

[From Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False*, OUP, 2012.]

Chapter 2

Antireductionism and the Natural Order

1

The conflict between scientific naturalism and various forms of antireductionism is a staple of recent philosophy. On one side there is the hope that everything can be accounted for at the most basic level by the physical sciences, extended to include biology.¹ On the other side there are doubts about whether the reality of such features of our world as consciousness, intentionality, meaning, purpose, thought, and value can be accommodated in a universe consisting at the most basic level only of physical facts— facts, however sophisticated, of the kind revealed by the physical sciences.

I will use the terms “materialism” or “materialist naturalism” to refer to one side of this conflict and “antireductionism” to refer

¹ This program has been pursued with dedication in the writings of Daniel Dennett.

to the other side, even though the terms are rather rough. The attempts to defend the materialist world picture as a potentially complete account of what there is take many forms, and not all of them involve reduction in the ordinary sense, such as the analysis of mental concepts in behavioral terms or the scientific identification of mental states with brain states. Many materialist naturalists would not describe their view as reductionist. But to those who doubt the adequacy of such a world view, the different attempts to accommodate within it mind and related phenomena all appear as attempts to reduce the true extent of reality to a common basis that is not rich enough for the purpose. Hence the resistance can be brought together as antireductionism.

The tendency of these antireductionist doubts is usually negative. The conclusion they invite is that there are some things that the physical sciences alone cannot fully account for. Other forms of understanding may be needed, or perhaps there is more to reality than even the most fully developed physics can describe. If reduction fails in some respect, this reveals a limit to the reach of the physical sciences, which must therefore be supplemented by something else to account for the missing elements. But the situation may be more serious than that. If one doubts the reducibility of the mental to the physical, and likewise of all those other things that go with the mental, such as value and meaning, then there is some reason to doubt that a reductive materialism can apply even in biology, and therefore reason to doubt that materialism can give an adequate account even of the physical world. I want to explore the case

for this breakdown, and to consider whether anything positive by way of a world view is imaginable in the wake of it.

We and other creatures with mental lives are organisms, and our mental capacities apparently depend on our physical constitution. So what explains the existence of organisms like us must also explain the existence of mind. But if the mental is not itself merely physical, it cannot be fully explained by physical science. And then, as I shall argue, it is difficult to avoid the conclusion that those aspects of our physical constitution that bring with them the mental cannot be fully explained by physical science either. If evolutionary biology is a physical theory— as it is generally taken to be— then it cannot account for the appearance of consciousness and of other phenomena that are not physically reducible. So if mind is a product of biological evolution— if organisms with mental life are not miraculous anomalies but an integral part of nature— then biology cannot be a purely physical science. The possibility opens up of a pervasive conception of the natural order very different from materialism— one that makes mind central, rather than a side effect of physical law.

It seems clear that the conclusion of antireductionist arguments against materialism cannot remain purely negative forever. Even if the dominance of materialist naturalism is nearing its end, we need some idea of what might replace it. One of the things that drive the various reductionist programs about mind, value, and meaning, in spite of their inherent implausibility, is the lack of any comprehensive alternative. It can seem that the only way to accept the arguments against reduction is by

adding peculiar extra ingredients like qualia, meanings, intentions, values, reasons, beliefs, and desires to the otherwise magnificently unified mathematical order of the physical universe. But this does not answer to the desire for a general understanding of how things fit together. A genuine alternative to the reductionist program would require an account of how mind and everything that goes with it is inherent in the universe.

I am just turning a familiar argument on its head in order to challenge the premises. Materialism requires reductionism; therefore the failure of reductionism requires an alternative to materialism. My aim is not so much to argue against reductionism as to investigate the consequences of rejecting it— to present the problem rather than to propose a solution. Materialist naturalism leads to reductionist ambitions because it seems unacceptable to deny the reality of all those familiar things that are not at first glance physical. But if no plausible reduction is available, and if denying reality to the mental continues to be unacceptable, that suggests that the original premise, materialist naturalism, is false, and not just around the edges. Perhaps the natural order is not exclusively physical; or perhaps, in the worst case, there is no comprehensive natural order in which everything hangs together— only disconnected forms of understanding. But whatever may be the result, we must start out from a larger conception of what has to be understood in order to make sense of the natural world.

My guiding conviction is that mind is not just an afterthought or an accident or an add-on, but a basic aspect of nature. Quite apart from antireductionist arguments in the philosophy of mind, there is independent support for the step to such an enlarged conception of reality in one of the background conditions of science. Science is driven by the assumption that the world is intelligible. That is, the world in which we find ourselves, and about which experience gives us some information, can be not only described but understood. That assumption is behind every pursuit of knowledge, including pursuits that end in illusion. In the natural sciences as they have developed since the seventeenth century, the assumption of intelligibility has led to extraordinary discoveries, confirmed by prediction and experiment, of a hidden natural order that cannot be observed by human perception alone. Without the assumption of an intelligible underlying order, which long antedates the scientific revolution, those discoveries could not have been made.

What explains this order? One answer would be that nothing does: explanation comes to an end with the order itself, which the assumption of intelligibility has merely enabled us to uncover. Perhaps one level of order can be explained in terms of a still deeper level— as has happened repeatedly in the history of science. But in the end, on this view of the matter, understanding of the world will eventually reach a point where there is nothing more to be said, except “This is just how things are.”

I am not disposed to see the success of science in this way. It seems to me that one cannot really understand the scientific world view unless one assumes that the intelligibility of the world, as described by the laws that science has uncovered, is itself part of the deepest explanation of why things are as they are. So when we prefer one explanation of the same data to another because it is simpler and makes fewer arbitrary assumptions, that is not just an aesthetic preference: it is because we think the explanation that gives greater understanding is more likely to be true, just for that reason.

This assumption is a form of the principle of sufficient reason— that everything about the world can at some level be understood, and that if many things, even the most universal, initially seem arbitrary, that is because there are further things we do not know, which explain why they are not arbitrary after all.

The view that rational intelligibility is at the root of the natural order makes me, in a broad sense, an idealist— not a subjective idealist, since it doesn't amount to the claim that all reality is ultimately appearance— but an objective idealist in the tradition of Plato and perhaps also of certain post-Kantians, such as Schelling and Hegel, who are usually called absolute idealists. I suspect that there must be a strain of this kind of idealism in every theoretical scientist: pure empiricism is not enough.

The intelligibility of the world is no accident. Mind, in this view, is doubly related to the natural order. Nature is such as to

give rise to conscious beings with minds; and it is such as to be comprehensible to such beings. Ultimately, therefore, such beings should be comprehensible to themselves. And these are fundamental features of the universe, not byproducts of contingent developments whose true explanation is given in terms that do not make reference to mind.

3

The largest question within which all natural science is embedded is also the largest question of philosophy— namely, in what way or ways is the world intelligible? Clearly natural science is one of the most important ways of revealing intelligibility. But in spite of the great accomplishments of the natural sciences in their present form, it is important both for science itself and for philosophy to ask how much of what there is the physical sciences can render intelligible— how much of the world’s intelligibility consists in its subsumability under universal, mathematically formulable laws governing the spatiotemporal order. If there are limits to the reach of science in this form, are there other forms of understanding that can render intelligible what physical science does not explain?

But first we should consider the view that there are no such limits— that physical law has the resources to explain everything, including the double relation of mind to the natural order. The intelligibility (to us) that makes science possible is one of the things that stand in need of explanation. The strategy is to try to extend the materialist world picture so that it

includes such an explanation, thereby making the physical intelligibility of the world close over itself. According to this type of naturalism, the existence of minds to whom the world is scientifically intelligible is itself scientifically explicable, as a highly specific biological side effect of the physical order.

The story goes like this: There is no need for an expanded form of understanding; instead, the history of human knowledge gives us reason to believe that there is ultimately one way that the natural order is intelligible, namely, through physical law— everything that exists and everything that happens can in principle be explained by the laws that govern the physical universe. Admittedly, we can’t grasp the natural order in its full manifestation because it is too complex, and we therefore need more specialized forms of understanding for practical purposes. But we can attempt to discover the universal principles governing the elements out of which everything is composed, and of which all observable spatiotemporal complexity is a manifestation. These are the mathematically stateable laws of basic physics, which describe the fundamental forces and particles or other entities and their interactions, at least till a still more fundamental level is uncovered. The most systematic possible description of a material universe extended in space and time is therefore the route to the most fundamental explanation of everything.

Physics and chemistry have pursued this aim with spectacular success. But the great step forward in the progress of the materialist conception toward the ideal of completeness was the theory of evolution, later reinforced and enriched by

molecular biology and the discovery of DNA. Modern evolutionary theory offers a general picture of how the existence and development of life could be just another consequence of the equations of particle physics. Even if no one yet has a workable idea about the details, it is possible to speculate that the appearance of life was the product of chemical processes governed by the laws of physics, and that evolution after that is likewise due to chemical mutations and natural selection that are also just super-complex consequences of physical principles. Even if there is a residual problem of exactly how to account for consciousness in physical terms, the orthodox naturalistic view is that biology is in principle completely explained by physics and chemistry, and that evolutionary psychology provides a rough idea of how everything distinctive about human life can also be regarded as an extremely complicated consequence of the behavior of physical particles in accordance with certain fundamental laws. This will ultimately include an explanation of the cognitive capacities that enable us to discover those laws.

I find it puzzling that this view of things should be taken as more or less self-evident, as I believe it commonly is. Everyone acknowledges that there are vast amounts we do not know, and that enormous opportunities for progress in understanding lie before us. But scientific naturalists claim to know what the form of that progress will be, and to know that mentalistic, teleological, or evaluative intelligibility in particular have been left behind for good as fundamental forms of understanding. It is assumed not only that the natural order is intelligible but that

its intelligibility has a certain form, being found in the simplest and most unified physical laws, governing the simplest and fewest elements, from which all else follows. That is what scientific optimists mean by a theory of everything. So long as the basic laws are not themselves necessary truths, the question remains why those laws hold. But perhaps part of the appeal of this conception is that if the laws are simple enough, we can come to rest with them and be content to say that this is just how things are. After all, what is the alternative?

That is really my question. The implausibility of the reductive program that is needed to defend the completeness of this kind of naturalism provides a reason for trying to think of alternatives— alternatives that make mind, meaning, and value as fundamental as matter and space-time in an account of what there is. The fundamental elements and laws of physics and chemistry have been inferred to explain the behavior of the inanimate world. Something more is needed to explain how there can be conscious, thinking creatures whose bodies and brains are composed of those elements. If we want to try to understand the world as a whole, we must start with an adequate range of data, and those data must include the evident facts about ourselves.

4

As a way of marking the boundaries of the territory in which the search for such understanding must proceed, I would now like to say something about the polar opposite of materialism,

namely, the position that mind, rather than physical law, provides the fundamental level of explanation of everything, including the explanation of the basic and universal physical laws themselves. This view is familiarly expressed as theism, in its aspect as an explanation of the existence and character of the natural world. It is the most straightforward way of reversing the materialist order of explanation, which explains mind as a consequence of physical law; instead, theism makes physical law a consequence of mind.

Considered as a response to the demand for an all-encompassing form of understanding, theism interprets intelligibility ultimately in terms of intention or purpose—resisting a purely descriptive end point. At the outer bounds of the world, encompassing everything in it, including the law-governed natural order revealed by science, theism places some kind of mind or intention, which is responsible for both the physical and the mental character of the universe. So long as the divine mind just has to be accepted as a stopping point in the pursuit of understanding, it leaves the process incomplete, just as the purely descriptive materialist account does.

For either materialistic or theistic explanation to provide a complete understanding of the world, it would have to be the case that either the laws of physics, or the existence and properties of God and therefore of his creation, cannot conceivably be other than they are. Physicists do not typically

believe the former,² but theists tend to believe the latter. This doesn't mean that a theistic world view must be deterministic: God's essential nature may lead him to create probabilistic laws and beings with free will, whose actions are explained as free choices. But some kind of divine intention would underpin the totality.

The interest of theism even to an atheist is that it tries to explain in another way what does not seem capable of explanation by physical science. The inadequacies of the naturalistic and reductionist world picture seem to me to be real. There are things that science as presently conceived does not help us to understand, and which we can see, from the internal features of physical science, that it is not going to explain. They seem to call for a more uncompromisingly mentalistic or even normative form of understanding. Theism embraces that conclusion by attributing the mental phenomena found within the world to the working of a comprehensive mental source, of which they are miniature versions.

However, I do not find theism any more credible than materialism as a comprehensive world view. My interest is in the territory between them. I believe that these two radically opposed conceptions of ultimate intelligibility cannot exhaust the possibilities. All explanations come to an end somewhere.

² Though Einstein seems to have regarded it as an open question, the question, as he put it, "Did God have any choice when he created the universe?"

Both theism and materialism say that at the ultimate level, there is one form of understanding. But would an alternative secular conception be possible that acknowledged mind and all that it implies, not as the expression of divine intention but as a fundamental principle of nature along with physical law? Could it take the form of a unified conception of the natural order, even if it tries to accommodate a richer set of materials than the austere elements of mathematical physics? But let me first say a bit more, for dialectical purposes, about the opposition between theism and materialist naturalism and what is lacking in each of them.

5

The place at which the contrast between forms of intelligibility is most vividly presented is in the understanding of ourselves. This is also the setting for the most heated battles over what physical science can and cannot explain. Both theism and evolutionary naturalism are attempts to understand ourselves from the outside, using very different resources. Theism offers a vicarious understanding, by assigning it to a transcendent mind whose purposes and understanding of the world we cannot ourselves fully share, but which makes it possible to believe that the world is intelligible, even if not to us. The form of this transcendent understanding is conceived by extrapolation from the natural psychological self-understanding we have of our own intentions. Evolutionary naturalism, by contrast, extrapolates to everything, including ourselves, a form

of scientific understanding that we have developed in application to certain other parts of the world. But the shared ambition of these two approaches, to encompass ourselves in an understanding that arises from but then transcends our own point of view, is just as important as the difference between them.

What, if anything, justifies this common ambition of transcendence? Isn't it sufficient to try to understand ourselves from within— which is hard enough? Yet the ambition appears to be irresistible— as if we cannot legitimately proceed in life just from the point of view that we naturally occupy in the world, but must encompass ourselves in a larger world view. And to succeed, that larger world view must encompass itself.

Any external understanding, however transcendent, begins from our own point of view (how could it not?) and is usually supposed to be consistent with the main outlines of that point of view even if it also provides a basis for significant criticism and revision as well as extension. With respect to human knowledge, for example, both theism and naturalism try to explain how we can rely on our faculties to understand the world around us. At one extreme there is Descartes' theistic validation of perception and scientific reasoning by the proof that God, who is responsible for our faculties, would not systematically deceive us. At the other extreme there is naturalized epistemology, which argues that perceptual and cognitive faculties evolved by natural selection can be expected to be generally reliable in leading us to true beliefs.

Neither of these proposals provides a defense against radical skepticism—the possibility that our beliefs about the world are systematically false. Such a defense would inevitably be circular, since any confidence we could have in the truth of either a theistic or an evolutionary explanation of our cognitive capacities would have to depend on the exercise of those capacities. For theism, this is the famous Cartesian circle; but there is an analogous naturalistic circle.³ In addition, evolutionary naturalism offers an explanation of our knowledge that is seriously inadequate, when applied to the knowledge-generating capacities that we take ourselves to have. I will return to this claim below.

But even if these two projects of self-understanding do not refute skepticism, I believe there is a legitimate aim of transcendence that is more modest and perhaps more realistic. We may not be able to rule out the skeptical possibility, and we may not be able to ground our normal capacity for understanding on something in which we can have even greater confidence; but it may still be possible to show how we can reasonably retain our natural confidence in the exercise of the understanding, in spite of the apparent contingencies of our nature and formation. The hope is not to discover a foundation that makes our knowledge unassailably secure but to find a way of understanding ourselves that is not radically self-undermining, and that does not require us to deny the obvious.

³ See Barry Stroud, *The Significance of Philosophical Scepticism* (Oxford: Clarendon, 1984), ch. 6, “Naturalized Epistemology.”

The aim would be to offer a plausible picture of how we fit into the world.

6

Even in this more modest enterprise both theism and naturalistic reductionism fall short. Theism does not offer a sufficiently substantial explanation of our capacities, and naturalism does not offer a sufficiently reassuring one. A theistic account has the advantage over a reductive naturalistic one that it admits the reality of more of what is so evidently the case, and tries to explain it all. But even if theism is filled out with the doctrines of a particular religion (which will not be accessible to evidence and reason alone), it offers a very partial explanation of our place in the world. It amounts to the hypothesis that the highest-order explanation of how things hang together is of a certain type, namely, intentional or purposive, without having anything more to say about how that intention operates except what is found in the results to be explained.

The idea is not empty, because any intentional explanation involves some interpretive assumptions, even about God. An intentional agent must be thought of as having aims that it sees as good, so the aims cannot be arbitrary; a theistic explanation will inevitably bring in some idea of value, and a particular religion can make this much more specific, though it also poses the famous problem of evil. To my mind, apart from the difficulty of believing in God, the disadvantage of theism as an

answer to the desire for comprehensive understanding is not that it offers no explanations but that it does not do so in the form of a comprehensive account of the natural order. Theism pushes the quest for intelligibility outside the world. If God exists, he is not part of the natural order but a free agent not governed by natural laws. He may act partly by creating a natural order, but whatever he does directly cannot be part of that order.

A theistic self-understanding, for those who find it compelling to see the world as the expression of divine intention, would leave intact our natural confidence in our cognitive faculties. But it would not be the kind of understanding that explains how beings like us fit into the world. The kind of intelligibility that would still be missing is intelligibility of the natural order itself— intelligibility from within. That kind of intelligibility may be compatible with some forms of theism— if God creates a self-contained natural order which he then leaves undisturbed. But it is not compatible with direct theistic explanation of systematic features of the world that would seem otherwise to be brute facts— such as the creation of life from dead matter, or the birth of consciousness, or reason. Such interventionist hypotheses amount to a denial that there is a comprehensive natural order. They are in part motivated by a belief that seems to me correct, namely, that there is little or no possibility that these facts depend on nothing but the laws of physics. But another response to this situation is to think that there may be a completely different type of systematic account of nature, one that makes these neither brute facts that are

beyond explanation nor the products of divine intervention. That, at any rate, is my ungrounded intellectual preference.

The problem with naturalistic theories is different: Rather than being reassuring but insufficiently explanatory, materialist theories do try to make the natural order internally intelligible by explaining our place in it without reference to anything outside. But the explanations they propose are not reassuring enough. Evolutionary naturalism provides an account of our capacities that undermines their reliability, and in doing so undermines itself. I will have more to say about these problems of reductionism later; here let me sketch them briefly.

Inevitably, when we construct a naturalistic external self-understanding, we are relying on one part of our “sense-making” capacities to create a system that will make sense of the rest. We rely on evolutionary theory to analyze and evaluate everything from our logical and probabilistic cognition to our moral sense. This reflects the view that empirical science is the one secure, privileged form of understanding and that we can trust other forms only to the extent that they can be validated through a scientific account of how and why they work. That still requires reliance on some of our own faculties. But some faculties are thought to merit more confidence than others, and even if we cannot provide them with a noncircular external justification, we must at least believe that they are not undermined by the external account of their sources and operation that is being proposed. A core of cognitive confidence must remain intact, even if some other faculties are rendered doubtful by their evolutionary pedigree.

Structurally, it is still the Cartesian ideal, but with the leading role played by evolutionary theory instead of by an a priori demonstration of divine benevolence. But I agree with Alvin Plantinga that, unlike divine benevolence, the application of evolutionary theory to the understanding of our own cognitive capacities should undermine, though it need not completely destroy, our confidence in them.⁴ Mechanisms of belief formation that have selective advantage in the everyday struggle for existence do not warrant our confidence in the construction of theoretical accounts of the world as a whole. I think the evolutionary hypothesis would imply that though our cognitive capacities could be reliable, we do not have the kind of reason to rely on them that we ordinarily take ourselves to have in using them directly— as we do in science. In particular, it does not explain why we are justified in relying on them to correct other cognitive dispositions that lead us astray, though they may be equally natural, and equally susceptible to evolutionary explanation. The evolutionary story leaves the authority of reason in a much weaker position. This is even more clearly true of our moral and other normative capacities— on which we often rely to correct our instincts. I agree with Sharon Street that an evolutionary self-understanding would almost certainly require us to give up moral realism— the natural conviction that our moral judgments are true or false independent of our beliefs.⁵

⁴ Alvin Plantinga, *Warrant and Proper Function* (New York: Oxford University Press, 1993), ch. 12.

⁵ Sharon Street, “A Darwinian Dilemma for Realist Theories of Value,” *Philosophical Studies* 127, no. 1 (January 2006): 109– 66.

Evolutionary naturalism implies that we shouldn’t take any of our convictions seriously, including the scientific world picture on which evolutionary naturalism itself depends.

I will defend these claims in later chapters, but here let me say what would follow if they are correct. The failure of evolutionary naturalism to provide a form of transcendent self-understanding that does not undermine our confidence in our natural faculties should not lead us to abandon the search for transcendent self-understanding. There is no reason to allow our confidence in the objective truth of our moral beliefs, or for that matter our confidence in the objective truth of our mathematical or scientific reasoning, to depend on whether this is consistent with the assumption that those capacities are the product of natural selection. Given how speculative evolutionary explanations of human mental faculties are, they seem too weak a ground for putting into question the most basic forms of thought. Our confidence in the truth of propositions that seem evident on reflection should not be shaken so easily (and, I would add, cannot be shaken on these sorts of grounds without a kind of false consciousness).

It seems reasonable to run the test equally in the opposite direction: namely, to evaluate hypotheses about the universe and how we have come into existence by reference to ordinary judgments in which we have very high confidence. It is reasonable to believe that the truth about what kind of beings we are and how the universe produced us is compatible with that confidence. After all, everything we believe, even the most far-reaching cosmological theories, has to be based ultimately

on common sense, and on what is plainly undeniable. The priority given to evolutionary naturalism in the face of its implausible conclusions about other subjects is due, I think, to the secular consensus that this is the only form of external understanding of ourselves that provides an alternative to theism— which is to be rejected as a mere projection of our internal self-conception onto the universe, without evidence.

7

Even if neither evolutionary naturalism nor theism provides the kind of comprehensive self-understanding that we are after, this should not threaten our more direct confidence in the operation of our reason, though its appearance in the world remains a mystery. We can continue to hope for a transcendent self-understanding that is neither theistic nor reductionist. But this also means rejecting a third response to the problem that does not seem to me sustainable, though it has distinguished adherents— namely, to give up the project of external self-understanding altogether and instead to limit ourselves to the sufficiently formidable task of understanding our point of view toward the world from within. Physical science is one aspect of this human point of view, but it can exist side by side with the other aspects, without subsuming them. This pluralistic method is what P. F. Strawson calls “descriptive metaphysics,”⁶ and it

⁶ See P. F. Strawson, *Individuals: An Essay in Descriptive Metaphysics* (London: Methuen, 1959).

has much in common with Wittgenstein’s antimetaphysical conception of the proper task of philosophy.

But while internal understanding is certainly valuable, and an essential precondition of a more transcendent project, I don’t see how we can stop there and not seek an external conception of ourselves as well. To refrain we would have to believe that the quest for a single reality is an illusion, because there are many kinds of truth and many kinds of thought, expressed in many different forms of language, and they cannot be systematically combined through a conception of a single world in which all truth is grounded. That is as radical a claim as any of the alternatives.⁷

The question is there, whether we answer it or not. Even if we conclude that the materialist account of ourselves is incomplete— including its development through evolutionary theory— it remains the case that we are products of the long history of the universe since the big bang, descended from bacteria over billions of years of natural selection. That is part

⁷ I am very much in sympathy with the following statement by Jaegwon Kim: “Metaphysics is the domain where different languages, theories, explanations, and conceptual systems come together and have their mutual ontological relationships sorted out and clarified. That there is such a common domain is the assumption of a broad and untendentious realism about our cognitive activities. If you believe that there is no such common domain, well, that’s metaphysics, too.” *Mind in a Physical World: An Essay on the Mind-Body Problem and Mental Causation* (Cambridge, MA: MIT Press, 1998), 66.

of the true external understanding of ourselves. The question is how we can combine it with the other things we know—including the forms of reason on which that conclusion itself is based—in a world view that does not undermine itself.

Our own existence presents us with the fact that somehow the world generates conscious beings capable of recognizing reasons for action and belief, distinguishing some necessary truths, and evaluating the evidence for alternative hypotheses about the natural order. We don't know how this happens, but it is hard not to believe that there is some explanation of a systematic kind—an expanded account of the order of the world.

If we find it undeniable, as we should, that our clearest moral and logical reasonings are objectively valid, we are on the first rung of this ladder. It does not commit us to any particular interpretation of the normative, but I believe it demands something more. We cannot maintain the kind of resistance to any further explanation that is sometimes called quietism. The confidence we feel within our own point of view demands completion by a more comprehensive view of our containment in the world.

In the meantime, we go on using perception and reason to construct scientific theories of the natural world even though we do not have a convincing external account of why those faculties exist that is consistent with our confidence in their reliability—neither a naturalistic account nor a Cartesian theistic one. The existence of conscious minds and their access

to the evident truths of ethics and mathematics are among the data that a theory of the world and our place in it has yet to explain. They are clearly part of what is the case, just as much as the data about the physical world provided by perception and the conclusions of scientific reasoning about what would best explain those data. We cannot just assume that the latter category of thought has priority over the others, so that what it cannot explain is not real.

Since an adequate form of self-understanding would be an alternative to materialism, it would have to include mentalistic and rational elements of some kind. But my thought is that they could belong to the natural world and need not imply a transcendent individual mind, let alone a perfect being. The inescapable fact that has to be accommodated in any complete conception of the universe is that the appearance of living organisms has eventually given rise to consciousness, perception, desire, action, and the formation of both beliefs and intentions on the basis of reasons. If all this has a natural explanation, the possibilities were inherent in the universe long before there was life, and inherent in early life long before the appearance of animals. A satisfying explanation would show that the realization of these possibilities was not vanishingly improbable but a significant likelihood given the laws of nature and the composition of the universe. It would reveal mind and reason as basic aspects of a nonmaterialistic natural order.

This is not just anthropocentric triumphalism. The entire animal kingdom, the endless generations of insects and spiders in their enormous, extravagant populations, all pose this same

question about the order of nature. We have not observed life anywhere but on earth, but no natural fact is cosmologically more significant. However much we come to understand, as we are in the process of doing, the chemical basis of life and of its evolution, the phenomenon still calls for a greatly expanded basis for intelligibility.

To sum up: the respective inadequacies of materialism and theism as transcendent conceptions, and the impossibility of abandoning the search for a transcendent view of our place in the universe, lead to the hope for an expanded but still naturalistic understanding that avoids psychophysical reductionism. The essential character of such an understanding would be to explain the appearance of life, consciousness, reason, and knowledge neither as accidental side effects of the physical laws of nature nor as the result of intentional intervention in nature from without but as an unsurprising if not inevitable consequence of the order that governs the natural world from within. That order would have to include physical law, but if life is not just a physical phenomenon, the origin and evolution of life and mind will not be explainable by physics and chemistry alone. An expanded, but still unified, form of explanation will be needed, and I suspect it will have to include teleological elements.

All that can be done at this stage in the history of science is to argue for recognition of the problem, not to offer solutions. But I want to take up some of the obstacles to reduction, and their consequences, in more detail, beginning with the clearest case.