

**Sabine Windmann**

Johann Wolfgang Goethe University of Frankfurt, Institute of Psychology, Mertonstr. 17, D-60054 Frankfurt/Main  
s.windmann@psych.uni-frankfurt.de

**Ten Models of Consciousness**  
**That Are None**

**Abstract**

*Ten models of consciousness are discussed. The models are proposed by individuals who do not seem to understand “the hard problem of phenomenal consciousness”, presumably because they have no qualia themselves. As the Zombie’s proposals are dismissed, the quality of their comments and contributions rises. It is concluded that no premature solution to the hard problem should be proposed at this point; instead it is suggested that the problem must first be appreciated to full extent by scientists and students of all faculties dealing with information processing in the human brain. Ultimately, the question is why the brain, when in a particular state, experiences its own activity qualitatively. The answer to that question will probably expand the current ontology of physics.*

**Keywords**

phenomenal consciousness, qualia, zombie, neuroscience, physicalism, philosophy of mind

Why do people bother about consciousness? Why should it be such a big problem? Why can we not leave it to the philosophers? “Give them something to do!”, George Mandler ridiculed in a keynote address at a big Psychology conference 1996 in Munich. After all, the problems that cognitive neuroscientists are working on “are *all* hard!” said Patricia Churchland at the annual meeting in San Francisco in 2000 (the audience applauded, just David Chalmers smiled).

I have often wondered whether some colleagues may be Zombies who you cannot argue with, as Jaron Lanier (1995) stated (who later in that article turns out to be a Zombie himself!). I don’t mean this in a disrespectful way (although admittedly, we would probably behave less considerate towards others if we did not believe that they had qualitative experiences). I just don’t see how anyone can be as smart as Crick and Koch (1990) and still believe that the question of qualia will simply “fall into place” whilst we are working on the easy problems, e.g., identifying the neural correlates of visual awareness. David Chalmers (1995) seems to be one of the very few who understands, and yet he does not, as he mixes up the physical world with mental entities when he believes that “information” might have a phenomenal side just like a Zombie whose neurons are silicon chips.

I have tried to argue with a Zombie before (Windmann, 2005), but received next to no feedback, perhaps because I wrote in German. In this article, I will try to explain once more to a bunch of Zombies bombarding me with their objections to my point of view why I think that consciousness, defined as sub-

jective qualia, extends the ontology of physics, which makes it an intractable problem at present.

I will illustrate the point with the example of colour perception. Colours do not exist in the outside world, according to physics; what exists are only surfaces that absorb certain wavelengths and reflect others. Subjectively, we use colours for example when we differentiate between a ripe tomato that is red and an otherwise identical green tomato that is not yet ripe. We need to make this differentiation between the two tomatoes to behave adaptively and eat the ripe one, not the unripe one.

However, when we look at the colour of the ripe tomato, what “really” happens (by really, I mean, objectively, physically) is that a photoreceptor in the retina responds to the wavelength of about 650 nm, generates electrical impulses that are forwarded to the visual cortex where neurons are activated, which in turn activate further neurons and these further neurons etc., until motor neurons get activated and govern the behavioural output. When we look at the colour of the unripe tomato, a slightly different process takes place because the wavelength is about 500 nm, stimulating different photoreceptors and neurons and activating a different cascade of neuronal processing, yielding a different motor output. It is not important what exactly is different or at what level, the only relevant point is that something in the way the visual system responds to these two wavelengths is different.

The essential point to understand here is that from a scientific point of view, this differentiation between 650 and 500 nm at the neuronal level is all we need, first, to make a behavioural distinction between the two tomatoes in order to behave perfectly adaptively, and secondly, to describe the underlying processes with scientific means. We need no other variables than the ones sketched here (measurable, definable entities and forces) to causally explain the behaviour and the mediating neuronal processes. We need not refer to “green” or “red” or other entities which exist only subjectively. These qualities seem theoretically redundant (not necessary to explain behaviour) and empirically not existent (not observable).

Now Zombies, take it away!

Zombie 1, probably a molecular biologist, asks: *I don't see the problem or why it is hard. In fact, I get annoyed when people argue about consciousness. Don't they have anything better to do, run a couple of carefully designed experiments for instance? They would be welcome in my lab! There we don't talk much about “the mysteries of the soul”* [Zombie is rolling his eyes], *WE WORK!!*

I am glad Zombie 1 is the first to ask his question as this gives me the opportunity to try and explain in a nutshell what the problem is. Science deals with objective reality, trying to find out the laws of nature and the universe. Phenomenal consciousness, however, i.e., qualitative experience, is entirely subjective. It cannot be observed or measured, neither with self-report nor with neuroimaging or intracranial recordings of any sort. What can be measured is only the neural correlates or observable behaviour, but whether or not these are accompanied by subjective qualities, and which ones, is only indirectly inferred on the basis of one's own ability to experience. Qualia are fundamentally private and therefore resistant to scientific investigation. If you are a scientist who is taking their business seriously, you should get worried because you are missing out on something!

The core of the problem is quite simple, really. Subjective qualities do not (or should not) exist in (proper) physics, biology, or chemistry. As a result, I cur-

rently see no way that phenomenal experience can ever be derived from the biophysical properties and dynamics of neuronal activity. Some colleagues have proposed nonreductionist approaches as a solution but I do not find these interesting as they describe, but do not explain, the phenomenon – explanation in a causal sense clearly requires referral to more fundamental entities and laws. I can see models of self-reflection, introspection, meta-awareness and all other sorts of complex cognition that one can principally observe in brain and behaviour and program a neural network to do. However, none of these functions give rise to “red” or “green” (as opposed to just wavelength detection), to smell (as opposed to just chemodetection), or to pain (as opposed to detection of system damage), at least I don’t see how or why. There can be (and is) modelling of all sorts of such “easy problems” associated with what is called access consciousness (Block, 1995), including attention, thinking, reasoning, problem solving, etc., but I don’t see how any of these models give rise to subjective qualities, be it through synchronous oscillations, global workspace coherence or quantum mechanics. All these models and approaches describe or simulate functions and dynamics of physical forces and entities, but they do not specify whether and how these functions are accompanied by or are identical with or give rise to subjective qualities (Chalmers, 1995). And besides, if they did, we would urgently need ethical guidelines for the development and use of neural networks, if not computers and other machines in general, that can principally implement these functions!

Zombie 2, and elderly person, scratches his long white beard and asks: *I think you have a very simplistic, if not naïve, understanding of science and reality. We all know that science can never bring out the objective truth! Everything we appear to have “discovered” is only constructed in our senses and minds, and is therefore utterly subjective anyway. Marx has already noticed that, alongside a number of influential philosophers who no one in this fast modern world ever seems to read or listen to or communicate with... The mistake you are making is believing in the objective existence of an outside world!*

All that I am assuming is that nature and the universe still existed even if humans didn’t, meaning, if an asteroid crashed down onto the earth and wiped out all human existence, there would still be a universe left that exists and continues to exist and that could be scientifically studied and described in physical terms (if only there were anyone left to do that). Eventually, new life on earth might emerge as there would still be the chance for evolution for as long as there is water and the atmosphere etc. Eventually, some forms of that life would perhaps develop subjective qualities (but what forms?).

If you think otherwise, then first of all I do not understand why you are a scientist as there is nothing relevant to discover. It is all just an illusion anyway. Secondly, I don’t understand why you trust airplanes or any other technological invention that is based on that very same assumption I am making. Instead, you keep using these while polluting the earth and exploiting its resources. Why don’t you just beam yourself wherever you want to go? Why don’t you just solve all the world’s problems in your head if it is all just in your mind? For the remainder of the discussion, I take no further questions from Zombie 2.

Zombie 3, a friend of Zombie 1, jumps in and says: *Yeah, I don’t like that sort of crap either. Let’s stick to the facts. Every student of Psychology learns in their first semester that we need to define a concept in operational (objective) terms before we can investigate and explain it. But for consciousness, I think Daniel Dennett (1991) has already done that! It has to do with self-reflection and metaawareness and such sorts of things. Shortly thereafter, Flohr (1996)*

*came along and even described the neural underpinnings of it, it's a receptor called NMDA. When this receptor is activated, the brain forms metarepresentations that encode or monitor the presence of simpler neuronal processes which thereby get experienced. I don't see any more questions. Can we go home now?*

Such cases have been dealt with by David Chalmers (1995) and I have nothing to add. Some colleagues take the easy way out and deny the problem – they do not accept or talk about anything which cannot be shown scientifically, and simply treat qualia as if they were observable. For instance, they describe some objectively observable process, like the neuronal dynamics underlying metacognition (metarepresentation), and simply claim that these “are” subjective experiences, without saying how and why (as for myself these are still simply a bunch of neurons firing in a particular pattern). The question of metarepresentation or metacognition or of any representation or cognition might be interesting in their own rights from a cognitive neuroscience perspective, but for as long as they do not logically explain why 650 nm “is” red and 500 nm “is” green, and not the opposite, or no colour at all, they have not explained the hard problem. This is where I start wondering whether some colleagues have phenomenal experiences themselves!

The problem is that there is a fundamental difference between, on the one hand, firing neurons, or ensembles of neurons, at whatever level, that are instantiating metarepresentation and metacognition or any other or cognitive function relevant to behavior, and on the other hand, seeing green and red or feeling pain. One is seen from a third-person perspective, a perspective that seems complete and not lacking anything fundamental, and the other is seen from a first-person perspective, and can only be seen in this way. Between the two there is an explanatory gap that cannot be bridged for as long as subjective qualities cannot be detected by a third person. The third person (as well as the rest of the outside world) have no means of getting in touch with the qualities of the first person, they can only get in touch with the first person's behaviour or brain states, no matter how sophisticated and computationally powerful these are. Why then is there an extra ingredient – the qualities?

It follows that qualities appear redundant in terms of natural selection and evolution. All that helps for survival, and all that natural selection can operate on, are features and functions that are observable (i.e., the phenotype). Subjective qualities are not of that nature, they do not interact with anything physical and therefore seem pointless.

*Zombie 4: Wait a minute. There is no need to become dualistic. If phenomenal experience has no behavioural function – that does not mean the qualities are not existent. Many cognitive functions are latent and do not manifest themselves in behaviour. Maybe these are simply epiphenomena!*

Well, first of all, any cognitive function is observable. Even if it does not seem to directly alter your behaviour, it will use resources (energy) and be accompanied by measurable neural activity. As a result, it will indirectly alter behaviour, maybe just by slightly delaying a response, maybe only by altering the activity history stored in your neuronal networks – which will alter information processing at some time in the future, at least to some degree, and ultimately does influence behaviour. It is truly possible that processes which have no adaptive value can nonetheless survive evolution (when there is insufficient selective pressure). But what is impossible is that these processes

are neutrally implemented and yet are energetically effectless, so that they do not interact with any other material or energetic structures. This, however, is what seems to be the case for subjective qualities.

Secondly, I am not a dualist. I agree that qualities depend on neuronal functions. The simple proof is that I can change my qualities (in a predictable way) by changing my neuronal activity, e.g., I can guarantee that my subjective qualities will be different after I have had a few glasses of wine (actually, half a glass is enough in my case). Or I could use transcranial magnetic stimulation to manipulate subjective qualities in a predictable way. So the qualities emerge from the brain, or depend on brain function, somehow. But how do they, in turn, impact on neural processing and cognitive behavioural functions?

The assumption of epiphenomenalism states that while neurons arise out of neuronal activity, they are themselves energetically effectless and therefore have no impact on further neuronal processing or motor output (behaviour). While this proposal is tempting at first sight, it is genuinely inconsistent with the first law of thermodynamics (energy is preserved and does not get lost). Furthermore, and more importantly, it is also at odds with my own personal experience. If anything that I know is implemented in the neural networks of my brain, but qualities have no impact on neural processing, then how can I know of my own qualities?

Zombie 5, an evolutionary psychologist working with Oliver Vitouch (2001), says: *I have no idea what you are talking about. Of course qualities have a behavioural function! It is only because of the redness that the ripe tomato appears attractive to me, it is what motivates me to eat it. I reject the green tomato because the colour signals to me that it is not ripe. I withdraw from something that hurts and I approach something that feels good. I would not have any motivation to do so (and hence would not be able to survive) if I did not experience these qualities! They tell me what to do and what not!*

In saying this, you have switched from the third-person to the first-person perspective which is not considered legitimate in science. Whatever you put into the scientific discussion has to be objective so that others can understand what you mean and reproduce your data. This is why any subjective terms have to be defined operationally before you work on them, a lesson learnt in first semester of Psychology as Zombie 3 has pointed out. In fact, subjectively you might be right in what you are saying (I cannot judge that). Objectively, however, the truth is that you are grasping and eating the 650 nm reflecting tomato simply because your neural system is wired up to do so, and you are retracting from any painful stimulation simply because your system is wired up to do so. The wiring of your system is very complex and very flexible and state-dependent (e.g., you'd probably behave differently if your blood sugar levels were high enough or if the 650 nm reflecting tomato was in another person's possession who you do not want to get into a fight with). It is the result of a long phylogenetic and ontogenetic learning history. Many people (and cognitive psychologists, especially those ignorant to behavioral ethology) do not seem to be able to imagine that this level of complexity can be entirely the product of natural evolution, without any extra ingredients. These people usually refer to emergent properties of a system, thereby mystifying what needs to be causally explained, and disregarding the fact that these phenomena can principally be modelled in nonlinear neural networks. But from a strictly scientific standpoint this is irrelevant, for the truth is, if your system were not wired up such that you behave the way you do, you would not be here today. Your ancestors would have died out a long time ago. It is as simple as that.

*Zombie 6: You cannot apply the same logic to all species. Humans are not passive observers of their evolution, they actively shape their genetic makeup and the environment in which they live in with their technological, cultural, and scientific achievements, much unlike any other animal. This would not have been possible without consciousness. We need consciousness to be able to reason and think and solve problems, which are ultimately human capabilities.*

It is true that humans are shaping evolution. But I don't see how this can have anything to do with subjective qualities. What is it about even the highest cognitive functions that should help us see red or green? Tell me the neural process, tell me the cognitive function that makes it happen, and tell me why! Conversely, what is it about subjective colours (as opposed to the associated neural processes) that should make complex neural processing more efficient? What is the physical process associated with colour perception as opposed to the same neural processing without colour perception that alters subsequent neuronal processing and therefore makes a difference at a higher level? And why should someone with brain dysfunction who is intellectually retarded not be able to see red and green the same way I do? Why should my neighbour's cat, which is clearly unable to reason much, be unable to see colours? And what about newborn babies – they cry from pain, but can they solve problems?

*Zombie 7, a neurobiologist recording in vivo from the visual system, says: There are colour neurons in V4. When the right ones fire, you see red, when others fire, you see green (it is a bit more complicated than that, but I do not want to challenge you). The firing of those neurons IS red or green. Therefore, your question what difference a neural process with colour perception should make to subsequent processing relative to one without colour perception does not make any sense.*

Dear Zombie 7, have you listened to anything I said? Those neurons fire when there is retina stimulation of a particular wavelength. From a scientific perspective, what these neurons are representing, are wavelengths of a particular kind. We call these "colours" when we speak, but when forced to define what we mean, we refer to wavelengths. The experience itself cannot be defined or described. For the same reason, we cannot verify whether anyone who uses the terms "red" and "green" to refer to wavelengths of 650 and 500 nm, respectively, experiences these colours the same way we do or experiences colours at all. Maybe s/he has just learnt to use these terms when speaking of the wavelengths and does not really know that something (something subjective) is missing. It would also be impossible to tell anyone who is colour blind what "red" and "green" means and what these look like. The colours are entirely subjective and cannot be shared, communicated, or otherwise intersubjectively verified.

*Zombie 8: Why do we keep talking of colours and pain. Why not talk of emotions? Fear, happiness etc, the stuff that makes life worthwhile living? The stuff that makes you know what you like or not? You have got the function of those qualities right there! Survival value is what it's called!*

When we investigate emotions or other complex brain states and processes, we would first have to tease these apart into their subcomponents, e.g., physiological components, cognitive components, brain states, and perhaps other components that can be experimentally investigated to explain them. These have clear survival value and can be explained in reductionist terms. Some-

thing would be left out though, namely the subjective part of the emotion, what it feels like to be in that state. It is only that part which is a problem and that does not seem to have an evolutionary function, but it is harder to isolate that component from the others in the case of emotions than it is in the case of colours which are elementary and cannot be reduced further (subjectively). Researchers like Damasio (1999) claim that they investigate the subjective feeling of emotions, but what they really do is observe behaviour, including neural activity and self-report. They then infer from this behaviour how they themselves would feel if were in that state, i.e., showed such behaviour, activated these neurons, gave this self-report, etc., but this is only indirectly inferred on the basis of their own capability to have qualities. In no case is it directly (or indirectly) *measured*. It is theoretically possible that the subject of their studies does not feel any qualities at all, but merely has a neuronal system that is set up such a way that the person acts the way s/he does and gives those responses. After all, the person is a product of evolution and ontogenetic learning, by which his/her neural system has been shaped. Therefore the person will be able to perfectly act and interact with other individuals, and talk of green, red, pleasure and pain, even if they have no qualities at all. For the point is, there are simply no qualities needed to respond perfectly appropriate and normal. Conversely, I do not know whether Damasio has qualities or is a Zombie. Maybe he is just talking about behaviour, brain states, physiology, when he is talking about feelings. I have no idea – at times, he seems to make a distinction between the objective and the subjective, and yet at other times he confuses the two, so I really have no idea whether he himself is a Zombie or not.

Zombie 9 is becoming impatient and says: *It is clearly a mistake to look at emotions or colours and other processes within the individual brain when you want to understand consciousness. Have you never heard of Wolf Singer (1998)? He has said a long time ago (e.g., in a talk he gave 1998 at the ASSC conference in Bremen, Germany), that he does not understand why is it so hard to see that phenomenal experience emerges as a cultural phenomenon! It emerges when many brains come together and communicate with each other. That means, you cannot explain consciousness from the individual brain! The sum is so much more than the parts, you reductionists, as new properties emerge from interactions of simpler systems!*

Okay, here we go again – the mysterious emergence of new properties. Let me first reiterate that whatever properties a system has, they would have to be definable and observable and deductible from other properties if physicalism is true. Second, regarding your proposal is that qualities arise out of (nonlinear) interactions between brains of individuals as a socio-cultural phenomenon: I think this idea is very easy to dismiss. First, if someone grew up in isolation from other humans like an *enfant sauvage*, we would probably still assume (though be unable to verify) that s/he has qualitative experience like seeing colours and feeling pain, wouldn't we? Second, if you were to make the assumption that socio-cultural processes give rise to qualia, you would have to specify how society and culture impact on the individual to make that individual generate or experience qualia. According to everything we know today, the only route such influence could take is via the senses and the brain of the individual. Therefore, when referring to socio-cultural phenomena, you still have to specify how the individual brain generates qualia.

Zombie 10: *Heyheyhey, relax. I don't think we need to go up to the sociological level. It is really much simpler than that. I am working in a psychophysiological-*

*cal laboratory doing research on pain. And I must say, of course we measure the subjective quality of pain. We use electroencephalography (EEG), electrodermal activity (EDA), diaries, questionnaires, behavioural indices such as the cold pressor test and many other experimental techniques. We can indeed tell you something about the subjective side of this quality pain. We find that it has an affective component: it can be bothering you or putting you in despair; it has a sensory component: it can feel tickly or stingy or sharp or pinchy; and it also has a cognitive component...*

Let me interrupt you right here. Would you want to team up with Zombie 5 and think this through first please? What you are measuring with your questionnaires is self-reported behaviour, with your EEG is neural activity patterns, with your EDA is peripheral physiology. You are not *measuring* qualities, you are inferring these. From a scientific standpoint, you don't have any evidence of whether your subjects feels anything when they say "ouch" or whatever – they do this only because their system is wired up that way.

Zombie 10: *But that makes no sense. Why should it be wired up so that the person says "ouch" when they don't feel any pain?*

Because this is what the participant has learnt through ontogeny and phylogeny to be able to communicate and function well and ultimately survive. After all, "ouch" calls for help. Maybe it also changes internal dynamics in a way that helps neuronal processing, relaxation of muscles, respiration, whatever. No more questions of that sort please!

Zombies 5, 7, & 8: *But could the motivation for behavioural tendencies like approach and withdrawal not perhaps be amplified or augmented or sharpened in some sense by the qualities?*

Why would the system need qualities for that? All it needs is the neural process that amplifies, augments, sharpens, etc., the other process. The point is, any process that is neurally implemented needs only that neural implementation to become neurally (and thereby behaviourally) effective. Once it has a neural implementation, it can exert its effects onto the system without any qualities.

Zombie 11: *Well then maybe the qualities cannot be explained. They are simply there, like Chalmers (1995) says. They like extra ingredients which cannot be reduced further; just like other fundamental entities in physics such as mass, space, time, and electrical charge. I think that solves the problem. We should leave it at that! (I am not sure if this is really a Zombie or just in disguise).*

I sympathize with that proposal because it accepts qualities as existent without denying the scientific view of the world. What we would still need, however, is a theory of consciousness that tells us how qualities relate to the other physical entities and their properties. I do not see this coming because we have no evidence of qualia other than from our own subjective experience. Unlike in the case of other fundamental physical entities, which have been introduced or stated only because there were otherwise inexplicable experimental observations or theoretical inconsistencies, subjective qualities have never been observed to interact with anything physical. Consequentially, physicists could carry on with their business while ignoring them completely; they would never encounter any problems and their research program would be as successful as ever. So, if we were to take qualia as fundamental entities, they would be the only ones that are isolated from the rest of the universe.



*Zombie 12: But if the physicists are ignoring the qualities, they are missing out on something, something real! What they wouldn't consider is what it is like to be that piece of matter called the brain. I suggest that qualia is the first-person perspective onto that physical phenomenon, while physicists observe and describe only the third-person-perspective of this system. If the two perspectives refer to the same phenomenon, then any explanation you give for the one must also hold for the other – you only need to change the perspective. In light of this view, people are actually right when, instead of referring to evolution and ontogeny and the wiring of their neuronal system, they say "I am grasping the red tomato because it looks as if were ripe and tasted good". It is the first-person language for: "My sensorimotor neuronal networks are wired up such that in the case of low blood sugar they make my hand reach out for the round-shaped object reflecting wavelengths of 650 nm, in anticipation of digestible food". Both describe processes that guide the behavior that will, incidentally, increase chances of survival. That way, you can describe anything either in scientific terms or in subjective terms, it is still the same thing, and nothing is missing, and there is no problem anymore. (This one is probably not a Zombie.)*

I agree that this view resolves many of the questions we discussed, including why qualia are not measurable from the third person's viewpoint although they do exist and what functions they might have (the answer is: they are in fact measurable, namely as neuronal activity patterns, with the same causes and effects). However, I do not find this position unproblematic because it seems clear to me that only a subset of physical entities or properties have a phenomenal side. The reason is that even within my own neuronal system, qualia can break down quite easily. For instance, I can cut my finger without noticing it, and only as I realize blood trickling down, I suddenly feel the pain. Generally, any process that is outside my focus of attention, or outside my awareness, does not lead to qualitative experience. This is one reason why I personally find the proposal that *any* physical system or even any animal can have qualities implausible. The system needs to be a neuronal brain which implements focused attention. Maybe this focal attention allows for global control (Chalmers, 1995), metarepresentation (Flohr, 1996), or feature binding (Crick and Koch, 1990). However, whatever the process, it cannot be based on *any* physical matter, let alone any "information" (Chalmers, 1995), as information (or function) is not a natural entity which impacts onto the physical world *per se* but something that exists only when it is "read out" by someone.

All Zombies: *So where do we go from here?*

I honestly don't know where we should go. I don't even have the slightest idea where the next relevant impulse will come from, if any, whether from neurosciences or physics or philosophy, and in what form. What has been proposed by other colleagues is that we should relate the structure and organization of qualia to the structure and organization of the neural correlates associated with qualia, perhaps by using self-observation and introspection alongside measures of brain activity. Personally, I am not convinced that this will bring us forward, though I am not all that sure. I just don't see right now how this can take us beyond correlations, and yield an explanation for why a biological neural network experiences its own activity qualitatively, i.e., why the activity of a neuron (or assembly) driven by 500 nm stimulation of the retina "is" green to the experiencing brain whereas another driven by 650 nm stimulation "is" red (but only when the brain is in a particular state, i.e., the

neural activity implementing focal attention and self-reflection). Without any additional fundamentally novel insights from physics, that are currently not considered in brain theories, I don't see how the gap can ever be closed.

However, there are two things that I would wish for my own sake and sanity as well as my personal involvement in further discussions. First, I would find it very refreshing and motivating if the discussions could move beyond the arguments brought up by Zombies 1–10, and some other positions which I haven't even addressed today. I realize that any Zombie will feel the same way about my writing! But I think in a book chapter one is free to say what one thinks, and I have a feeling that about a handful of scientists might actually be with me on this. Maybe they and I should found an association for the study of qualia (ASQ) from which Zombies, George Mandler, and the Churchlands are excluded, whereas physicists are particularly invited, especially if they have qualities. This group should then obtain a huge amount of grant money, preferably from the industry (Microsoft?), to travel across the world...

Second, perhaps it would help if colleagues and students thinking and writing about the hard problem would first try to appreciate the hardness of the problem in its full extent before trying to solve it, thereby jumping to premature conclusions and keep stepping into the same sorts of traps. Maybe they could try applying the question, "If I were nature and not a thinking human being, what would I find wrong about my own proposal" to verify their views. I find it ironic that even Chalmers (1995) article has that structure where it begins with an invocation of the mystery of the phenomenon, and becomes more optimistic in the second half where Chalmers own view is outlined... and where he steps into the very same trap of confusing physical with mental entities. I would think that we have the greatest chance of moving forward in understanding the *nature* (i.e., the biophysical basis) of phenomenal consciousness if as many well-informed Non-Zombies as possible would communicate their thoughts and ideas with physicists. In my wildest dreams I imagine the hard problem, properly taught, to be part of the curriculum in every faculty's school and department so that every academic knows about it. Eventually, there may be someone somewhere who can draw a link between some things or others which will help the right idea to emerge. Whether this will be within the lifetime of Christof Koch, I am not sure.

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**Sabine Windmann**

### **Zehn Bewusstseinsmodelle, die keine sind**

#### **Zusammenfassung**

*In diesem Beitrag werden zehn Bewusstseinsmodelle diskutiert. Vorgeschlagen werden sie von Individuen, die offensichtlich das „schwierige Problem des phänomenalen Bewusstseins“ nicht verstehen, vielleicht aus Ermangelung an eigener Qualia. Die Vorschläge werden einer nach dem anderen verworfen; unterdessen steigt die Qualität der Kommentare. Die Schlussfolgerung aus der Diskussion ist, dass momentan keine endgültige Lösung für das Problem in Sicht ist. Stattdessen wird angeregt, das Problem zunächst im vollen Umfang Wissenschaftlern und Studenten aller Fakultäten näher zu bringen, die sich mit Informationsverarbeitung im menschlichen Gehirn befassen. Die entscheidende Frage ist letztlich, warum das in einem bestimmten physikalischen Zustand befindliche Gehirn seine eigene Aktivität qualitativ erlebt. Die erfolgreiche Beantwortung dieser Frage erfordert vermutlich die Erweiterung der Ontologie der Physik.*

#### **Schlüsselbegriffe**

Phänomenales Bewusstsein, Qualia, Zombie, Neurowissenschaft, Physicalismus, Philosophie des Geistes

**Sabine Windmann**

### **Dix modèles de conscience qui ne le sont pas**

#### **Résumé**

*Dix modèles de conscience sont discutés. Les modèles en question sont proposés par des individus ne semblant pas comprendre « le problème difficile de la conscience phénoménale », vraisemblablement parce qu'ils n'ont pas de qualia eux-mêmes. Alors que les demandes des Zombies sont rejetées, la qualité de leurs commentaires et de leurs contributions augmente. La conclusion est qu'aucune solution précoce ne devrait être proposée à ce stade. Plutôt, il est suggéré que le problème devrait d'abord être pleinement examiné par les scientifiques et les étudiants de toutes les universités concernées par le traitement de l'information dans le cerveau humain. Enfin, reste la question pourquoi le cerveau, lorsqu'il est dans un état particulier, vit sa propre activité de façon qualitative. La réponse à cette question contribuera probablement au développement de l'actuelle ontologie de la physique.*

#### **Mots-clés**

conscience phénoménale, qualia, zombie, neuroscience, physicalisme, philosophie de l'esprit