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Species of Philosophical Naturalism, Science and Scientism: Comments on the On-going Philosophical Debate Concerning the Relation between Science and the Rest of Human Practices

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Abstract: Today every analytic philosopher calls himself a naturalist; all agree that all is natural and that science is the best way to discover how the empirical world works. Yet they disagree on what natural means; on what the empirical world includes; on what counts as science. Eliminative hard naturalists think of philosophy as a branch of science. Science then is taken in as the only explanatory method people have; different branches of it work in uncovering the ways the empirical world functions. And by empirical world they mean all there is. Soft naturalism, on the other hand sees philosophy as a qualitatively different discipline than science; philosophy aims at clarifying our concepts and understanding, while science provides us with knowledge about the empirical world. Concepts and understanding, then, are not part of the empirical world; thus they cannot be reduced into the empirical or studied by science. In this paper I will briefly present those two views and discuss how each of them deals with science. Since there is a consensus regarding the privileged role of science, it seems important to see whether naturalism can give an account of how one becomes a scientist and consequently how science evolves. I will argue that although hard naturalists' strongly rely on science, their scientism is exactly what disables them from explaining how science is communicated and evolves. The soft naturalists, however, restrict science within our ordinary conceptual framework and yet can give a more successful approach of scientific evolution.

Keywords: Philosophical Naturalism, L. Wittgenstein, P.M. Churchland, Philosophy, Science, Science Education and Evolution

Introduction

TODAY, MOST PHILOSOPHERS would call themselves *naturalists*: most agree that *all is natural* and that *science is the best way to discover how the empirical world works*.

Yet, they disagree on what *natural* means; on what the *empirical world* includes; on what counts as *science*. The conflict also regards the relation between philosophy and science and, consequently, the scope of scientific explanations: On one hand, eliminative *hard naturalists* think of philosophy as a branch of science. Science is taken in as the only explanatory method people have; different branches of it work in uncovering the ways the empirical world functions. And by *empirical world* they mean all there is. On the other hand, *soft naturalism* sees philosophy as a qualitatively different discipline than science; philosophy aims at clarifying our concepts and understanding, while science provides us with knowledge about the empirical world. Concepts and understanding, then, are not part of the empirical world; thus they cannot be reduced into empirical (physical, e.g. biological, neurological, etc) facts and studied by science.

In this paper, I will briefly present those two views and discuss how each of them represents science and its interaction with other human practices. Since there is a consensus regarding the privileged role of sci-

ence, it seems important to see whether either kind of naturalism can give an account of how one becomes a scientist and consequently how science evolves. I will argue that even though the hard naturalists strongly depend on science, their premises disable them from explaining how science interacts with other disciplines and evolves. The soft naturalists, however, can give a more successful approach to scientific evolution within the framework of human practices.

First, I need to make a note regarding the notions of *hard* and *soft naturalism*. The term *naturalism* itself is very vague; there are many varieties of naturalism and many alternative terms the philosophers would rather call themselves. Here I am going to follow the terminology of P.F. Strawson (1985): I will use *hard naturalism* to refer to eliminative naturalists, such as P.M. Churchland (see 1981; 1986; 1989; 2006), who sees philosophy as a branch of science and argues for the elimination of all phenomena that cannot be explained in physical terms from our ontology. I will use *soft naturalism* to refer to critics of the former type of naturalism, such as later L. Wittgenstein (see 1977; 1997), who argues for the autonomy of philosophy as a conceptual investigation and suggests that our conceptual framework is crucial for understanding the world around us and cannot



be replaced by physical explanations.¹ So, in this paper I will use P. Churchland and L. Wittgenstein as two extreme examples of those different species of naturalism. Each of them represents views and arguments that are very vivid today in analytic epistemological or metaphilosophical debates.

Hard Naturalism

The term *naturalism* refers to the general view that everything is natural. What gives hard naturalism a more specific touch is how one conceives nature. Hard naturalists take *natural* to mean *physical, material, scientifically explainable*. The claim that *all is natural* then implies that *all is to be studied by the methods of physical science*.

The question is what happens if something stands out against physical explanation. The most worrying example comes from consciousness: mental states resist a purely physical description. To use a crude example, it seems different to say “horror movies scare me” than say “horror movies produce amygdaloid signals to my brain”. The two sentences have different meanings: They are used in different contexts in order to draw attention in different aspects of my experience of horror movies. One important difference being that the former describes the way I feel, providing the phenomenology of the experience from the first person perspective, while the latter is a neutral description from the third person perspective. Now, according to Churchland, propositions of the former type cannot be translated into propositions of the later type just because the way we approach mental phenomena is already mediated by *folk psychology*.

Folk psychology is, according to him, an implicit *theory*; a theory which people use in order to understand, explain and predict their own or other people’s psychological events and behaviour. Following folk psychology, we attribute *desires, fears* or *beliefs* in our attempt to explain our behaviour. Propositional states, such as these, are theoretical constructions and therefore should be evaluated with reference to experience: We should prise them against the world and examine whether there is strong evidence that these entities exist. And like all theoretical entities, *desires* and *beliefs* are open to revision and total elimination, if proven false. This, he suggests, has happened a lot in the past with the terms of other folk theories; for example, to folk physics talking about phlogiston.

Churchland goes on arguing that folk psychology is a *false* theory, “significantly worse [...] than [...] folk mechanics, folk biology and so forth” (Churchland, 1989, p.231). He compares it with the theory

of witches, demonic possession, exorcism and trial by ordeal: *Demons* and *witches* just like *desires* and *beliefs* are theoretical entities. And just as we got rid of the theory of witches, we must now eliminate folk psychology. *Folk psychology is false since it resists physicalistic explanations*. As Churchland writes:

If we approach *homo sapiens* from the perspective of natural history and the physical sciences, we can tell a coherent story of his constitution, development and behavioral capacities which encompasses particle physics, atomic and molecular theory, organic chemistry, evolutionary theory, biology, physiology, and materialistic neurotheory. That story, though still radically incomplete, is already extremely powerful... And it is deliberately and self consciously coherent with the rest of our developing world picture... But FP [folk psychology] is no part of this growing synthesis. Its intentional categories stand alone, without visible prospect of reduction to that larger corpus. (Churchland, 1981, p.75.)

In order to save this *growing synthesis*, then, we should reduce all mental terms about desires, beliefs, fears etc in physical terms about brain activities. If this is not possible, we should eliminate the mental vocabulary from our ordinary language altogether. Neuroscience talk about brain states is supposed to fill in everyday vocabulary about mental states.

It should be clear that *folk psychology* refers to the way we all think and talk about all kinds of issues in our everyday life. It has to do with descriptions and concepts we all use everyday in ordinary language. When we say that the world is round, for example, we express a *belief*, when we take an umbrella before we leave our house, we again reveal our belief that it may rain. When Churchland asks for the elimination of folk psychology, he asks for the abolition of a basic corpus of ordinary dispositions and practices.

The implications of Churchland’s views thus go further than his philosophy of mind: Scientific explanations about the physical world are the only kind of *explanation* he is willing to admit. Physical science is *the only* explanatory principle. Consequently, all kinds of problems people are struggling with (psychological, moral, aesthetic issues etc) should be translated into scientific, materialistic, physical language. If this is not possible, their resistance is strong evidence that they are *pseudo-problems*, which we should abandon by *eliminating* all relevant terms from our vocabulary.

¹ There are many interpretations of the philosophy of Wittgenstein. Here I will use P.M.S. Hacker’s (1993, 2008) reading of the later Wittgenstein for it best represents the account of *soft naturalism*.

Moreover social sciences or theoretical sciences like sociology or psychology should again either be reduced into physical science or be eliminated. Philosophy too is taken in as a branch of theoretical proto science that articulates hypotheses for other sciences to test. (Churchland, 1986)

Churchland's views then suggest a very strong version of scientism: Physical science is the norm by which the legitimacy of all quests, descriptions and explanations will be measured. The question is whether the primacy ascribed to science will help the hard naturalist give us a theoretical account of how scientific education and evolution is possible. I will come back to this at the end of the paper.

Soft Naturalism

Soft naturalists, on the other hand, see the so-called *folk psychology* as the corpus of inescapable and valuable of dispositions of our ordinary conceptual framework. According to them, ordinary consensus is not a theory. It embodies our common *conceptual background*, the conceptual glasses by which we approach the external world. Such a background cannot be empirically verified, for it is normative: It describes the norms our concepts impose on us. It is also *natural*, "as something animal" (Wittgenstein, 1969, par.359), in the sense that it is part of people's everyday lives. Analysing this conceptual background is the philosopher's job.

For example, while science investigates the brain, it is up to philosophy to analyse mental vocabulary and see if it can be translated into material terms about brain or body activities. And such analyses suggest that mental talk about our desires or beliefs is used differently than physical descriptions about the brain. The concept of *belief* or *desire* cannot be reduced to brain or body activities because its role in language and everyday life is different. I believe that when I drive and see the stop-sign I have to stop the car. So when I do see the stop sign, my brain gives a cue and my leg hits the break. Yet it is different to say "one should stop whenever one sees the stop-sign", expressing a belief, and different to say "when one's eye sees the stop-sign, the brain gives an order and their leg muscle moves and hits the break", providing an empirical description. The former sentence cannot be reduced to the latter for their use is different. The very concept of *belief*, that is the rules of applying this term, makes it impossible in principle to translate the first sentence into the latter.

Such a conceptual analysis is the philosopher's job. Philosophers clarify conceptual rules, while scientists study the empirical world. The Wittgensteinian view implies a logical distinction between the *empirical world* and the *conceptual rules*. Science

investigates the reality; philosophy clarifies the concepts we use to talk about reality. The space of reason and justification, the space of meaning and understanding, the terms we use in order to classify and comprehend the world around us, this is philosophy's field of inquiry.

Propositions such as "something cannot be red and green all over at the same time", "an ophthalmologist is the doctor for the eyes" or "one plus one equals two" are analytic for they give us the rules of language. Any competent speaker can verify them without having to look at the empirical world. Propositions such as "it is raining" or "the cat is on the mat" are empirical (or synthetic) for they describe how the empirical world is. In order to verify them one needs *both* to know the meaning of the terms *and* give a glance to the empirical world to see whether they stand. Philosophy deals with clarifying the meaning in either type of propositions. Science checks out the empirical world. Philosophy analyses the *concepts* used in either grammatical or empirical propositions, science investigates how the outside world works.

The distinction between the grammatical propositions and presuppositions and the empirical propositions is the very core of analytic non-reductive tradition. It is best articulated in Wittgenstein's *On Certainty* as the distinction between the riverbed the river-flux. Empirical propositions are the flux as they change through time. Conceptual rules, dispositions and certainties are the bed that faintly, if at all, evolves:

... it is the inherited background against which I distinguish between true and false. The propositions describing this world-picture might be part of a kind of mythology. ...

...some propositions, of the form of empirical propositions, were hardened and functioned as channels for such empirical propositions as not hardened but fluid; and that this relation altered with time, in that fluid propositions hardened, and hard ones became fluid.

The mythology can change back into a state of flux, the river bed of thoughts may shift. But I can distinguish between the movement of the waters on the riverbed and the shift of the bed in itself; though there is not a sharp division of the one from the other.

...And the bank of the river consists partly of hard rock, subject to no alteration or only to an imperceptible one, partly of sand, which now in one place now in another gets washed away or deposited. (Wittgenstein, 1969, par. 94-99.)

In the above quote, the parallel between empirical propositions and the flux of the river, on the one hand, and between the conceptual background and

the river bed, on the other, is vivid, if metaphorical: Just as the river bed delimits the flux, the conceptual defines the empirical. One cannot investigate reality without using concepts in order to do so. Concepts are used to describe, schematise and categorise the world around us. Our concepts even prescribe what questions we can sensibly ask.

The conceptual background comes down to conceptual rules, propositions or prejudices that we cannot sensibly doubt. It evokes all the things we take for granted while performing any kind of empirical investigation. Even scientific hypotheses are constructed within our background of concepts and preconceptions. Every question presupposes concepts and ways of looking at things. According to Wittgenstein:

That is to say, the *questions* that we raise and our *doubts* depend on the fact that some propositions are exempt from doubt, are as it were like hinges on which those turn. (Wittgenstein, 1969, par. 341).

Now I would like to regard this certainty, not as something akin to hastiness or superficiality, but as a *form of life*... (Wittgenstein, 1969, par. 358)

These quotes underline the Wittgensteinian idea that there is a ground of certainties, an initial, pre-rational commitment in a common world-view and that, only within this context, it is sensible to talk about knowledge or doubt. According to him, one cannot doubt everything at the same time. In order to doubt whether this desk is five feet wide, I presuppose (that is, I understand and accept) the concept of *table*, as well as the concept of *feet*, I acknowledge some way of calculating size and so forth. One always needs some background presuppositions in order to perform any investigation, scientific or other.

This set of presuppositions lies within our form of life. One does not choose those presuppositions; we inherit them. So we cannot just decide to eliminate them. *Form of life* refers to our historical- social-cultural everyday framework. It is changeable through time. Yet, at any given moment, it imposes certain conceptual rules. The riverbed image represents the verge of *grammar*: Our bedrock certainties that at any given time lie beyond doubt. Within them runs the flux: All kinds of human practices interacting with each other. Wittgenstein's view sees science as a part of this flux.

Science is part of all human practices. It is the discipline that discovers new knowledge and produces theories about the empirical world. Philosophy cannot "penetrate phenomena"; its investigation is

"a grammatical one": it can only analyse the conceptual bed "clearing misunderstandings away" (see Wittgenstein, 1997, par.90). The discrimination between the empirical and the conceptual propositions is taken in as a dichotomy between science and philosophy.

If we take Wittgenstein's words literally, the distinction between the empirical and the conceptual level is neither strict nor dogmatic: some dispositions or presuppositions, embedded in our form of life, can turn into flux and, vice versa, some empirical propositions may, in time, harden and become part of the river bed. This means that some parts of our conceptual background may be revised (probably due to empirical breakthroughs) or that some of today's empirical views can form part of tomorrow's presuppositions.

On the one hand, concepts influence the way we see the world, but are still revisable. On the other, experience can provide us with new concepts or dispositions. For example, once we thought that whales are fish, now we know them to be mammals. The concept of *whale* has changed through time. Among the grammatical propositions, though, some are more mutable, while others form the bedrock of our dispositions (for example, the disposition that *one equals one*). These bedrock dispositions are considered extremely difficult to change through time.

Wittgenstein firmly denies though that concepts can be *reduced* into empirical facts: my belief that I should stop my car every time I see the stop-sign, for example, cannot be translated into a sentence describing what is going on in my brain in materialistic terms. Mental concepts have different functions and different rules of application: Mental vocabulary express reasons, physical explanation express causes. The former is normative, the latter is causal. Thus mental terms are irreducible to material descriptions about the brain. Wittgenstein insists that, despite the fact that we cannot draw a very strict line between the empirical and the conceptual, those two areas are *logically distinguishable*. The line between the flux and the riverbed changes very slowly in time. Wittgenstein thus implies that *at any given historical moment there is a logical distinction between those two areas*.²

The distinction also holds the view that philosophy is qualitatively different from science. Philosophical quests are different in kind: they do not aim at new discoveries concerning the empirical world nor do they want to add up to our empirical knowledge about how things are. Its job is the clarification of our concepts and the illumination of our understanding of things. Our conceptual framework is tightly con-

² Such an account differentiates him from the hard naturalists (or from W.V. Quine, 1980), who suggest that, in principle, there is no boundary between analytic (conceptual) and synthetic (empirical) knowledge.

nected with all human practices within the cultural, social, scientific, historical context of our lives, that is, with our *form of life*. Clarification then is very important; it illuminates our background presuppositions and defines what we can sensibly question or seek for. It also gives philosophy its autonomy and a special kind of authority.

Problems with Soft Naturalism

This soft naturalist's standpoint, though, does not leave any room for scientific innovation. It does not explain how certain revolutionary theories occur; theories that put very fundamental certainties of our form of life in question. How did it happen, for example, and the quantum theory occurred, questioning a very basic commitment of our world view, namely the commitment that *something cannot be both a and b simultaneously all over* (both wave and particle)?

In theory, even grammatical propositions are reviewable. Yet, Wittgenstein's river image implies that this evolution is very slow. Moreover, the suggestion is that some propositions or attitudes are excluded from revision and cannot be doubted. They are the rock bottom of our understanding. (Strawson, 1983, p.17) The question arises then about how are we supposed to distinguish, at any given time, the reviewable from the non reviewable. Will we count the proposition "something cannot simultaneously be both a and b all over" revisable *because* it is under question? If we admit that we can determine which propositions are reviewable and thus empirical and which are rock bottom, and thus grammatical, only *ex post facto*, then the logical distinction between the conceptual and the empirical breaks down.

In order to save this distinction between the empirical and the conceptual and, therefore, the view that we share a common form of life that implies some conceptual commitments, it could be that certain theories should be dismissed on the basis that they question our grammatical framework. A theory cannot *make sense* if it is against our worldview; it is *contradictory* or *senseless*.

Yet, again, if soft naturalists insist on dismissing any theory that puts in question aspects of our common world view, they are no longer performing just a *conceptual* investigation: They are stepping into the empirical and take a stand on empirical and scientific matters. And this is exactly what most soft naturalists are doing:

Take the issue about artificial intelligence for example. Wittgensteinian soft naturalists, such as J. Searle or P.M.S. Hacker, deny there is any chance that computer scientists will ever succeed making artificial intelligence programs. The very concept of *intelligence*, they argue, implies certain conceptual

commitments: Intelligent behaviour implies intentionality, it involves semantics, and not just syntax as the Turing test suggests (J. Searle, 1984), it cannot be ascribed in some inanimate, body-less creature (Hacker, 1993, p.80). The *grammar* of (that is, the rules of applying) the concept *intelligence* does not leave any room for computers' having artificial intelligence.

Even if one agrees with the conceptual analysis summed up above, they will have to admit that such an analysis takes a stand not just about how concepts work but also about *how things are* (or are going to be). Soft naturalists, while analysing concepts, claim that artificial intelligence will never be a *fact*. Therefore they transcend philosophers' alleged role as conceptual analysts. Their views on *how concepts should be used* suggest certain theses about *how extra-linguistic reality is*.

Perhaps there is no way to avoid such a step and prevent oneself from expressing beliefs about the empirical world; perhaps concepts are related with beliefs and so to other concepts. Someone might not be able to understand the word "cat", for example, unless he has attached some beliefs to the concept *cat*—that they have four legs, that they are pets etc. They also claim to refer to some actual cat or to this kind of animal; that is, they claim to give some referential content to the concept.

Consider another example: Bennett & Hacker argue that problems concerning the nature of the mind are conceptual, rather than empirical, problems. (Bennett & Hacker, 2003) According to them, any effort to explain mental phenomena using material terms and explanations about the brain lies in conceptual misunderstandings. An example of such a conceptual confusion is:

...the neuroscientists' mistake of ascribing to the constituent *parts* of an animal attributes that logically apply only to the *whole* animal. ... This application of psychological predicates to the brain makes no sense ... Human beings, but not their brains, can be said to be thoughtful or thoughtless... (Bennett & Hacker, 2003, p. 72-73).

So, it is wrong to ascribe thoughts or feelings to brain parts *because* it is wrong English to say: "my brain is thoughtful" or even "my brain thinks". The correct, rule governed, ordinary linguistic usage implies that such questions are illegitimate.

Yet, such an analysis does not just clarify concepts; it prescribes that the scientists' answers to those questions are wrong. Bennett and Hacker here overstep their role as conceptual analysts; their analysis is *about* something, namely about intelligence as an empirical fact. When Hacker suggests that the grammatical rules of applying the concept of *thinking*

makes any talk about body-parts, such as the brain, having thoughts incoherent, or that the very notion of *intelligence* does not leave any room for it cannot be ascribed to some inanimate, body-less creature (Hacker, 1993, p 80), he takes up a position that has to do with the world of experience: he insists that only whole humans can have intelligence. The empirical- conceptual dichotomy can hardly be defended in practice since any grammatical clarification is unavoidably taking a stand about how the world is.

Soft naturalists analyse a web of *concepts and beliefs*, which they consider fundamental for our common point of view. The suggestion that there is a background of such propositions at any given moment seems plausible. Yet, usually they imply that this set of dispositions restrict us in a worldview that cannot be revised. But if one sticks to our present attitudes and conceive them binding to our form of life, then they are just plain conservative. Conceptual analyses eternalise a current world-view as constitutive of every hypothesis or description. When it comes to science, traditional explicit or implicit theories dominate, since they can be regarded as bed-rock certainties of our form of life. This is the reason why this view fails to explain scientific breakthroughs.

Problems with Hard Naturalism

The question is whether hard naturalism can provide a better explanation of scientific evolution. Churchland insists that all questions regarding human consciousness, for example, will be resolved by physical science. His argument is supposedly inductive, for, as it is often said, "induction is the method of science". So he infers the future of science from its past: Since science has progressed and has managed to illuminate some issues concerning human consciousness, it will evolve more and resolve all relevant questions in the future. Yet, his argument goes beyond induction; it rather appeals to Churchland's intuitions about the future of science and of ordinary language. For there is no evidence nowadays that beliefs and desires will be eliminated from our folk vocabulary. We have no clue whether science (perhaps some new branch of science) will embrace them into our common natural history or even whether this whole natural history will prove inaccurate and change. From our current viewpoint all these hypotheses are mere speculation.

Meanwhile, Churchland identifies explanation with the reduction of any phenomenon into physical phenomenon. Yet, he has no full-fledged, specific paradigms of such a reduction to offer. Failing an alternative coherent description of mental phenomena, his insisting on eliminating the ontology of or-

dinary language seems impracticable. Moreover, the identification of scientific explanation and physical reduction restricts the concept of science, without even defining it conceivably.

Churchland, though, can answer this line of criticism: being a philosopher (and thus a proto-scientist) he doesn't need to provide a full-fledged theory to take folk psychology's place. (Churchland, 1986, p.6). He only needs to give an outline of what this theory should be like; and, according to him, this is already being built. (Churchland, 1991, p.67)

Yet his views suffer an imminent tension: he takes for granted that many concepts, that are basic for communication and understanding, are pseudo-concepts with no literal meaning. Meanwhile, they are the concepts, which we are brought up with. From day one, we learn to engage those concepts and use them to understand all there is around us, including science. Official education teaches them, our books include them, the phenomena we approach are described by them, and our hypotheses involve them.

These are the concepts Churchland himself uses: when he says that folk psychology is a pseudo-theory he expresses a *belief* of his, there is no other way to say it. Of course, one would answer that this only goes for now; when folk psychology gets eliminated there will be some other, better way to say it. (Churchland, 1981, p.87)

But *for the time being* those are the only concepts we have; it is through them that today's scientists are trained. If we accuse them of being void, how are we supposed to train today's scientists? How are they supposed to articulate their hypotheses or theories? Churchland writes and teaches in a language he considers meaningless. But you cannot teach using a language and simultaneously suggest that most the concepts and dispositions embedded in this language are senseless. This only makes what you say senseless as well.

Conclusion

Naturalism sees science and scientific method as a valid way people have in their attempt to explain the world. But how do people get engaged into scientific method(s)? Does naturalism manage a theoretical explanation of how scientific education and evolution work? Here I tried to compare and criticize two opposite accounts:

On the one hand, Wittgenstein's attempt to differentiate between the conceptual and the empirical. This distinction makes it harder for those in Wittgenstein's side to explain scientific breakthroughs. The reason for this is that they describe us as limited within a specific conceptual background, in which we grow up. We are initiated to our current form of life, its dispositions, values and practices. Both offi-

cial and unofficial learning consists in engaging into the community's grammar, practices and worldview. This is the conceptual bed that can hardly be questioned.

If one interprets the conceptual framework as binding of every idea or theory, this view boils down to conservatism: it abolishes new revolutionary theories, just on the basis that they question current dispositions. But despite the conservatism this view implies, it depicts science as a part of human practices, a part that interacts with all other disciplines. Perhaps one can provide a more liberal account, admitting that change and revision is easier than this view suggests, and still accept that science is a branch among others; all of them share the concepts, the rules and the dispositions of our form of life.

Putting science in the flux of our form of life illustrates how people learn the science of their time, how they articulate theories, how they evolve or change them as time passes. Science is taught and constituted by the same concepts we use to approach all reality. Even scientific technical vocabulary cannot trespass grammar. Science progresses as the form of life evolves. The concept of *science* can also evolve through time. The interaction between science and all other human practice can help understand this evolutionary progress.

Scientific education then is just part of our initiation into the form of life. We learn about the sciences just as we learn art, religion or whatever constituent of human practice. All are grounded within the same bedrock presuppositions of the community. From such a procedure new scientists (among other specialists) turn up, new theories are brought in, and as science (or other practices) develop, some of the community's dispositions may evolve as well. As a result of scientific evolution, concepts or practices of our form of life also change. This process can be rational and can help us revise our beliefs, dispositions and attitudes.

Hard-core naturalism, on the other hand, identifies scientific explanation with an ideal physicalistic reduction. Yet, hard naturalists such as Churchland offer no strict criteria about what *physical* means: is meteorology a physical science? Is cognitive psychology a purely physical science today? *Science* seems restricted into very few branches and, what's more, one cannot even know the criterion by which a discipline qualifies as scientific. Churchland offers only

some intuitive remarks about how the scientific worldview will be like by proposing the elimination of all terms that today's science has trouble accounting for.

Moreover, by insisting that all non-reducible terms should be eliminated from our explanatory story, the hard naturalist restricts *the phenomena* in need of explanation into very few. Many questions posed by today's people (psychological or ethical worries and troubles) are considered pseudo-questions, raised by the pseudo-theory of folk psychology, which our language supports.

Most importantly, Churchland's hard naturalism, despite the scientism it implies, does not manage to illuminate the very fact of scientific education and evolution. It makes it incomprehensible that people who teach and think into pseudo-terms produce new good theories and educate new scientists that help science evolve. If our language is full of pseudo-concepts and false ontology, it is a mystery how scientific education was made to work and still continues to do. Consequently, it is a mystery how science progressed and still continues to do so. For education reproduces grammar. The conceptual rules used in everyday life are the same rules the scientist uses, even within his technical vocabulary. And despite this very fact, new scientists learn good science, make valid hypotheses and produce compelling theories. Even the most revolutionary among them rely, at least at first, on common world picture. Or, even when they question it, they are articulated in language.

It seems that the primacy ascribed to science comes with a high price: it makes science "stand alone, without visible prospect of reduction to that larger corpus", to paraphrase Churchland. (1981, p.75) According to him, scientific practice is not *part* of human practices but stands way *above* them. It is the primary explanatory method and the one which will eventually eliminate all other branches. It will also eliminate the problems other disciplines confront, even the vocabulary that gives rise to those questions. But if one puts science so much higher than any other human practice, they cut its every connection with the community it comes from, the very community that practices it. Hard naturalist's scientism has to face this paradox: the very primacy of science's explanatory methods makes it harder to explain how science is communicated and evolved.

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Dr. Zacharoula (Renia) Gasparatou is a lecturer of Philosophy at the University of Patras, Greece. She received her BS in Philosophy from the University of Athens, Greece (1992-1996) and her PhD in contemporary Epistemology from the University of Crete, Greece (1999-2005). Part of her PhD research was undertaken in the Department of Philosophy and History of Science of the University of Pittsburgh (Pitt), where she was a visiting scholar (2002-2003). Since 2005, she teaches Epistemology in the Department of Philosophy and in the Department of Educational Science of the University of Patras. Her research interests include the use of intuitions and thought experiments in science, philosophy and education, the relation of science and philosophy, the nature of emotions in explanation and understanding.



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