Akademiniai maršrutai

"NEUROSCIENCE IS RELEVANT FOR PHILOSOPHY"

Professor Patricia S. Churchland interviewed by Bruno Mölder

Patricia Smith Churchland (born 1943) is a Canadian-American philosopher, a Fellow of the American Academy of Arts and Sciences. She is University of California President's Professor of Philosophy Emerita at UC, San Diego. Patricia Churchland is renowned for her seminal contributions to neurophilosophy, moral philosophy and philosophy of mind.

Books: Neurophilosophy: Toward a Unified Science of the Mind-Brain *(The MIT Press, 1986),* Brain-Wise: Studies in Neurophilosophy *(The MIT Press, 2002),* Braintrust: What Neuroscience Tells Us about Morality *(Princeton University Press, 2011),* Touching a Nerve: The Self as Brain *(W. W. Norton & Company, 2013)*.

She was one of the keynote speakers at the conference "Toward a Science of Consciousness 2015" held at the University of Helsinki (9–13 June 2015). The interview was taken on June 10, 2015.

BM: *You and your husband Paul are the most prominent defenders of eliminativist materialism nowadays. Let's get this eliminativism thing sorted out. People often dismiss it based on some skewed conception they have of this view. What is eliminativism exactly, and how did you come upon it?*

PC: Most people misunderstand the point partly because they do not read the papers, but just spread by word of mouth what they assume is the idea. The basic idea was a sort of a prediction. The prediction was this: just as folk physics changed as it became more scientific and experimental, and just as folk chemistry similarly changed, so it is possible that some aspects of everyday use of mental state explanations and categories and concepts may also change. It was never part of the story that the category of "consciousness" or "goal" or "fear" or "anger" would disappear. It was that they may be modified if we come to understand more about the brain.

But the real motivation had to do with the propositional attitudes and in particular with the idea of belief. At the time when Paul was thinking about this most philosophers took it as obvious that a belief was a state of the brain that stood in relation to a particular sentence. In other words, a belief is what it is by virtue of its connection to a piece of language. Paul pointed out that because there are nonverbal humans as well as nonverbal animals that do very complex problem solving and have lot of knowledge about the world, we need an understanding of representation which is sort of like belief but is not tied to language. He had this idea that we really need to replace a notion of belief with a very different kind of representation. That was the main thrust of eliminative materialism.

Some philosophers grotesquely misunderstood this and assumed that we argued that

mental states do not exist, that consciousness does not exist. Unfortunately, that was mostly a kind of wilful misreading of what we had said. I first suggested that the concept of consciousness might be modified depending how the data come in. The title of the paper was "Consciousness: A Transmutation of a Concept" (note: *a concept*), where the argument was that as we understand more about the biological mechanisms, the concept may come to change. We may find that there are different kinds of consciousnesses or that it is related to nonconscious processes in surprising ways. This turned out to be accurate. Despite my being super-careful on this topic, many people happily concluded that I thought that there is no such thing as consciousness. That was most unfortunate for us, but I sometimes wonder if it was also a bit of a reaction to our broader point that neuroscience was relevant to philosophy – a point that made many philosophers shudder. So saying that we did not believe consciousness exists was an effective way of sidelining us. And it worked in philosophy, less in neuroscience.

I wish now that we never used the word "eliminate", but it was in the currency at the time, because Richard Rorty had really been the one to introduce it. We were nobodies in Manitoba, and we did not feel we had the status to introduce a new word. Philosophy, at the time at least, was a highly ritualized discipline. But it is very interesting now to see that amongst neuroscientists there are great concerns about how to understand what a representation is, and the expectation is that representation should not be tied to language because, for example, rats have splendid amount of spatial knowledge, but they can't talk, they're rats! If the rat knows where home is, its knowledge cannot be characterized as a relation between its brain and a bit of its language. In fact, it now appears that its representation is more map-like than language-like. But the sociological point is that many philosophers of mind, unless they were philosophers of science, just lampooned our ideas; they characterized them in cartoon fashion and then poked fun at the cartoon.

BM: *The earlier eliminativists like Rorty and Feyerabend were actually talking about experience as well.*

PC: They both wished to challenge the integrity of the language we use to talk about our cognitive life. Reasonably enough, though we were making a somewhat different point drawn from the history of science. Notice that neuroscientists reflecting on this language also share their worries about the adequacy of current psychological vocabulary. As far as consciousness is concerned, from early on Paul and I favoured the hypothesis that consciousness is brain-based. In the framework of the 1980's, we were identity theorists, in the sense that we suspected that consciousness is a function of patterns of activity in the physical brain. In our view, then and now, consciousness is not, as Chalmers thought, a property of spooky stuff. Moreover, real progress on the brain-based nature of consciousness has been made. (See for a simple example my column in the Wall Street Journal, July 11, 2015).

BM: *Do you already see some change in our folk mental concepts?*

PC: Whether and exactly how the vocabulary of ordinary people changes is something that a psycholinguist would have to address. Still, it is notable that ordinary people are really interested in the brain. Notwithstanding hidebound philosophers, they readily pick up the vocabulary that is coming available to them, so they say: "Well, you know, my declarative memory is bad, but my skill memory is still good." That distinction comes straight out of neuroscience research on the

hippocampus and on the basal ganglia. After the split brain results, people talked a lot about right brain and left brain, though not always knowledgeably. Ordinary people also talk about addiction in a slightly different way now than how they used to talk about it 20 years ago, as they realize that addiction to cocaine or nicotine involves structural changes to the reward system (basal ganglia) of the brain. Many people understand that the placebo response involves the brain's own opioid and cannabinoid system. Nobody ever talks about nervous breakdown anymore, but when I was a child, anybody who had any mental problem had a nervous breakdown. These are small and slow changes, but they are real.

BM: *Hysteria is yet another such example.*

PC: Hysteria is a beautiful example. No reputable psychiatrist ever diagnoses a woman with hysteria anymore. I think we can see changes already in the language and I think there is a group of neuroscientists, probably best known is Russ Poldrack, who are very concerned about whether the vocabulary of psychology will mesh well with what we are learning about neurons and neural networks. It is not clear how that is going to work.

BM: *Do you still consider yourself an eliminative materialist?*

PC: I never use the word, because everybody misunderstands it. It is still an open question and it always was for us – how much the folk theory would change. I think the notion of a goal, for example, is very robust and probably is not going to change all that much. But the notion of self-control is another one where we can see that there are somewhat different pathways for different kinds of self-control. Self-control that involves deferring gratification involves slightly different but overlapping circuitry from the self-control that involves cancelling an action once you started it. It turns out that they are not exactly the same from the point of view of the brain. Some rats that are very good at deferring gratification are not very good at cancelling an action and vice versa.

BM: *The eliminativist argument assumes that folk psychology is a theory, that it has some kind of a theory-like structure that people possess, but many have argued that folk psychology is not really a theory that one could replace or eliminate.*

PC: It is a theory in the sense that folk physics is a theory, that is, it is an interconnected set of concepts and categories that allows us to make inferences and predictions about events. Nobody consciously made up folk physics; it was formed piecemeal by piecemeal. Our everyday conceptual network is a theory in that very, very weak and loose sense. If people don't like the idea of calling it a theory, they can just call it "an explanatory framework". It is also relevant that many nonverbal animals have representations of the mental states of others, such as what the other can see, or feel or intend. The experiments showing this, for example on jays by Nikki Clayton, are very tight and careful. Undoubtedly animals rely on these representations because they allow them to make predictions in a social context. And chimpanzees do have a kind of folk physics.

BM: *In his paper "Eliminative materialism and the propositional attitudes", Paul had folk laws as part of folk psychology as well, and this is quite strong.*

PC: I think he thought that they were generalizations that we rely on and to some degree it is true that we do. We predict that if somebody has third degree burns, they are going to suffer, for example. There are laws in the loose sense that they are generalisations that to a first approximation are more or less

reliable, but the important part vis-à-vis theory is that people do rely on them in making an inference or a prediction about what to do or what is going to happen. He did not think, and made the point of emphasizing this, that the generalizations are known to be true. Just that they are useful in predicting. As indeed they are.

It is important to keep in mind that a fundamental driver of brain evolution concerns the capacity to predict, and in social animals, it concerns the capacity to predict the behaviour of other animals. So-called folk psychology plays the role of enabling predictions. If, by relying on scientific results, I can improve my predictions by upgrading my folk psychology, I think I will do that. Other humans will too. Maybe analytic philosophers will refuse.

BM: *Have these ideas also influence the way you talk in the everyday life?*

PC: It many subtle ways, yes, of course. I sometimes think my oxytocin levels are going up after a stressful day when I take my loving dogs for a romp. That is because I know that stress hormones and oxytocin act in opposition to each other, and oxytocin is increased by social bonding. I sometimes wonder whether certain changes in mood during the day are related to cyclical changes in serotonin released from the raphe nucleus in the brainstem. I often do physical exercise and think about how that is related to proliferation of new neurons in the hippocampus (specifically, in the dentate gyrus). Everyone I know in neuroscience makes real life connections with what they know about the brain. Why would they not? Why would an engineer not use the best physics when designing a bridge or fixing his car?

BM: *If I can ask a bit more personal question, what is it like to be married to another philosopher? There are not too many philosophers' couples. Sartre and de Beauvoir come to mind as well as Anscombe and Geach, and Mary and Geoffrey Warnock. Is it not a bit like bringing work back to home? Do you get into philosophical argument often?*

PC: Paul and I talk about what interests us all the time, and often what interests us is stuff about the brain. I might be sitting at the breakfast table and I read something and think "Oh, now I shall tell Paul what I just read." Or we'll talk about the new developments in deep learning algorithms and what that really means for how we think networks form between neurons. Or we talk about *non*propositional knowledge – of space and time and even social conventions that are tacitly learned. This has been my whole married life, so I guess I have not got anything to compare it to.

BM: *Have you ever had any big ideological differences?*

PC: We have, on occasion. The earliest one, which took us weeks to hammer this out, had to do with meaning. I was really convinced by Quine in *Word and Object* that there is no significant or useful distinction between the analytic and the synthetic; that is, there are no analytic truths worth caring about. Everything we think we know is revisable. Fundamentally, our categories and our knowledge is all a matter of meaning and belief being one big mash-up. To assume otherwise, is one of the dogmas Quine was out to defeat. Paul and I disagreed about that for a while. We went back and forth for days on this. Eventually Paul came to share my view that Quine actually had it right. You can always hoke up an analytic-synthetic distinction, but the question is whether it is productive in any way insofar as addressing philosophical issues is concerned and ours and Quine's view was that it is not. (See also my preface to the 2013 edition of *Word and Object*.)

This was important because many philosophers thought that philosophy should be about the so-called conceptual (necessary) truths, and that once found, such truths could never be refuted or falsified. It allowed them the illusion that they did not need to know any science, and that philosophy was deeper than science and laid the foundations for science. What Paul thought about a lot was the history of science and how our concepts are modified by progress in understanding, and his knowledge here helped me a great deal. Unfortunately the assumption that there are necessary truths about the world or the mind that should constitute constraints for what science can discover is a delusion. No wonder physicists like Feynman and Wheeler scoffed at philosophers. To be fair, however, I should add that philosophers of science tended not to buy into the conceptual analysis gambit. Philosophers of science such as Clark Glymour and Peter Spirtes have made a huge contribution to science by developing powerful causal search algorithms; Carl Craver has helped neuroscience by explaining that discovery of mechanisms, as opposed to laws, typify research in much of biology, in contrast to physics; Chris Eliasmith has developed powerful ideas of representation in nervous systems that can actually be applied to solve neurobiological questions; Brian Skyrms has made powerful contributions to understanding reasoning, to name a few.

BM: *Your first book was titled* Neurophilosophy: Toward a Unified Science of the Mind-Brain. *Neurophilosophy has steadily gained popularity over the years. Could you explain what it is and why we need it?*

PC: At the time that I was learning about the brain (starting about 1978), the great majority of Anglo-American philosophers were convinced that the science of the brain was totally irrelevant if we wanted to understand the nature of knowledge, choice, consciousness, or decision-making. This included philosophers who were physicalists. That assumption just seemed to me perverse. If the brain is the thing that thinks and perceives and is conscious, how could neuroscience fail to be relevant? I was strongly inspired by the split-brain results that showed that one brain hemisphere could be aware of things and feel things that the other hemisphere did not. My sense was that if you can split consciousness by splitting the brain, then dualism is likely to be an unrewarding strategy; that is, a dead end. I learned as much neuroscience as I possibly could and found it to be all engrossing as well as highly relevant to learning and memory and hence to epistemology, for example. Despite some of my critics, I did not think that psychology was irrelevant and was at pains to say so. I just thought that neuroscience *was* relevant. But people like Dan Dennett were fond of saying: "Well, there is software and there is hardware and cognition is all about the software. You are just working on the hardware. That is like trying to understand a computer program by looking at the motherboard." I think he realizes now that that was quite wrong. First of all, the software/hardware distinction does not apply to the brain at all, not least because there are many levels of functional organization, but also because the brain constantly changes as it learns. Moreover, no one, including Dennett, was ever able to articulate what "running software" could mean in the case of the brain.

Among the most striking developments in neuroscience are those concerning spatial representation, and how the mammalian brain builds a model of its spatial world. This domain of research was recognised in 2014 with the Nobel Prize for research on spatial learning, and the role of place cells and grid

cells. What the research had revealed is that there are very specific cells in rat's brain (in the hippocampus) that respond to very specific places, both when the rat is in that specific place and when the rat is rehearsing the spatial routes offline – when it is resting. From a philosophical perspective, the discovery of "place cells" and "grid cells" (they essentially tile the environment but are in the entorhinal cortex that feeds into the hippocampus) gives us a crucial framework for understanding what it is for the brain to represent features of the external world, and to build a model of a world. Notice that such models are not linguistic – rats do not use language. So the rat's spatial knowledge is not a propositional attitude – it is not a belief that *P*, where *P* is some sentence. Rather, the models are map-like, and they are embodied in the pattern of responsivity of the neurons in complex networks. Consequently, over the last few decades, a new framework has become available for understanding something that has eluded philosophers for a very long time. It means that the total preoccupation with language and the propositional attitudes has been misguided. Almost certainly nonpropositional knowledge is more fundamental than propositional knowledge.

BM: *You have been critical about some methods and concepts contemporary analytic philosophers tend to use. What's wrong with relying on modal intuitions and making a priori claims about how things are in all possible worlds?*

PC: Suppose I say: I can imagine a possible world (and it might actually really exist somewhere in the universe) where DNA is not a heritable material. Does that have any implications for whether DNA is the heritable material on this planet? I'd say no, but if I am David Chalmers I should say "Yes". The conceptual truth folks think that identity statements, if true, are necessarily true – true in all conceivable worlds. So DNA cannot be identical to the heritable material on *this* planet if I can imagine it is not the heritable material on some imaginary planet. That's the DNA analogy to the Zombie Argument. The argument with respect to DNA is silly, and so is the Chalmers' Zombie Argument.

BM: *Their claim is about concepts, not about the stuff. So in this case the claim would be that the concept of DNA is not necessarily a concept of hereditary material.*

PC: There is not the slightest reason to think that an identity statement has to be necessarily true, whatever that is supposed to mean. That is a scientifically preposterous idea developed by Saul Kripke. Moreover, the concept of the Morning Star is not at all the same as the concept of the Evening Star, but the Morning Star sure as heck *is* the Evening Star. My various celestial observations are of exactly one and the same thing. The concept of temperature is not the same as the concept of mean molecular kinetic energy, but temperature *is* mean molecular kinetic energy nevertheless. Same point regarding DNA and hereditary material, same point regarding brain states and mental states. What I am interested in, and what science aims for, is the truth about the world – the real, actual world. Imagining other possible worlds has got nothing to do with what is in actual fact the truth here. Even if you can imagine some possible world where there are zombies, your feat of imagination has nothing to do with whether or not your own consciousness is a neurobiological phenomenon. Consciousness in mammals is pretty obviously a neurobiological phenomenon – it vanishes in coma and in deep sleep, it can be altered by chemicals such as alcohol, anaesthetics and cocaine, it

can be modified by lesions in specific areas, and so forth. All the evidence really points to the biology

BM: *Some philosophers would say that, of course, consciousness is a neurobiological phenomenon in here, but it is not necessarily so.*

PC: So what if it is not necessarily so – how is that relevant to evidence for factual truth? I am a biologist, and I want to know what is true about consciousness, knowledge, etc. Necessity seems to play no role in how science goes about its business. The puzzle is this: Why are some philosophers so fixated on necessary truth, whatever that is? Partly, I suspect, because they think their training and talents give them a special line to necessary truth, and necessary truths as specified by philosophers put constraints on what science can discover. Thus they have this fixed and peculiar idea that an identity statement, to be true at all, must be true across all possible worlds. One cannot escape the feeling that this idea about identity statements seems sort of made up to serve the purpose of claiming that the mind is not the brain because we can imagine zombies. Quine suggested that modal logic is kind of a game. Hence the idea that the semantics of modal logic can legitimize a constraint on science and the kinds of identities that we can discover to hold in the actual world, such as the identity between DNA and heritable material, is close to delusional. The semantics of modal logic is little short of ridiculous as applied to real world questions such as whether mental states are states of the brain. The idea that the semantics of modal logic should impact science by announcing that if I can imagine a zombie, then conscious states are not brain states, is just astonishing. When people look back at the Zombie Argument in fifty years they will slap their knees and laugh.

BM: *What in your view is the role of academic philosophy? Do we need philosophy?*

PC: There are many ways of doing philosophy and there are many different philosophical questions. If the questions that you want to address are questions about such things as how do we represent causality, then you really need to do the science of what is already known. This is the sort of achievement we see in the work of David Danks, for example. In moral philosophy, some of the most important work since Hume has been done by the primatologist, Frans de Waal. In epistemology, some of the most important work since Aristotle has been done by researchers studying infant behaviour, such as Alison Gopnik and Patricia Kuhl. Some philosophers might wish for a shortcut where you can just speculate about a concept and make headway on a problem. But that is not how real progress is made. A concept is just a tool we use for carving up the world, and it a tool that we learned to use. But the tool may need to be modified to keep up with the facts. For example, consider the concepts of "hysteria" and "nervous breakdown" – they were in common use 50 years ago, but are being replaced by rather different concepts, such as "major depression" or "bipolar disorder". "Hysteria" used to be a convenient way of categorizing the world, but no longer. Science often teaches us to carve up the world in different ways that we are accustomed to. We used to think the elements were earth, air, fire and water. Necessarily!

One of the things that changes with human discoveries is our concepts. Part of the catastrophe in Anglo-American philosophy in the 20th century was that so many philosophers were threatened by the idea that they could not just make a living by sitting in their armchair and doing a priori fantasizing, but that they would actually have to learn something

about reality. So they relied on hokey ideas about necessity across possible worlds, and so forth. They were so afraid of science – especially neuroscience – that they really kind of lampooned people such as me and Paul and wrote us out of profession. We were not considered "real" philosophers by a fair number of those in the profession. I was treated abominably by my colleagues in first ten years after *Neurophilosophy* was published. The neuroscientists embraced me and welcomed me, but the conceptual analysis philosophers seemed to hate every word I wrote.

BM: *Do you see philosophy as distinct from science?*

PC: There are philosophers who want to address the big questions and learn as much about the relevant science, whether it is astronomy or neuroscience. Then there are philosophers who want to simply say that there are necessary truths about the nature of knowledge and belief and that these necessary truths lay the foundation for science and that neuroscience had better not trammel those necessary truths. Colin McGinn is an example of that.

Thus much depends on the kind of philosopher you are and the kinds of questions you are asking. If you are asking questions about how people use language, then that is very different from asking questions about the nature of knowledge. If you want to inquire into language, you should know a lot of psycholinguistics. And if you want to ask about the nature of knowledge, then there is plenty of research in psychology and in neuroscience concerning learning and memory and the brain. I think some ethicists, such as Katinka Evers, are not merely talking about words, but actually addressing substantive issues concerning matters such as informed consent or criteria for brain death. I regard this work as important. Some philosophers such as Nita Farahany are interested in the relationship between law and neuroscience; some philosophers such as Craig Callender continue to work on problems in physics about the nature of time. There are many interesting topics for philosophers to explore.

BM: *Could philosophy play a role in helping to form an image of ourselves, based on science? For instance, clarifying questions like "Are we distinct from animals?", "Are we egoistic by nature?", "Do we survive in some form after death?".*

PC: I think that is a reasonable thing to do, but even there you really need to draw on science. If you want to know about what is innate and what is not, for example, there is a huge literature out there now. We know huge amount about gene-environment interactions. Every time you learn something, there is gene expression to make the proteins that build the structure that allows the knowledge to be permanent. I doubt that a philosopher who knows nothing about neurobiology or molecular biology can make a serious contribution to the reality of innateness. Consider, for example, the claims by Jerry Fodor that all our basic concepts (those that are not definable by other concepts) are innate. This was an unfortunate program that went absolutely nowhere. But all the questions you raise are important, and certainly those concerning the differences between us and chimpanzees or bonobos, for example, are ones we care about. May I mention again Frans de Waal, who has been particularly important in viewing humans biologically. In a somewhat different way, so has E. O. Wilson. There are of course debates on this topic, and Dennett has claimed that in nonhuman animals we see nothing like the altruism that we see in humans. This is quite wrong, and the countervailing data are readily available. See for example Peggy Mason and the altruistic rats on Youtube.

BM: *So in your view philosophers should show more humility and learn more about science?*

PC:, Perhaps it is not so much humility they need, but a sense of realism and pragmatism.

BM: *Many philosophers tend to rely on their intuitions rather than on science.*

PC: Where do they suppose their intuitions come from? It seems evident that one's intuitions are states of the brain; they are products of learning and experience. What they are *not* is a direct avenue to Truth – or to Plato's Heaven. Regrettably, some prominent philosophers have convinced themselves that their intuitions should be taken very VERY seriously by science. But it is important remember that even when we are super-convinced are our intuitions are correct, they can be wrong. Consider Kant, who was utterly convinced that it is a necessary truth that space is Euclidean. But Einstein have shown that it is not – space is warped by gravitational fields. Long ago, philosophers firmly believed that "downwards" is a direction that is the same wherever you are in space. It is not. They also believed – firmly and with complete conviction – that the job of the heart is to concoct animal spirits. Nope. Its job is to pump blood.

BM: *They could say that intuitions are dispositions to apply concepts and thus give us access to these concepts.*

PC: Then the question is whether that concept is true of anything in the world. Not all the concepts we have are adequate to the way the world is. The concept of impetus – central to folk physics and Aristotelian physics – does not apply to anything in the world. There is no such thing as impetus in the real world, as we learned from Newton, though it seemed like an explanatorily useful idea to Aristotle. Ditto for demonic possession, and for phlogiston, and for ghosts, and hysteria, and for the alchemical notion of spirit of sal ammoniac. When we learn that a concept does not truly apply to anything, we tend to stop using it, not to keep on analysing the concept for its necessary implications. Similarly, when we know, for example, that self-control comes in different forms and has different but overlapping underlying circuitry, then somebody who is using his intuition with no psychological or neurobiological knowledge to tell me about self-control is probably wasting my time.

It is crucial to realize that categories (concepts) have a radial structure, with prototypical cases at the centre, where we all pretty much agree, fuzzy boundaries at the edge, where there is plenty of disagreement, and assorted cases in between. Most everyday concepts are not defined by necessary and sufficient conditions, but are identified and learned via prototypes and outliers. Thus carrot is a prototypical vegetable, parsley is on the fuzzy boundary, and parsnips are somewhere in between. Much philosophical debate is the equivalent of fighting about whether parsley is a vegetable. There may be no fact of the matter. By contrast, scientific concepts may, with careful attention to experimental data, be defined in terms of necessary and sufficient conditions. For example "protein" = "a string of amino acids".

BM: *Some people claim that philosophy just is the study of concepts. We do really have to worry about whether they apply to anything in the real world. We just clarify our conceptual structure.*

PC: Except that this is not what is going on in the works of many famous philosophers. They are actually theorizing about the phenomenon, and claiming immunity from criticism by saying that what they are doing is conceptual analysis. I think that is a bit of

a charade. If what you really want to do is analyse concepts, they go ahead and do it. Realistically, however, the task of analyzing any given concept should be completed in about 10 days, with plenty of time in there for long lunches followed by a snooze. Presumably it is a factual matter what is and is not part of a person's concept. How hard can that be to figure out?

BM: *In your recent book* Touching a nerve *you give you own story about "getting accustomed to one's brain". Why is it so difficult to accept that we are our brains? Do we need to accept this?*

PC: It does seem that many people find that it is hard. Because I did not find it particularly hard myself, part of my aim was to convey a bit of how I see things. Naturally enough, many people do want to think of themselves as having a soul that will survive their bodily death and having a soul that will have memories and character traits and so forth. I give talks for general audiences and almost always there is a question "Do you think there is life after death?" How do I think of it? Begin by thinking about your memories and what they are. Well, we know that memories and skills are anchored by structural changes in the brain. What you remember is embodied in the actual structure of the brain itself. When I die and those neurons supporting the skill of reading, for example, are deprived of oxygen, they disintegrate and rot. There is no skill or memory left. So it is hard to see what of me could survive the death of my brain.

BM: *Do you think there is no work left for the concept of the soul to do?*

PC: It does not look like there is much of a role for "the soul", meaning a nonphysical thing that is the repository of thinking and feeling and perceiving. This is not an ideological point of view. Whatever the truth turns out to be is fine with me. If somebody produces something more than just saying "Maybe it is magic", but actually gives significant, replicable evidence of a nonphysical soul, then I am happy to change my mind. But as we know the data on out-of-body experiences and near-death experiences, which a lot of people hoped would take us in that direction, have not panned out. There are well-supported alternative physical explanations of the phenomena.

BM: *You have argued that morality has a biological basis. What do you mean by this?*

PC: The basic platform for sociality is clearly biological, but what happens after that depends on how people negotiate with one another, what their history is, whether they develop certain religious attitudes towards things, what the local conventions are. And all that has an effect on the moral norms that are developed within a group. But the basic platform whereby we care about each other is quite evidently biological and it was selected for as a part of the evolutionary changes that produced the mammalian brain. Moreover, the reward system whereby we learn social conventions and norms and skills is also crucial, and that again, is neurobiology. Of course I do not for a moment suppose that neuroscience can settle moral questions such as whether physician-assisted suicide should be permitted or whether we should use gene editing techniques to change germ cells. Data will be relevant, but ultimately we have to discuss and debate and ponder what is the best long-term and short-term outcome.

BM: *If morality is contingent on our biological basis, doesn't this make morality subjective and relative?*

PC: It is very easy to understand how there can be values that are biological. All animals have the circuitry in their brainstem to value their own survival. Mammals and birds also

have circuitry to value others and in the case of mammals, that happened because of the way the evolution of the mammalian brain played out. Caring for others is what is important to individuals in the group and individuals who are entirely selfish are sometimes punished or thrown out of the group (we can see that in chimpanzees and in baboons). There is going to be lots of norm variation, but there is also lots of commonality and the commonality makes good evolutionary sense. So far as we can tell, there is no Plato's Heaven replete with moral absolutes, and there is no Divine Being who commands what should be done. To quote the old saying, there is no Justice, there is just us.

BM: *How does this bear on the relativism issue?*

PC: Biology provides for a sort of common core, but outside of that common core there is going to be variability in norms, depending on the conventions of the tribe. Given certain ecological conditions, some tribes might practice infanticide, as many human groups have done in the past, but given conditions of prosperity and plenty, infanticide may be considered wrong. But context is tremendously complex, and involves many factors, some of which compete with each other. It is very easy to be smug and insist that one's own morality is right, and those who differ are just plain wrong. I tend to think we need to be reflective and sensible when encountering cultural differences. Philip Kitcher suggests "Don't call your view relativism, because that has got a bad name, call it pluralism." I think that is probably wise. His point is not that "anything goes", but that cultures, building on the platform of biology, may for historical and ecological reasons take various forms. On occasion, we may wish to judge some forms as more conducive to prosperity and well-being than others, both with and external to our own culture. While condemning brutality, we also want to be mindful of snobbish responses to norms of cleanliness or how to punish deception. The fact that there is no such thing as absolute "down-ness" does not mean that we do not make useful and important distinctions about falling down hereabouts. We do not say, "well, you cannot say the bridge fell down because there is no such thing as absolute down-ness." Nuts. Similar considerations apply in the social and moral domains.

BM: *What are those still unresolved philosophical issues that you still hope to settle in some day?*

PC: I am particularly interested in social neuroscience. There is a whole set of issues involving the role of oxytocin and the role of the opioids and the importance of early nurturing. We know from the rat studies that if the pups are not nurtured and cuddled, even though they are kept warm and fed, when they grow to maturity they tend not to be good social rats and females won't make good mothers, for example. In an environment where there isn't love, fondling, caring and nurturing, certain genes having to do with stress hormones are more highly expressed. This may well hold for humans and this has enormous public significance. It is something that everybody already knows in some sense. We already know that children who are neglected and abused tend not to turn out well. But having the hard data and seeing the gene-environment interactions really has a big effect on all of us. I think it is helluva lot more important than arguing about zombies, but most of my colleagues would say that social neuroscience is irrelevant to philosophy.