1 Introduction: Becoming Paul M. Churchland (1942–)

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The goal of this chapter is two-fold. First, I will present an overview of the philosophical vision of Paul M. Churchland (PMC). This will help situate the more detailed, and necessarily narrower, discussions of the other authors in this volume. Second, the more substantive goal here is to show that Paul Churchland's views have not developed in a vacuum. While he has clearly developed his own unique view of the philosophical terrain, he is not without his influences – influences that he in no way attempts to hide. His work is a unique blend of ideas encountered as a nascent philosopher. The philosophers I will be discussing are not always so well known to today's students of philosophy, so there is value in considering how these views of the preceding generation are being passed on within the work of one of today's more influential philosophers of mind and science.

I will begin by sketching Paul Churchland's personal biography. After getting the basic facts on the table, I will turn to the three philosophers whose influence on PMC are my foci: Russell Hanson, Wilfrid Sellars, and Paul Feyerabend. Each of these thinkers made philosophical contributions that are reflected in the work of PMC. Next, I will show how all three of these thinkers contributed to the philosophical position most closely associated with Churchland, namely "Eliminative Materialism." My comments critical of Churchland's version of eliminative materialism are meant to set the stage for the rest of this volume's contributions, as this philosophical framework is at the core of PMC's view of science, the mind, and the science of the mind.

PERSONAL HISTORICAL OVERVIEW

PMC was born a Canadian and earned a B.A. from the University of British Columbia, and in 1969, he was awarded a Ph.D. in Philosophy from the University of Pittsburgh. There, he wrote a dissertation under the direction of Wilfrid Sellars. He spent the first 15 years of his career at the University

of Manitoba, taking advantage of its relative isolation to further develop his own approach to the ideas to which he was exposed during his graduate education. In addition to a number of important early papers on eliminative materialism and the status of commonsense reasoning, he published his first two books. The first is his still-insightful monograph, *Scientific Realism and the Plasticity of Mind* (1979). Here, he lays out his views on the nature of scientific process and how it is based in the cognitive capacities of adult, human scientists.

His second book, *Matter and Consciousness* (1984, revised and updated 1988; translated into five languages), has become one of the most popular textbooks in the philosophy of mind. (Rumor has it that this book is the all-time bestseller for the Bradford Books imprint of the MIT Press; quite an impressive achievement given the competition from the likes of Jerry Fodor, Dan Dennett, Stephen Stich, and Fred Dretske, to name only a few.) *Matter and Consciousness* provides an introduction to the Churchland worldview; how the problems of the philosophy of mind are to be approached from a perspective developed out of the neural sciences. The book is an important step in PMC's development because it contains the first sustained discussions of contemporary neuroscience and how these theories and discoveries provide grist for the traditional philosophical mill.

Several of PMC's early papers were co-authored with his perennial partner in crime: his wife, Patricia Smith Churchland. Starting early in their respective careers, these two have worked closely together; a more-than-three-decades-long collaboration so close that it is often difficult to determine who is ultimately responsible for this or that idea.[1]

In 1984, the Churchlands moved to the institution with which they would become most closely associated: the University of California, San Diego (UCSD).[2] There, he fell in with the then-burgeoning Connectionist (a.k.a. Parallel Distributed Processing (PDP)) movement in cognitive science. According to the proposals of this group, the mind is best understood as a computational system formed of networks of simple processing units. The units are modeled on neurons (in that they sum inputs analogously to the behavior of dendrites and either "fire" or not in a process akin to a paradigmatic neuron's either producing an action potential down its axon or not). While other models of the mind made use of language-like units (say, formal symbols in a "language of thought" (Fodor 1975)), the PDP approach was intended to present a "sub-symbolic" alternative to such theories of mind in that the fundamental units are vectors of activation across networks of neuron-like entities (cf., Smolensky 1988; Clark 1989). The two-volume bible of this approach came out of the San Diego–based

PDP Research Group two years later (McClelland and Rumelhart 1986; Rumelhart and McClelland 1986).

From this point forward, the science of connectionism and what came to be known more generally as "computational neuroscience" became the main source of scientific theories and ideas used by Churchland to present his new theory of mind. His next two major works explore how to apply the insights resulting from thinking of the mind as a neural net to a variety of problems within philosophy: *A Neurocomputational Perspective: The Nature of Mind and the Structure of Science* (1989) and *The Engine of Reason, The Seat of the Soul: A Philosophical Journey into the Brain* (1995, translated into six languages). A collection of papers by Paul and Pat, separately and together, has also been published (Churchland and Churchland 1998).

As of the writing of this chapter, Paul is still as productive as ever and continues his career as Professor of Philosophy at UCSD.

INFLUENCES

The question of influences on a thinker is necessarily irresolvable in any final way. The influence of some – Socrates, Plato, Hume, Kant – are so wide ranging that there is little value in trying to pick out their specific contributions to any given philosopher. Anyone with a reasonably strong background in philosophy can see their influences on most who followed them. Two clear influences on PMC whose ubiquity, even in a very short span of time, is wide ranging are W. V. O. Quine and Thomas Kuhn. Quine's promotion of naturalized epistemology opened the way for the highly naturalized approach that PMC has undertaken.[3] Kuhn's post-positivist exploration of the dynamics of theory change within science places a strong emphasis on the psychological processes of individual human scientists. This foreshadows PMC's own concerns with the scientist as learning machine and the human learner as a kind of scientist. That said, it seems as though it is practically impossible for philosophers to avoid reading Quine and Kuhn these days, so spotting these influences is less than earth shattering.

In what follows, I will concentrate on three philosophers – Russell Hanson, Wilfrid Sellars, and Paul Feyerabend – all of whose work is clearly reflected in the mature philosophy of Paul Churchland. Furthermore, their work is sometimes overlooked by recent generations of philosophers,[4] such that, while reading Churchland, it may be unclear what is his unique contribution and what he takes from those upon whose shoulders he stands. While he is clearly influenced by these thinkers, it is not fair to say that he is

merely parroting them. With each influence, he accepts some aspects of the proffered theory and weaves those ideas into a tapestry of his own making. He clearly rejects some elements as misguided or otherwise wrongheaded. It is instructive to undertake an investigation into such a personal history of ideas because it reveals decisions on the part of Churchland as to what component ideas to embrace and which to leave by the wayside.

HANSON

Norwood Russell Hanson (1924–67) is not so well known today, in part because he did his most important philosophical work in the years after the disillusionment with Logical Positivism but before the rise of some of the more popular post-positivist approaches to philosophy of science, such as found in the work of Lakatos and Kuhn. Therefore, his oeuvre gets short shrift. This is a shame because Hanson's work is an important stepping-stone from the positivist dreams of Carnap, Ayer, and others to the contemporary work of philosophers such as PMC.

One belief that Hanson and PMC share is that philosophy of science is best done with a solid understanding of the practice of science. Large chunks of Hanson's work in philosophy of science involve detailed discussion of the minutia of science and its practice. In the introduction to his landmark *Patterns of Discovery*,[5] Hanson writes,

> The approach and method of this essay is unusual. I have chosen not to isolate general philosophical issues – the nature of observation, the status of facts, the logic of causality, and the character of physical theory – and use the conclusions of such inquiries as lenses through which to view particle theory [in physics]. Rather the reverse: the inadequacy of philosophical discussions of these subjects has inclined me to give a different priority. Particle theory will be the lens through which these perennial philosophical problems will be viewed. (1958: 2)

As a result of this novel approach, a significant portion of Hanson's book contains a fairly detailed discussion of then-current particle microphysics.[6] Decades later, it would be PMC's books that would be filled with the details of science. The reason for this is not mere "scientism" on the part of Hanson and Churchland (despite what some critics might believe (Sorell 1991)). Instead, their reason is that it is in the practice of science – particularly of new and unsettled disciplines – that one finds the most interesting philosophical

problems and often the material for their solution. What Hanson wrote of particle physics in 1958 would be equally true of the neural and cognitive sciences of the 1980s: "In a growing research discipline, inquiry is directed not to rearranging old facts and explanations into more elegant formal patterns, but rather to the discovery of new patterns of explanation. Hence the philosophical flavour of such ideas differs from that presented by science masters, lecturers, and many philosophers of science" (1958: 2). Like Kuhn, Hanson stressed the importance of studying how science is actually conducted (and not how it is mythologized after the fact). It is in the practice of actual science that one finds explanatory genesis. For Hanson, the chosen source was particle physics; for Churchland, it is computational neuroscience.

So, what image of science did Hanson get from this detailed look at physics and how did it differ from that of his allegedly misinformed predecessors? First, Hanson argued that one of the central tenets of Logical Positivism – the distinction between the context of discovery and the context of justification – was a nonstarter. According to the dogma Hanson sought to challenge, there are two different aspects to the formation of new theories. The first aspect, the *context of discovery*, is the often-mysterious process of the creation of new hypotheses. How does a scientist generate a new hypothesis? The second, the *context of justification*, is the more structured and logical process of determining whether a given hypothesis is correct. Given a hypothesis, how does a scientist figure out whether it is correct?

The classic illustrative example of this distinction is Friedrich Kekulé's famous description (years after the event) of how he came to discover the chemical structure of benzene (Kekulé 1890/1996). As he describes it, the idea that the benzene molecule had a ring structure came to him as he was dozing next to a fire during an evening break from trying to work out a solution to this structural problem. Having arrived at this proposal, "... I spent the rest of the night working out the consequences of the hypothesis" (34). Thus, while the creative process through which the hypothesis was generated seems relatively mysterious (it just came to him while he napped), that process is distinct from the more rigorous (and fully conscious) process of *working out* the logical consequences of the idea in order that it may be tested.

The work done by this distinction in the positivist story is the demarcation of a division of labor within the study of the scientific method. The context of discovery, with its apparently irrational intuitive leaps and the

like, is the purview of psychologists. The logic of the context of justification is not so unconstrained and willy-nilly, and this is where philosophy of science must necessarily dig in and set the rules. The creative aspect of discovery is, in essence, rule-breaking whereas the justification process is essentially rule-driven. Philosophy of science, according to the positivists, has the goal of determining what those rules should be.

While such a division of labor offers a neat and clean picture of the scientific process and a clear role for philosophical inquiry, Hanson argued that it is simply not an accurate portrayal of the scientific process. The only way one might come to believe it *is* the correct picture would be by concentrating too much on such cleaned up "text book" examples as Kekulé's. Instead, when one looks at how science is actually done, it is revealed that the discovery of explanatory patterns is not only tractable and interesting, it is perhaps *the* most interesting part of the scientific method: "The issue is not theory-using, but theory-finding; my concern is not with the testing of hypotheses, but with their discovery. Let us examine not how observation, facts and data are built up into general systems of physical explanation, but how these systems are built into our observations, and our appreciation of facts and data" (1958: 3).

The idea that theories are "built into our observations" brings us to Hanson's most lasting contribution to philosophy of science: the thesis that scientific observation is inescapably "theory-laden" (to use the term he introduces into the philosophical lexicon in Hanson (1958: 19–24); see also Hanson (1971: 4–8). Positivist dogma held that an essential component of the logic of justification is the claim that the process of observation is independent of our theorizing about the world. After working out the empirical consequences of a particular hypothesis, we evaluate it by observing the world and determining whether its predictions obtain. On the positivist view, in order to be an arbiter of theory evaluation, observation must, in principle, be independent of theory. Again, the merely psychological (the physiology of perception) is distinct from the philosophical (the interpretation of observations as evidence either for or against a particular theory).

Hanson again rejects this simplifying distinction, arguing that observation cannot be so cleanly separated from theory: "The color-blind chemist needs help from someone with normal vision to complete his titration work – whether this someone be another chemist, or his six-year-old son, does not matter. But, now, are there any observations that the latter, the child, could *not* make?" (1971: 4). Hanson's answer is "yes."

After citing a passage from Duhem (1914: 218) that foreshadows the claim he wants to propose, Hanson asks what is presupposed by an act of genuine scientific observation. The ability to sense is one thing.

> *Knowledge* is also presupposed; scientific observation is thus a 'theory-laden' activity. . . . Brainless, photosensitive computers – infants and squirrels too – do not make scientific observations, however remarkable their signal-reception and storage may be. This can be no surprise to any reader of this book. That the motion of Mars is retrograde, that a fluid's flow is laminar, that a plane's wing-skin friction increases rapidly with descent, that there is a calcium deficiency in Connecticut soil, that the North American water table has dropped – these all concern observations which by far exceed the order of sophistication possible through raw sense experience. Nor are these cases of simply requiring physicobiological 'extensions' to the senses we already have; for telescopes, microscopes, heat sensors, etc., are not sufficient to determine that Mars' motion is retrograde, that blood poisoning is settling in, that volcanic activity is immanent. Being able to make sense of the sensors requires knowledge and theory – not simply more sense signals. (Understanding the significance of the signal flags fluttering from the bridge of the *Queen Elizabeth* does not usually require still *more* flags to be flown!) (1971, 5).

This inseparable intermixing of theory and observation is central to Hanson's thought. Along with the importance of engaging actual scientific practice, the theory-ladenness of observation becomes a foundation stone in PMC's philosophy as well. We will turn to where PMC parts company with Hanson later, following a discussion of his affinities with the two other philosophers considered here.

SELLARS

Wilfrid Sellars (1912–1989), son of philosopher Roy Woodward Sellars (1880–1973), taught at the University of Minnesota and Yale, before finally settling at the University of Pittsburgh, where he supervised a doctoral thesis by Paul Churchland.[7]

According to Sellars (1960/1963),

> The aim of philosophy, abstractly formulated, is to understand how things in the broadest possible sense of the term hang together in the broadest possible sense of the term. Under "things in the broadest possible sense" I

> include such radically different items as not only "cabbages and kings", but numbers and duties, possibilities and finger snaps, aesthetic experience and death. To achieve success in philosophy would be, to use a contemporary turn of phrase, to "know one's way around" with respect to all these things, not in that unreflective way in which the centipede of the story knew its way around before it faced the question, "how do I walk?", but in that reflective way which means that no intellectual holds are barred. (1)

This is to say that Sellars sees the academic discipline of Philosophy as not so much asking the "Big Questions" as asking the "*Broad* Questions." It is that which stitches together all of our various understandings of the world – those provided by the natural and social sciences, those of the humanities, as well as those of ordinary humans just grappling with their multifarious worlds – into a coherent, unified conception of the world. By "unified," we should not think of anything akin to a classical reductionist picture in which every legitimate form of explanation should eventually be translated into some single language (cf., deVries and Triplett 2000: 114–16). Instead, there will likely be many different understandings, with philosophy providing the intellectual resources for understanding how they, as he says, "hang together."[8]

During his long career, Sellars made a number of contributions to philosophy, quite a few of which had an impact on the work of his apprentice. The first I will note is a key distinction Sellars draws in the ways that we humans understand ourselves, referred to earlier. Sellars distinguishes two "images" or very general philosophical frameworks for understanding human activity. The first is the *manifest image* – the embodiment of our commonsense understanding of human behavior, including our own personal behavior. Sellars (1960/1963) characterizes "... the manifest image of man-in-the-world as the framework in terms of which man encountered himself – which is, of course, when he came to be man" (6). This image is not pre-theoretical in the sense of being unreflective. Rather this is the image of oneself achieved upon taking oneself as an object of understanding; what humans got when they first realized that they, too, were something that required understanding, in addition to all the other confusing aspects of the world, including other animals, the weather, the night sky, etc.[9] Furthermore, it is a framework in which the basic ontological category is that of "persons." In the manifest image, everything understood is understood in terms of being a kind of person. As deVries and Triplett (2000) put it, "It is our refined commonsense conception of what the world and ourselves are and how they interact" (190).

The manifest image is contrasted with what Sellars calls the *scientific image*. This is the image of our self and the world provided by the explicit theorizing of post-Enlightenment science. There is a strong "what-you-see-is-what-you-get" element in Sellars' conception of the manifest image. He cites Mill's inductive method as central to the method of the manifest image; such explanation is generated by noting the correlations of observed events in the world (1960/1963: 7). In contrast, what demarcates the method of the scientific image is its method of hypothesis and the postulation of the unobserved and the unobservable in the service of explanation. The fundamental ontology of the manifest image (persons) is directly observable to everyone; indeed if all one had was the manifest image, persons are all one would ever see. By contrast, the fundamental ontology of the scientific image, say that provided by contemporary physics, is one of unobservable atomic elements, atomic forces, and the like.[10]

What is the relationship between these two images? They are often taken to be opposed to one another. As one striking example, one line of thought derives from taking the scientific perspective on humans themselves and seeing them not as persons in the sense of the manifest image but rather as a collection of abstract, scientific entities (cell assemblies, molecules, expressed DNA, quarks, what have you): "Even persons, it is said (mistakenly, I believe), are being 'depersonalized' by the advance of the scientific point of view" (Sellars 1960/1963: 10). This is "mistaken" because he takes the goal of philosophy to be explanation in the broadest sense; he sees both images as essential to a full understanding of humans, the world, and the place of humans in the world. He likens the relationship between the two to be that of the different component images of a stereoscopic diagram. Properly viewed through a pair of stereoscopic lenses, the two images combine to provide an image with dimensions lacking in either component image on its own.[11]

Sellars' notion of these two different images of ourselves and the world around us show up in PMC's career-long concern with what have come to be known as "folk theories." Folk theories are what they sound like: the commonsense theories possessed by the average person. In particular, PMC is concerned with *folk psychology*, our commonsense theory of animal (most important, human) thought and behavior.[12] While PMC accepts Sellars' distinction between the two images, how he treats the relationship between these two images represents perhaps his largest break from his dissertation advisor, but that will addressed in the following section.

Another contribution Sellars made to contemporary philosophy – the contribution he is likely best known for today – is his attack on

foundationalist epistemology, such as one finds, for example, in the work of C. I. Lewis (1929, 1945). Like Hanson, Sellars disagreed with the positivist tenet that there was some store of human-independent data upon which we can build our scientific knowledge by using these data to arbitrate between hypotheses. However, where Hanson attacks the notion that such data can exist independently of our theories, Sellars takes a slightly different tack. Sellars takes issue with the very notion of this fund of data, what he calls the "Myth of the Given." His *Empiricism and the Philosophy of Mind* is a long argument intended to expose this myth and undermine its foundation (Sellars 1956/1997). As Richard Rorty puts it in his introduction to the recent republication of this essay, this work, "... helped destroy the empiricist form of foundationalism by attacking the distinction between what is 'given to the mind' and what is 'added by the mind.' Sellars' attack on the Myth of the Given was a decisive move in turning analytic philosophy away from the foundationalist motives of the logical empiricists. It raised doubts about the very idea of 'epistemology,' about the reality of the problems which philosophers had discussed under that heading" (Rorty 1997: 5).

Along with Hanson's related arguments for theory-laden observation, PMC takes Sellars' Myth of the Given arguments on board in his own work.

FEYERABEND

Paul K. Feyerabend (1924–94) was a sometimes self-deprecating[13] epistemologist and philosopher of science. The slogan, "Anything goes," summed up his approach to philosophy (and probably explains some of his popular cachet in the radical 1960s and early 1970s). He was passionate in his defense of explanatory pluralism and tried to keep alive the iconoclastic spirit of early Enlightenment science against the growing hegemony of industrialized and institutionalized science. He saw that the tables had turned; whereas once science had to eke out a precarious existence in the shadow of culture-dominating seventeenth century ecclesiastical powers, in the late twentieth century he saw the need to write papers with titles such as "How to defend society against science" (Feyerabend 1975). Following World War II, science was quickly becoming one of the dominant cultural institutions of the world. Having served in Hitler's army as a young man, Feyerabend was deeply suspicious of any tyrannical force in society, no matter how benevolent its stated intentions.

Feyerabend sees science – properly understood – as a fundamentally democratic process, rather than as a necessarily truth-seeking one. In fact, he