Perspectives

The Even Harder Problem of Consciousness

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Abstract
The problem of subjective experience remains a major topic of debate amongst researchers in both the philosophy of mind and the foundations of artificial intelligence. David Chalmers has referred to this as The Hard Problem of Consciousness, since subjective experience appears to resist most attempts at a functional description. Theories involving 60Hz oscillations in the cerebral cortex, Bose condensates, and quantum collapse in microtubules have all been proffered as offering potential solutions to The Hard Problem, while some other researchers seem eager to retain an essentially dualistic world-view. This paper proposes an even more fundamental problem, potentially disturbing to both sides of the materialist / dualist divide: given that conscious organisms exist in the world, how can it be that one of those organisms happens to be you?

Key Words: subjective experience, hard problem of consciousness, functionalism, dualism, indexicality

NeuroQuantology 2007; 2: 214-221

Note to the Reader

Almost all scientific papers follow the convention of not addressing the reader directly. In this case, however, addressing the reader directly is essential, and I therefore need a name for the reader. The phrase "The Reader" will not suffice, since I mean to refer to a person who for most of the time will not be reading at all, and I do not wish to imply that the person is imbued with any special status as a result of a momentary activity. So I will use the made-up name Kim Smith, and ask all readers, whenever they come across this name, to mentally substitute their own name in its place. The necessity for this strange behavior will, I hope, become apparent.

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1 Introduction

Half a century ago a British mathematician raised the question of whether a formal system (such as a digital computer) which appeared to be completely lifeless could display attributes (such as reasoning and intelligence) which had previously been thought to reside purely in the human (or, at best, the animal) domain (Turing, 1950). In the same year an American biologist and a British molecular biologist began the research that was to lead three years later to their suggestion of the double-helical structure of DNA, by which the initial development of humans (and other living organisms) is determined wholly by sequences of lifeless symbols (nucleotides) which comprise the genetic material of individuals (Watson and Crick, 1953).

Since those early beginnings the successes of both artificial intelligence and molecular biology have been massive. No-one today seriously doubts that machines can appear intelligent, or can learn, or can play a damn good game of chess; and even fewer seriously doubt that physical attributes such as height and physique, or an aptitude towards certain skills, or a propensity towards certain diseases, are the direct results of genetic characteristics.

1.1 Artificial Life

From these successes it is argued that the mystery of life has been solved; indeed, there turns out to be no mystery. There is no *elan vital*. Life turns out to be nothing more than a word to represent a number of features (movement, growth, reproduction, etc.), each of which is ultimately describable in more fundamental terms. It is not the molecules themselves which are alive, but their organization which ultimately yields properties which are components of life.

This view provides the philosophical basis of, and the ultimate justification for, the field of research now known as Artificial Life.

1.2 Two Problems

It is the contention of this paper that two aspects concerning life remain to be explained, and have yet to succumb to reductionist methods. Only the first has received much attention in the relevant literature; this is the so-called Hard Problem of Consciousness, a phrase made popular by David Chalmers (1996) and others, which is concerned with why - and how - subjective experience occurs at all.

Over the last decade or so there has been a huge resurgence of interest in the subject of consciousness, with many new journals, both printed and electronic, devoted to the topic and books by a veritable alphabet of authors (Armstrong, Baars, Churchland, Dennett, Edelman, etc.)[2].

Any discussion of consciousness inevitably raises the mind-body problem, which has bedeviled philosophers and scientists for thousands of years - how exactly does the brain give rise to the mind?

[2] This makes for an interesting party- game for consciousness theoreticians. It gets hard towards the

While there are now many promising hypotheses for such functional aspects of the mind as memory and learning, it is the view of the current author that no-one has as yet suggested a plausible answer to the problem of how the brain gives rise to subjective experience.

1.3 The Functionalist Viewpoint

The mainstream AI community remain largely functionalists, the majority adhering to the doctrine that consciousness emerges naturally as a result of sufficiently complex information processing.

There are many different forms and varieties of this argument. Though many appear at first sight to take radically different points of view, they all share a common core. For example, the casual reader may mistakenly believe that the arguments put forward by (amongst others) Daniel Dennett, that consciousness is merely an illusion that does not really exist, must somehow be irreconcilable with, and perhaps even opposite to, those put forward by (amongst others) John McCarthy, famous for his statement that "even thermostats are conscious" (Dennett,1991; McCarthy, 1979). And yet, both of these arguments follow almost identical lines, and lead to almost identical conclusions.

In both cases, they lead to positions that consciousness (in McCarthy's case), or the illusion of consciousness (in Dennett's case), emerges naturally from a sufficiently complex organization of neuronal activity. Both agree that consciousness (or the illusion of consciousness) is a distributed, rather then localized, phenomenon. Both are in agreement that functionally equivalent robots are just as conscious (or just as prone to the illusion of consciousness) as human beings, and that mice are rather less conscious (or rather less prone to the illusion of consciousness) than are chimpanzees.

In brief, therefore, the differences between various streams of functionalist thought may be more apparent than real. More often than not such differences are likely to arise only because of preconceived notions of the meanings of such words as consciousness and experience.

1.4 A Difficulty for Functionalists

Suppose the functionalist view is basically correct, and that in the near future it becomes generally accepted that, above a certain level of complexity, consciousness spontaneously emerges, or perhaps that consciousness arises from quantum coherence in cytoskeletal microtubules, or whatever; and suppose further that such a theory explains not only subjective experience (this is what Chalmers has termed the "hard" problem), but also the range of qualia (colors, smells, tastes, etc) that are subjectively experienced. Then what will remain unexplained is an even greater and more fundamental mystery: why one particular conscious human being happens to

end.

be *you*; or, as Thomas Nagel put it, referring to himself:

> *...how can it be true of a particular person, a particular individual, TN, who is just one of many persons in an objective centerless world, that he is me?*

This is closely related to the problem of personal identity. The number of recent papers directly addressing this problem is paltry compared to the number of recent papers published on consciousness, and the most well-known and well thought out contributions to this area are still those by Nagel himself [1983; 1986].

2 The Harder Problem of Consciousness

Whereas the problem of the existence of subjective experience has been called The Hard Problem, we can call this the Even Harder Problem. It can be simply stated. Why are you *Kim Smith*?

And this in turn leads to a host of related questions, such as, was it ever possible for you to be someone else? What would it mean to say that you "could have been" someone else?

What caused you to be *Kim Smith*? Could you just as easily have been a farmer living in Warwickshire in the mid-sixteenth century? Could you have been a Chinese soldier killed in the Second World War? Could you be cosmic voyager destined to be born on Mars in the late thirty-third century? Could you perhaps be an orangutan living today in the jungles of Borneo? Could you have been one of the locusts that swarmed over south-eastern Australia in 1995? Could you perhaps be an ant scurrying outside your window just at this moment? Could you perhaps be an oak tree?

2.1 Another View

The problem may be profitably viewed from another perspective. Where were you 200 years ago? The standard response is nowhere; you had not yet been born.

Let us examine this response more closely. What caused you to be born? Well, the genetic details concerning the birth of *Kim Smith* are well known; the birth was not unlike countless billions of others, but the uniqueness of *Kim Smith* was determined by the genes of both parents. The birth of *Kim Smith* is not, and was not, a scientific surprise in any sense. But what caused you to be *Kim Smith* rather than any of the other millions of babies born that day?

2.2 A Gedankenexperiment

Let we assume only the conventional wisdom that your existence is a result of the DNA mixing that occurred at the time of conception of *Kim Smith*.

Now, for the thought experiment, suppose that in the near-random mixing of genetic material that was to form *Kim Smith*, one of the nitrogenous bases was changed from, say, adenine to guanine[3].

[3] This may or may not make a difference to the amino acid coded for. For example, the triplets TCA and TCG both code for the amino acid serine, whereas the triplet TAC codes for methionine, and the triplet TGC

Kim Smith would still have been born, but perhaps with different features or characteristics. But would it still have been you? If yes, then how many nucleotides would have had to have changed for it not to have been you? If no, then we must conclude that your existence depends on that precise genetic chain. We will examine both yes and no answers more closely.

The "Yes" Answer

If we could have changed *Kim Smith*'s genetic makeup by a single nucleotide prior to birth, and *Kim Smith* would still have been you (albeit with different features), then the problem arises of how many nucleotides would have to have been changed before it was not you. A particular number (31,536 perhaps?) seems completely arbitrary and unjustifiable; for whatever number is chosen, we are left with the conclusion that at some point a change to a single nucleotide had the dramatic effect of someone else being born rather than you (whilst still being *Kim Smith*). This seems absurd.

The only answer that does not seem to be absurd is if we speculate that any number of nucleotides, up to and including 100%, could have been changed and *Kim Smith* would still have been you. But this is a very mysterious conclusion, for it now divorces you from the physical make-up of *Kim Smith* completely. If you did not originate from genetic material, where else is left? And what was it about *Kim Smith*, rather than anyone else, that caused you to be that person?

The "No" Answer

The Yes answer is highly problematical, so let us instead opt for the No answer. Here we have to face the fact that if a single nucleotide had been changed, a person would still have been born, whom your parents, unaware of the disaster that had just occurred, called *Kim Smith*; but *Kim Smith* would not have been you, but someone else (and if you accept this conclusion, you must also accept the conclusion that follows directly from it - that you will never exist at all).

The human genome contains 23 pairs of chromosomes, with approximately 3 billion nucleotides; the odds against the appearance of a specific chain of nucleotides in a typical human being is left as an exercise for the reader[4] (of course, if the chain length is not specified in advance, we are left with the unfortunate problem of handling an infinitely large quantity of possible chains).

The "Partly" Answer

Faced with this dilemma, it is tempting to seek a middle way out. Perhaps changing the genetic make-up slightly would have resulted in a *Kim Smith* that was mostly you. But this only has to be stated to be seen to be absurd. There are few things more certain than the fact that you are 100% *Kim Smith*, and 0% anyone else. Siblings who have

for threonine.

[4] If the chain-length of a typical homo sapiens is assumed, a familiarity with the meaning of the terms

significant degrees of commonality amongst their DNA do not claim to be partly each other; and studies of identical twins indicate no cases where one twin thought they were the other.

2.3 Result of the experiment

Since all answers are unacceptable, the only honest course is to reject the assumption. It therefore follows that your existence is not a result of the DNA mixing that occurred at the time of conception of *Kim Smith*.

3 Contrary Views

This is a highly unpopular (although necessary) conclusion, so let us proceed to consider some possible objections and contrary opinions.

3.1 How Could It Be Any Other Way?

The most frequent response to such problems is to say "How could it be any other way?". Given that there are conscious organisms in the world, and one of those organisms happens to be you, of course you will have a subjective point of view, i.e. the point of view of *Kim Smith*.

The fallacy here is hard to see, but, once seen, is very evident. The fallacy occurs in the phrase "one of those organisms happens to be you". How precisely can an organism just "happen to be you"? Could a bacterium just "happen to be you"? If so, how? And also if so, how come millions upon millions of different bacteria don't just "happen to be you"? Well, OK (so the argument goes), but even given that problem, it still couldn't be any other way, could it? And the answer is yes, it could be another way. The way it could be is for all the conscious organisms in the world still to be conscious, but for none of them to be you.

googol and googolplex would probably help.

3.2 You are *Kim Smith* by chance.

This view is separate from, but very closely related to, the *How Could It Be Any Other Way?* View mentioned above. The idea, as far as I can make sense of it, is that you could indeed have been a bacterium alive millions of years ago in another part of the Universe, but, just by chance, you happen to be *Kim Smith*, a human being, alive now.

There are two problems with this. Let us suppose the view is coherent; then the probability against such an event is hard to calculate, but is so massive as to be beyond comprehension. This is the less serious of the two problems, however.

The greater problem is that this scenario, though widely believed, is totally incoherent. It is not as though we are asking, why the ball landed on 27 red, and not in any other space. In the roulette analogy, both the ball and the roulette wheel have to exist before "landing by chance" makes any sense at all. Further, had we known such things as the exact mass and speed of the ball, etc, it would have theoretically been possible to determine that it would land in 27 red.

That is not the case here. Given the assumption, it is clear that you did not exist

before the conception of *Kim Smith*. Hence, to correct the roulette analogy, the question becomes "Given that there is no ball, what is the chance of it landing in 27 red?".

3.3 The question "Why are you *Kim Smith*" is nonsensical.

When a question presents difficulties, it may be because the question itself is meaningless, or contains hidden within it false assumptions. Why do dreaming green clouds bicycle madly? is an example of the former, and Have you stopped beating your wife? is an example of the latter. But neither is the case here. We are trying to determine why you happen to be *Kim Smith*; the question is well-formed, and does not contain any unwarranted assumptions.

3.4 There is no "you" in the first place.

This is a very radical view, though not without its supporters. However, it has no significance to the question under consideration, for if we accept that you do not exist, it still remains to explain why there is the illusion that you are *Kim Smith*. Thus the question Why are you *Kim Smith*? can be rephrased as Why is there the illusion that you are *Kim Smith*?, and all of the arguments cited above still hold.

3.5 You are a result not only of your DNA, but also of your environment.

This point of view is clearly correct in spirit, but equally clearly wrong in detail. The characteristics of *Kim Smith* will vary according to the environment; but you remain *Kim Smith*, even though *Kim Smith* has been altered in some way. Thus, the problem cannot be eradicated by any differing emphasis on the nature/nurture question.

3.6 The word "you" is an indexical, so there is no real problem.

The words "here" and "now" are indexicals, because their meaning is not static, but varies according to the position of the speaker in space and time respectively. It is true also in one sense that the word "you" suffers from the same problem, because it is used at different times and different places to refer to different third person individuals. But this does not help to solve the problem under discussion, unless the reader has missed the point.

It is senseless to look for a real, physical place that is "here"; it is equally senseless to look for a particular date and time that is "now". But in the sense in which we have been using the word you, you are always exactly *Kim Smith* (or, to be pedantic, have the illusion that you are *Kim Smith*).

4 Conclusion

The preceding remarks are meant to provide a challenge to those working in the fields of philosophy of mind and the foundations of artificial intelligence. In particular, they especially challenge those working in the field of Artificial Life. For if subjective experiences such as qualia count as an

essential component of life, then builders of artificial life forms must explain where, in their creations, these qualia arise. And if they can do this, perhaps by pointing to some complex organizational structure also found in natural living organisms, they then face the even harder challenge of explaining who it is that has these subjective experiences.

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