became problematic because consciousness up to so far resisted a complete explanation in physical-neurological terms.

Even Dennett (1993), who unlike Nagel, Chalmers and Searle does not see consciousness as something *sui generis*, admits that:

My explanation of consciousness is far from complete. One might even say it is just a beginning, because it breaks the spell of the enchanted circle of ideas that made explaining consciousness seem impossible. (p. 455)

Dennett (1993) says he has not replaced metaphors for non-metaphorical, 'literal', 'scientific' theory:

[A]ll I have done, really, is to replace one family of metaphors and images with another ... It's just a war of metaphors, you say – but metaphors are not 'just' metaphors; metaphors are the tools of thought. No one can think about consciousness without them, so it is important to equip yourself with the best of tools available. Look what we have built with our tools. Could you have imagined it without them? (p. 455)

In 'theoretical reduction' the terms of the reduced theory are defined in the terms of the reducing theory and its laws are derived from those of the reducing theory. The history of science contains few if any pure cases of theory reduction. Even thermodynamics is not a pure case in so far as the higher-level term 'temperature' which is defined, as mean molecular kinetic energy in gas must be given a different definition in plasma. In 'causal reduction' the existence and causal powers of the reduced entity are explained in terms of the causal powers of the reducing phenomena. Thus, for example, the causal powers of solid objects are explained by the causal powers of molecular vibrations in lattice structures, and mental phenomena and their causal powers are explained by the causal powers of neurobiological processes. (Burton 1995:170, 171)

Roger Trigg (1993) cautions that in reduction there are truths about organisms that can be lost at a lower level; one can have a science-based thesis which still calls for a stratification of levels of explanation. Crane is sceptical as to such a project and doubts whether any scientific practice conforms to it. Very few non-physical sciences have actually been reduced to physics in this sense and there seems little prospect that science in future will aim to reduce all sciences to physics:

If anything, science seems to be becoming more diversified rather than more unified ... two kinds of phenomena stand out as observed to the mechanical view of the mind: the phenomenon of consciousness and the phenomenon of thought. (Crane 2003:6)

Take note: It would be wrong to infer that all physicists and biological scientists with a strong physics background are automatically proponents of physicalism and who apply Ockham's razor in a totalising way. A good example is the molecular biologist and Nobel laureate Francis Crick (he originally was a physicist who later turned to biology). He is not only very sceptical about reducing biology to physics, but even about just applying the razor at all in biology!

In spite of the above, physicalism is still going strong. So, has consciousness been explained by the reduction discussed above? To do this, the question must be addressed whether neurons and synapses are the total picture or whether they are correlates of consciousness?

Consciousness: Neural pathways as correlates?

One could safely claim that consciousness is not thinkable without a connection to brain states or activity. Without our brains, without our nervous systems, thinking and consciousness are just not possible. Consciousness and thinking are not situated in or linked to our toes, ankles or intestines. Reductionism is a good explanation, since the identification of consciousness with brain is a coherent theory. However, is it a sufficient and complete explanation? No. On the contrary, it rather seems that consciousness poses the greatest difficulty for physicalism – a very hard nut to crack. Thus, if a reductive materialist or physicalist reduction is problematic, we will have to consider the alternative namely a non-reductive explanation, meaning then that consciousness is something over and above the brain.

Let us examine this by means of the following examples of scientific identification:

Consider for example, the identification of water with H₂O. Chemistry has discovered that the stuff we call 'water', is made up of molecules that are themselves made up of atoms of hydrogen and oxygen. There is nothing more to being water than being made up of H₂O molecules; this is why we say that water is (i.e. *identical with*) H₂O. Given this, then, it is not logically possible for H₂O to exist and water not to exist; after all they are the same thing! (Crane 2003:222, 223)

There could not be water without H₂O. This means H₂O is not something over and above water.

According to reductive physicalist theory, it is quite the same with the brain and consciousness. The two are identical. Consciousness and inner mental states do not exist over and above brain states or activities. So, it then follows that according to current reductionistic thinking, that the explanation of consciousness is exhausted by its reduction to neural correlates of neuron firings. Must it be denied that we may have conscious experiences at all in addition to having neurons or X-fibres firing in our brains? I argue: Some statements say that the hills around Pretoria contain minerals of hematite and are matters of third-person descriptions. This statement can be objective in the sense that it does not necessarily involve anyone's conscious subjective states. They are realities 'independent' from human consciousness. One could then try to argue that likewise conscious brain states are third-person realities. It is thus in principle the same as water and H₂O. However, this seems counterintuitive:

One could object to this argument by claiming that this just is not the case because it does not look so. This however is a weak argument, which does not provide reasons for what it claims. One could counter such a line of thinking by saying that this would be tantamount to another claim: 'matter is not energy is untrue because it does not seem like that'. (Crane 2003:221)

We usually experience a headache as a conscious mental state.

If a conscious mental state were really identical with a brain state (called 'B' for simplicity), then it would in a similar way be impossible for B to exist and for the headache not to exist: For, after all, they are supposed to be the same thing. But this case does seem to be different from the case of water and H₂O. For whereas the existence of water without H₂O seems absolutely impossible, the existence of B without the headache does seem to be possible. Why? The short answer is: because we can coherently conceive or imagine B existing without the headache existing. (Crane 2003:223)

It is a coherent explanation.

Crane argues that constitution and identity are not the same as it involves different relations – if we should claim that instead of saying conscious states are identical to states of the brain, rather say that mental states are exhaustively *constituted* by states of the brain, one could then claim that *identity* is symmetrical, whereas constitution is not (Crane 2003:223). If water is identical to H₂O then H₂O is identical to water. It is a symmetrical relation. If members constitute parliament then it does not follow that the members are *constituted* by parliament (Crane 2003:224). Crane (2003) now argues that one could either claim that states of the brain are identical with states of consciousness, or one could claim that states of consciousness are constituted by the states of the brain.

Erwin Schrödinger, physicist and founder of molecular biology, was ahead of his time with his 1944 book *What is life*.

He claimed that from all we have learned about the structure of living matter, we must be prepared to find it working in a manner that cannot be reduced to the ordinary laws of physics (Schrödinger 1967).

Saying that, can we claim that neural pathways are the total pictures? This brings us to the distinction between *correlation and causality*. Processes and states at the lower level of neuron firings, neural pathways, are correlated to conscious states. They are consciousness' neural correlates. But do they themselves constitute consciousness? Once we know that two things are correlated, have we then explained the *explanandum*? No. Correlations may be a necessary condition for a scientific explanation, but correlation alone will not explain much. More is needed like causality, a causal correlation. It would be more explanatory. Take for example heat:

Once we have an account of how various causal relations are fulfilled, then we have an account of say heat. Heat is a *causal – role concept* ... Once empirical investigation shows how the relevant causal roles are played, the phenomenon is explained. (Chalmers 1996:44, 45)

Therefore I agree with Chalmers (1996) that causation is something more than the presence of regularity. Immanuel Kant has noted this some time ago. A strong version of this regularity is called '*invariant causality*'. Since, it explains, one could say that a causal correlation is also an *epistemic* correlation.

Furthermore, one can have a causal correlation between something conscious, for example, pain on the one hand and neuron firings on the other. With neurophysiologists one can accept this as a fact. Saying that I take causality in a narrow and broader sense. Invariant causality is a narrower understanding of causality. It involves a necessary relationship of logical equivalence and symmetry. In as far as scientific explanation is causal explanation, it must contain or implicitly assume one or more laws – laws are explanatory:

[S]cientific explanation is causal explanation. Scientists search for causes. They do so because science seeks explanations, which also enables it to control and predict phenomena, and this is something only knowledge of cause can provide ... The empiricist account of causation holds that the relation of cause and effect obtains only when one or more laws *subsume* the events so related – that is, cover them as cases or instances of the operation of the law. (Rosenberg 2005:27)

Agreed. However, I argue that causality is not exhausted by invariant causality. It also involves contingent, genetic or historical causality, and reasons in qualitative research, all of which do not necessarily imply an invariant relationship between cause and effect. In more complex issues such as in evolution, causality is very well established (evolution with natural selection is largely a causal theory), but not necessarily always in the invariant version thereof. These other varieties of causality also fulfil a causal role satisfactorily. An invariant causal account, important as it is for explanatory purposes, I argue, does not exhaust

explanatory strategies when it comes to the brain and consciousness. This applies to the complex evolutionary emergence of consciousness.

From this it follows that, I would say, a causal and so epistemic reduction of consciousness to the brain would be plausible. Would an ontological reduction also follow as Identity Theory claims? Not quite. Why? An epistemic and causal reduction is not necessarily an ontological reduction.

The proximal neural causes and correlates of pain are undoubtedly located in the brain. However in science, the causes or correlates of a given event, like pain are not ontologically identical to that event. (Velmans 2001:3, 4)

From a causal reduction of consciousness, it does not follow that it does not exist over and above the neuronal. 'There is an *explanatory gap* between such accounts and consciousness itself' (Chalmers 1996:47).

To conclude the above: In terms of the theory of evolution, both consciousness and self-consciousness have emerged from primary brain activities, neural entities and pathways. It is evolution, in my view, which made the asymmetrical brain-self-consciousness possible. Far from being contradicting evolution, it is evolution itself, which led to the fact that self-consciousness is something over and above the brain. Though it emerged from the brain, and is still linked to the brain, it is not identical to it. On the other hand it is not ontologically an absolute independent and separate substance. So, in that sense I do not argue for a Cartesian substance dualism, but a duality. I claim this would also constitute a coherent description.

Does an exclusive disjunction bring us forward?

This brings us to the central thesis of this article.

What does David Chalmers have in mind with 'physical'? Though the 'ladder of explanation' accepts the 'legitimate' position of the biological, Chalmers (1996) seems to largely avoid using the term biological.

For Chalmers the nature of consciousness does not allow for any biological, chemical, or physical explanation. I interpret this as an *exclusive* or *strong disjunction*: If we take two disjuncts (alternatives) in a strong or exclusive sense, say the physical brain or consciousness, the meaning is not 'at least one' but 'at least one and at most one'; it is one of the two, but not both (Copi 1986:272). An inclusive or weak disjunction on the other hand is true in case one or the other or both disjuncts are true; only if both disjuncts are false the inclusive disjunction is false; if at least one of the disjuncts is true, the whole disjunction can be true; in an exclusive disjunction at least one of the disjuncts are true, but not both (Copi 1986:272). An exclusive or strong disjunction claims 'either ... or but not both', while an inclusive disjunction says it is rather an 'and ... and' relation, for example, brain and consciousness.

This is my interpretation of Chalmers's views of his *opus magnum*, *The conscious mind* (1996) as well as more recent articles. I conclude that the strong disjunction follows from his view that the physical world is causally closed. This world includes the brain. Chalmers does not himself apply the term exclusive *disjunction*. He may even disagree with it. It is my interpretation and conclusion. For Chalmers consciousness' uniqueness is so exclusive that any physical explanation is excluded. There can be only one unique consciousness explanation but not both. In my view an *inclusive disjunction* is more appropriate. Since it evolved from the physical (biological) brain, both apply: A weak or inclusive disjunction allows for the difference between the two as well as the novel of consciousness. Consciousness is indeed something novel and unique, but not absolute. This links up with being *causally closed*. Causally closed means that the physical world is causally self-sufficient:

Physical events can have only physical explanations, and consciousness is not physical, so consciousness plays no explanatory role whatsoever ... In each case the effect was a physical event and therefore must have an entirely physical explanation. Though consciousness exists, it plays no role either in the explanation or of anything else. (Searle 1997:154)

Chalmers (1996) argues that for every physical event there is a physical sufficient cause; conscious experience is not entailed by the physical properties although they may depend lawfully on those properties. Consciousness is a feature of this world over and above the physical features of this world – phenomenal properties are ontologically independent of physical properties. On the one hand the physical cannot causally impact upon consciousness and can also not explain it. On the other hand this new feature of the world, consciousness, has epistemological implications for Chalmers namely that as the phenomenal it is explanatory irrelevant and superfluous to everything physical that happens in the world and the explanation of human behaviour (Chalmers 1996). The physical world is causally closed. Consciousness for Chalmers is not part of the physical world. Chalmers's (1996) property dualism invokes fundamentally new features of the world. It follows from the disjunction I mentioned, that this *new* is neither biological, nor physical. Chalmers is mistaken on this. Consciousness is indeed something novel, *sui generis*, but why push it so far towards an exclusive disjunction?

This is an unfortunate conclusion by Chalmers, because this leaves consciousness as something impotent, and it comes very near to *epiphenomenalism*. Epiphenomenalism claims that consciousness has its origin in the physical brain, caused by it, but consciousness can have no causal impact on it whatsoever. It is like a puff of smoke from a motor car's exhaust. In his argumentation Chalmers does not mention, let alone take into account, the difference between physics and biology.

Chalmers however, by importing the exclusive disjunction, claims (unlike Searle) that consciousness is a phenomenal state and, unlike psychological ones, is not defined by a



causal role that it may play. Therefore he sees an explanatory gap between a functional and physical realm on the one hand and phenomenal consciousness itself on the other (Chalmers 1996).

Both Searle and Chalmers accept the ontological irreducibility of consciousness, but the consequences they deduce are not the same. Unlike Chalmers, Searle (1997) does not apply the exclusive disjunction and claims that irreducibility by itself is not a proof of property dualism.

From the strong disjunction, follows Chalmers's strange distinction between *consciousness* and *awareness*: The term consciousness refers to experience, *qualia*, or phenomenal experience. Awareness he suggests should refer to phenomena associated with consciousness, such as the ability to discriminate, categorise and react to environmental stimuli, the integration of information by a cognitive system, and so on (Chalmers 2001). Both Searle and Velmans disagree with Chalmers. Awareness for Chalmers can be given account of in causal functional terms while not so with consciousness. One problem with this is that without any consciousness at all, there is no possibility of awareness or any psychological reality (Searle 1997). Velmans (1995) thinks Chalmers's choice of the term 'awareness' for information processing functions is unfortunate. In common usage, the terms 'consciousness', 'awareness' and 'experience' are often interchangeable as are the terms 'conscious awareness' and 'conscious experience'. The ability to discriminate, categorise and react to environmental stimuli, the integration of information in a cognitive system, and the ability of a system to access its own internal states, can be accounted for (in principle) by information-processing terms which make no reference to consciousness or awareness (Velmans 1995:3, 4).

Chalmers's strong disjunction, explains why he distinguishes between the 'easy' and 'hard' problems of consciousness. Some are easier to explain than others; the easy problems are those that seem directly susceptible to the standard method of cognitive science, whereby a phenomenon is examined in terms of computational or neural mechanisms. The hard problems are those that seem to resist those methods. The easy problems of consciousness include those of explaining the following phenomena, for example, the focus of attention, the ability to discriminate, categorise, and react to environmental stimuli, the reportability of mental states (Chalmers 2001:1, 2). All of them are straightforwardly vulnerable to explanation in terms of computational or neural mechanisms (Chalmers 2001). The hard problem of consciousness is phenomenal consciousness itself:

It is widely agreed that experience arises from a physical basis, but we have no good explanation of why and how it so arises. Why should physical processing give rise to a rich inner feeling at all? It seems objectively insane that it should, and yet it does. (p. 2)

Velmans (1995) rightly disagrees: Many of the 'easy' problems of consciousness listed by Chalmers ... are, strictly speaking,

not problems of consciousness at all. Velmans (1995:5) does not exclude functionality from the phenomenal and he does not use the term 'awareness' used by Chalmers.

Exclusive disjunction and naturalism

Causality as seen above, implies that one set of biological or whatever facts can determine or cause other sets of facts such as consciousness, but need not be identical to it. Chalmers (1996) says biological properties can naturally supervene physical properties; yet the high-level properties are something over and above the basic lower level properties.

Ockham's razor tells us that in explanation we should not multiply things or entities without necessity. We must apply parsimony. Is consciousness such an unnecessary multiplication? Chalmers thinks that it is plausible that consciousness arises from a physical basis, even though it is not entailed by that basis. Very well, but this is somewhat inconsistent with his strong disjunction because it is difficult to see how he can maintain an exclusive disjunction, but at the same time declare that it arises from a physical basis which is causally closed. Like Searle, Chalmers argues that this arising does not imply a Cartesian separate substance. Yet, in my view, his strong disjunction gives the impression of moving very near to a Cartesian metaphysical substance dualism. Chalmers is however right that there are varieties of dualisms. Unlike a dualism, a duality does not claim that the consciousness is totally separate from the brain or the biological, but is connected to it; in fact, it is even biological itself. It is thus distinct and different from the physical, but not separate as a substance; caused by it, but not reducible and identical to it.

Saying that, Searle (1997) argues that consciousness is a natural biological phenomenon and is as much part of our biological life as digestion, growth or photosynthesis. This implies naturalism. It makes good sense. Indeed something *new* is emerging; consciousness and brains are both biological, but not the same. Compare the morning and evening stars. They are two aspects of the same thing, namely the planet Venus – no one is going to be a dualist about Venus. H₂O causes liquidity, but no one is a dualist about liquidity (Chalmers 1996). Consciousness is a natural biological phenomenon. Lower-level micro processes in the brain cause it and it is therefore a feature of the brain at the higher macro levels. This in my view is biological naturalism but not materialism.

As we saw, according to Chalmers, the phenomenal or consciousness is not caused by physical processes. However, Chalmers (1996) says consciousness can *arise* from the physical. If it is not causal, what is 'arising' then? Chalmers (1996:127) however, admits that: 'There is good reason to believe that there is a lawful relationship between physical processes and conscious experience, and any lawful relationship must be supported by fundamental law.' 'There is no *apriori* principle that says that all natural laws will be physical laws' (Chalmers 1996:170). This claim points to the

exclusive disjunction. This physical substrate must still be discovered and new fundamental features and supervenient laws are needed (Chalmers 1996). Chalmers (1996) calls this view *naturalistic dualism*. I have a problem with how Chalmers can call it naturalism if he strongly disjuncts consciousness from the physical-biological and implies that laws at the level of consciousness may not be naturalistic. That all natural laws need not be physical when consciousness has already arisen cannot be ruled out in principle. However, its existence has not been confirmed and as he suggested himself, in fact not even discovered. Not operating with an exclusive disjunction in mind, Searle avoids Chalmers's version of dualism, and argues that brains causally give rise to consciousness by means of their quite specific, though still imperfectly understood, neurobiological structures and functions:

We do not know the details of how brains do it, but we know that they have some powers to get us over the threshold of consciousness. That much causal power must be possessed by any successful artefact. (Searle 1997:158, 159)

Our brains are carbon-based. An artificial brain for Searle, using another medium, say silicon chips, must at least equal the brain's threshold capacity to cause consciousness. From this Searle, and I think wrongly, deduces that the kind of brain, say with a silicon base, is explanatory out of the question (Searle 1997:159). It is surely empirically unlikely that an artificial brain will give rise to consciousness. But can it be ruled out? Further, I think Searle does not take fully into account that the proponents of silicon or other alternatives to carbon, understands this within a natural biological context. Like Searle, Chalmers (1996) rightly claims that naturalism is not necessarily materialism. Most clearly his naturalistic dualism cannot be materialism, since it is in disjunction with the biological brain as something neurological. Again, it is problematic how with this dualism he can call it naturalism at all. To have an origin in something does not define it necessarily. Contemporary astronomy has its origin in astrology, but is itself not astrology; likewise is Chalmers property or naturalistic dualism. A commitment to a naturalistic understanding of the world can survive the failure of materialism (Chalmers 1996:128). Physicalism and materialism is naturalism, but not all naturalisms are physicalisms or materialisms!

Even so, I argue that something novel in consciousness emerges from the neurological substrates. Chalmers and Searle accept and presuppose the theory of evolution, but could have made much more of it. It is not accidental that consciousness evolved from not only human neural substrates, but also from other non-human mammals like primates, cetaceans and others. But what is novel about consciousness that has emerged? Are we not just physical, star stuff (Sagan 1980)? How can the novel evolve?

It can and it does:

So when we say that the living is *essentially* something different from the non-living, we then mean: although the B life evolved

from A, B is not the same as A. The *evolving from* implies that there could not be equality between A and B. B evolves from A, thus B is not the same as A. (Delfgaauw 1967:25–26)

Evolution would be very uninteresting and impotent if everything remained at the same structure and content (Delfgaauw 1967). We are the same chunks of matter, star stuff, with its same structure and dynamics. But we are not the same. The novel, infinitely more novel, has emerged.

But what is this 'novel' as to consciousness? The third-person perspective is firmly established in science. Previously it also thrived in another way in the behaviourist paradigm of the human sciences 'which can be characterised as, "[i]f you can't see it from the outside it does not exist"' (Velmans 2001:5). Saying that, Chalmers is concerned about the scientific status of a new non-reductive theory of consciousness he is working on: Consciousness itself is not as a third person entity available for empirical testing. Therefore he 'proactively' claims that empirical evidence is not all that we have to go on in theory formation. There are also principles of plausibility, simplicity and aesthetics, among other considerations relevant to non-reductive theory formation. Rigorous intersubjective testing is not always possible: 'Because consciousness is not directly observable in experimental context, we cannot simply run experiments measuring the experiences associated with various physical processes, thereby confirming and disconfirming various psychophysical hypotheses' (Chalmers 1996:215). Chalmers is not wrong when claiming that there are other principles besides empirical evidence. However, I think his real concern is his view of consciousness as something beyond the physical and biological (disjunction). Consciousness is something novel yes, but not something alien. Although not reducible to the physical brain, consciousness cannot be said to be totally severed from the empirical. In my approach, a duality is unlike dualism, compatible with an inclusive disjunction.

Again what is the novel about consciousness? We unavoidably and continuously strike against the obvious fact that we all have inner, qualitative, subjective states such as pains and joys, memories, receptions, thoughts, feelings, moods, regrets and hungers (Searle 1997). The point is that we experience these as *first person* facts.

One cannot find consciousness by any conceivable histological examination of the brain ... In short, while it is likely that consciousness will eventually be found to be *associated* with given forms of processing, it looks increasingly likely that consciousness cannot be *reduced* to such processing. (Velmans 1995:2)

Consciousness as first person ontology is essentially more than that; consciousness can be defined as an inner, first person, qualitative phenomenon (Searle 1997).

According to Searle (1997) neural pathways exist independently of being experienced in the way pain does: subjectivity and consciousness *exist at a higher-level than that of neurons and synapses*. Consciousness does not seem to

be physical in the way other features of the brain are, like neurons, synapses, axons, and dendrites; I experience my shoes not in the same way that I experience pain.

They are subjective, because my joy or pain has a certain *qualitative peculiar feel* that is accessible only to me, in a way that is not accessible to somebody else. It is qualitative in that for any conscious state (pain) there is something in that *it qualitatively feels to be in that state* (Searle 1997). Even if we know every last detail about the brain physiology and anatomy, we would not be able to know anything about consciousness unless we have experienced it directly. Nagel's (1986) founding of first person ontology can still be maintained.

Does the new physics meet the challenge of consciousness?

In the last three decades several physicists, biologists and philosophers proposed that the new physics (relativity), quantum chaos and complexity theories could be the key to the explanation of consciousness. Francis Crick and Christof Koch in 1994 have hypothesised that 40-hertz oscillations in the visual cortex and elsewhere may be this fundamental neural feature responsible for conscious experience; the idea is to develop a neurobiological theory along these lines (Chalmers 1996). Chalmers is not much impressed; he claims that the key question remains unanswered: Why should these oscillations be accompanied by conscious experience (Chalmers 1996:116)? What he implies is that if it is accompanied by conscious experience, the problem of consciousness is explained. However, he does not give specific reasons why he claims this, except that he presupposes his argument on physical structures (see next paragraph). Has Crick not elaborated enough on this? Are there good reasons for his denial? His dismissal seems to be not well considered.

'Classical' physics consists in an arrangement of particles and fields in the spatio-temporal manifold, underlying complex processes of causation and evolution (Chalmers 1996:107). Chalmers is negative and claims that the new physical theories would not crack the hard nut. 'The trouble is that the basic elements of physical theories seem always to come down to two things: the structure and dynamics of physical processes' (Chalmers 1996:118). If the new theories also consist in the description of the structure and dynamics, fields, waves, nanoparticles and the like, then all the usual problems will apply:

And it is unclear that any sort of new physical theory could be different enough from this to avoid the problems ... Different theories invoke different sorts of structure. Newtonian physics invoke a Euclidean space-time; relativity theory invokes a non-Euclidean differential manifold; quantum theory invokes a Hilbert space for wave functions. And different theories invoke different kinds of dynamics within those structures: Newton laws, the principle of relativity, and the wave equations of quantum mechanics. But from the structure and dynamics, we can only get more structure and dynamics. This allows for the possibility of satisfying explanations of all sorts of high-level

structure and functional properties, but conscious experience will remain untouched. No sets of facts about physical structure and dynamics can add up to a fact about phenomenology. (Chalmers 1996:118)

(By 'phenomenology' Chalmers of course does not mean, for example, Husserlian phenomenology, but the *phenomenal consciousness*). Chalmers's argumentation about structure and function above is good, but he again too simplistically and quickly dismisses the new theories. He does not give new theories a 'chance' to progress further. To claim that from the structure and dynamics, we can only get more structure and dynamics (all the same) surely does not apply to complexity theory and the theory of evolution. To say that new theories are also comprised of the description of structure and dynamics is not wrong. But this is so broadly formulated, it nearly becomes empty.

Chalmers does not take too much into account that the structure and dynamics of quantum and complexity theories are vastly different from those of classical theories. Non-linear chaos and *complexity theory* give a radically different account of the emergence of consciousness. It is not just another structure and dynamics. Complexity theory in linking up with the theory of evolution, argues that novel emergence in evolution, emerges as *wholes, which cannot* be explained fully from the parts (neurons, synapses) from which they emerged – consciousness can be seen as a whole, which is larger than its components. These wholes are primarily constituted by non-linear relationships. Spontaneous self-organisation plays a crucial role in the process of emerging. *Complexity theory* in claiming this does not eliminate linear causality. On the contrary, it supplements or enhances it, for example, *natural selection* as a causal theory is maintained, but then enhanced by self-organisation. This looks promising as an exploratory and explanatory attempt for consciousness.

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Within quantum theory attempts were made to explain consciousness. This theory that is also non-linear is in my view, like complexity theory, logically compatible with the idea of consciousness. It is especially freedom of will and decision that become relevant here. Work in this area was and is being done by Roger Penrose and Stuart Hameroff. Professor Penrose is the Oxford mathematician – philosopher. Stuart Hameroff is emeritus professor in the department of anaesthesiology and psychology at the University of Arizona and did much research on consciousness.

Penrose suggested that the key to the understanding of consciousness lies in a theory which reconciles quantum

theory with the theory of general relativity. He suggested that gravitational effects not yet understood may be responsible for the collapse of the quantum wave function, leading to a non-algorithmic element in the laws of nature (Chalmers 1996). Drawing on the ideas of Hameroff, Penrose (1990) suggested that human cognition might depend on quantum collapses in *microtubules* (protein structures found in the skeleton of a neuron). Both suggested that quantum collapses in microtubules may be the physical basis of conscious experience. Let Hameroff (1997) speak himself:

However the work that I have done with Roger Penrose predicts a threshold for emergence of conscious experience at a level of microtubule complexity and quantum coherence in roughly hundreds of neurons. This level if found, for example in small worms, tiny sea urchins, and other similar creatures. Bacteria and protozoa like paramecia are below that line, so, in this view, they would not be conscious. They would be more like a proto-conscious – something like a primitive sub-conscious or dream state. (p. 3)

In another article, Hamerhoff from his own premises came very near to Nagel, Searle and Chalmers's view of consciousness as 'over and above' the neuronal:

Despite the fact that in any given instant we may have a hundred billion neurons firing all over the brain, we somehow have a sense of oneness. You are one person, I am one person. ... This unity or binding is a feature of consciousness, which, along with the others, can be explained by quantum theory ... Consciousness happens all over the place, and in the same neurons that were preconscious. So some event happens. Some process or transitioning is occurring. (Hameroff 1997:4)

Or:

I think of consciousness as our 'inner life' – a series of multimodal integrated experiences ... the weird thing about consciousness is that it is unobservable. I think *the essential ingredient of consciousness is this experience that we have*. (Hameroff 1997:3; [italics original])

Hamerhoff (1997), in agreement with the philosophers, again for his own reasons, realised and acknowledged that there is indeed a problem of transition from the neuronal to inner life: consciousness. Also in agreement, he states that a brute reductionist approach to consciousness is not acceptable:

As I said, I could not accept the reductionist approach that consciousness involved a hundred billion neuronal switches analogous to a computer, and as I am interested in the idea that microtubules were processing information inside neurons ... I realized that even if microtubule information processing was essential for normal neural cognitive function, it didn't really explain consciousness any more than information processing at the neural level. (pp. 4, 5)

Penrose (1990) suggests that elements in the collapse of wave function could explain certain aspects of our mathematical insight, which he believes goes beyond the capacity of any algorithmic (read: linear) system. Hameroff suggests that the collapse of a superimposed wave function might help to explain certain aspects of human decision-making. Chalmers

(1996) again sceptically asks why quantum processes in microtubules should give rise to consciousness. He argues that it is not much different from and as hard as the classical physics processes of the brain (Chalmers 1996:119). This is plainly wrong. The disjunction in the back of his mind, makes him nearly epistemological dogmatic in his dismissal of quantum theory as an explanation. The reasons I mentioned above on compatibility apply. One could add: If quantum processes could give rise to consciousness, his disjunction is challenged.

Chalmers is negatively critical (and I think wrongly so) and dismisses Penrose's and Hameroff's hypothesis. He claims something extraordinary is needed. He admits that quantum mechanics is by far the most extraordinary part of contemporary physics – but in the end it does not seem extraordinary enough (Chalmers 1996:119). I disagree since his 'extraordinary' is informed by his exclusive disjunction. Being 'either-or' he surmises that the extraordinary of consciousness is so beyond the physical, whether quantum or not, that any physics approach must fail. Indeed, Penrose's and Hameroff's hypothesis on consciousness is not yet confirmed. It is what I would call an exploratory hypothesis. However it is plausible. Research is ongoing. It still has not explained consciousness completely, but I think their exploratory research has opened up new routes, which will let us move nearer to an explanation.

The reason? Unlike classical physics, the non-linearity of this quantum explanation is in a logical sense nearer to and compatible with the idea of conscious free will and freedom of decision. It is more compatible than linear classical physics. This non-linearity and its 'acausality' is not the same as free will and decision-making or consciousness itself, but logically speaking it is nearer to the 'nature' of consciousness than the classical variety. It offers avenues for further research. It is a radical and not trivial break from 'classical' physics. It removes the linear physicalist barriers to consciousness. One cannot just beforehand rule out the possibility that quantum collapse may be the physical basis of emerging biological structures and eventually conscious experience. I think the main reason for Chalmers's dismissal must be seen in the light of his background of exclusive disjunction.

A last example (still quantum theory): It has been suggested that the non-locality of quantum mechanics, as suggested by the Einstein-Podolsky-Rosen paradox and Bell's theorem (Chalmers 1996:119), might be the key to a theory of consciousness Chalmers (1996) is negatively critical and says that even if physics is non-local:

[I]t is hard to see how this should help in the explanation of consciousness; Even given a nonlocal physical process, it remains logically possible that the process take place in the absence of consciousness; The explanatory gap is as wide as ever. (p. 119)

The radicalness of non-linearity makes it more compatible with what consciousness involves. It indeed made the gap smaller.

Chalmers's (1996) claim that processes take place in the absence of consciousness is rather a further confirmation of my view as to the exclusive disjunction. Chalmers (1996:120) admits one cannot rule out the possibility that the new fundamental physical theories may play a key role in a theory of consciousness, for example perhaps consciousness will turn out to be associated with certain fundamental properties, or perhaps there will be a new subtle link. Very well, but how can it play a key role if the physical world, including the quantum one, is causally closed? What would then a 'key role' be? No one required a *wholly* physical explanation (which Chalmers fears). At issue here is not an ontological reduction of consciousness of the brain, but an epistemic one. Ontological reduction was not mentioned at all by new physics. It is about an explanation of consciousness in the vicinity of new physics. The scientist Hameroff (1997:3, 4, 7, 10) is aware of and sympathetic to the philosophers Nagel, Searle and Chalmers's views on the non-reducibility of consciousness.

It is manifest in the causal effect of consciousness upon behaviour. Chalmers (1996:28–29, 220–246, 225–229) is eager to postulate such rules because he is dragged between his awareness and consciousness distinction, thus isolating consciousness from the empirical and scientific testing. I argue: Physical-chemical realities do influence our behaviour. We are never completely detached from them, but they do not determine us completely (sometimes they do). Therefore I distinguish between influence and determination. Consciousness as manifested in free will decisions and behaviour can in principle be confirmed.

Chalmers (1996:102, 106, 107–108) is right that the arising of consciousness is as baffling as ever. Until today it is a 'hard nut' to crack. Searle said we still do not understand exactly how it works, but eventually we will. Others like Colin McGinn (1991) are more pessimistic. McGinn even calls it in principle an unsolvable problem. McGinn suggested that human beings are forever blocked from knowing the 'link' between the brain and consciousness, roughly because introspective consciousness gives no knowledge of brains, while neuroscientific access to brains gives no access to consciousness.

Functionalism

Chalmers (1996) caused a stir by joining in with functionalism. Functionalism does not explain consciousness, but rather awareness. For functionalism the content of the brain is not of so much importance, but the way in which it causally structures and operates. Searle (1997) argued that functional relations in the brain can give rise to consciousness, but the neurons are not themselves conscious. For functionalism belief *consists* entirely in having the right functional causal relations. Searle is not convincing in calling it implausible and describes Chalmers's thinking here as an odd marriage between functionalism and property dualism. Indeed some (but not all) functionalists lean towards materialism, but materialism is not necessarily implied by

functionalism. Functionalists leave it open as to what the content (matter or whatever) of consciousness is. I argue that functionalism does not logically supervene materialism. It is to the credit of functionalism, which has rightly (in my view) indicated that brain states and functions can be realised in more than one way. If the causal relatedness of neural brain functions is duplicated in another system – not made up of neurons, but say silicon – then consciousness can also be realised. It is *multiply realisable*. The human brain with its neurons, which are carbon-based, would then be isomorphic to say, a silicon brain. This is why I argue that an extraterrestrial brain with a different content than ours would not only be possible, but there would also be similarity in experiencing his or her world – including logic and science. Searle's description of functionalism is somewhat of an oversimplification, even though he is right on its priority of causality.

To relate to functionalism is thus not a too far-fetched idea. For Chalmers (1996) consciousness is something in addition to and not part of the physical world (exclusive disjunction).

There is nothing *fundamentally* ontologically new about properties such as fitness, as they are still supervening upon microphysical properties ... By contrast, the property dualism that I advocate involves fundamentally new features of the world. (p. 125)

I argue that consciousness is indeed something novel emerging from the neuronal, but this novel consciousness needs not imply an exclusive disjunction. In terms of evolution it is something novel. One can thus speak of a duality – but not necessarily a Cartesian substance dualism.

Conclusion

Even though the identification of consciousness with the brain is coherent, consciousness poses the greatest difficulty to be exhaustively explained with the methods of physics. Consciousness is not identical to the brain, but something over and above it. Consciousness is epistemic reducible, but not ontological.

From his view that the physical world is causally closed, the article concluded that Chalmers operates with an exclusive disjunction. It was pointed out why this is problematic. An inclusive disjunction would explanatorily be more appropriate.

To exclude causality completely from consciousness is to leave consciousness impotent. By understanding consciousness as a natural biological phenomenon, epiphenomenalism can be avoided.

Chalmers's distinction between consciousness and awareness is unconvincing.

Non-linear quantum theory like complexity theory is compatible with the idea of freedom of decision. It makes

the explanatory gap smaller. The scientists Penrose and Hameroff, on quantum collapses in microtubules as physical basis of conscious experience, are taken into account.

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