**Reviews**

**Mind and Cosmos**
Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False (Oxford University Press)

By Thomas Nagel



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## An Author Attracts Unlikely Allies

**New York Times**

**By JENNIFER SCHUESSLER**

**Published: February 6, 2013**

http://www.nytimes.com/2013/02/07/books/thomas-nagel-is-praised-by-creationists.html?pagewanted=all

In 1974 Thomas Nagel published [“What Is It Like to Be a Bat?,”](http://organizations.utep.edu/portals/1475/nagel_bat.pdf) a short essay arguing that the subjective experience of consciousness — what philosophers call the “qualia” — could not be fully reduced to the physical aspects of the brain.

That essay framed a landmark challenge to the materialist view of the mind that was then prevailing and helped cement Mr. Nagel’s reputation as one of the most incisive and imaginative of contemporary philosophers.

But since the late October release of his latest book, “Mind and Cosmos,” reviewers have given Mr. Nagel ample cause to ponder another question: What is it like to be an eminent (and avowedly atheist) philosopher accused of giving aid and comfort to creationist enemies of science?

Advocates of intelligent design have certainly been enthusiastic, with the [Discovery Institute](http://www.evolutionnews.org/2012/12/our_top_10_evol067901.html) crowing about Mr. Nagel’s supposed “deconversion” from Darwinism. The book, subtitled “Why the Neo-Darwinian Conception of Nature Is Almost Certainly False,” has also drawn [appreciative notice](http://www.firstthings.com/onthesquare/2012/10/aristotle-call-your-office) from conservative publications that might normally disdain [Mr. Nagel’s liberal writings](http://www.nytimes.com/2002/04/21/books/you-can-t-take-it-with-you.html) in moral and political philosophy.

The response from scientists and most of his fellow philosophers, however, has ranged from [deeply skeptical](http://ndpr.nd.edu/news/35163-mind-and-cosmos-why-the-materialist-neo-darwinian-conception-of-nature-is-almost-certainly-false/) to scorching.

Before publication the philosophers Brian Leiter and Michael Weisberg set the tone with a [long demolition](http://www.thenation.com/article/170334/do-you-only-have-brain-thomas-nagel) in The Nation, prompting the Harvard psychologist (and arch-Darwinian) Steven Pinker to [dismiss](https://twitter.com/sapinker/status/258350644979695616) the book on Twitter as “the shoddy reasoning of a once-great thinker.” More measured but no less critical reviews have followed, including assessments last month in The [New York Review of Books](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false) and The [London Review of Books](http://www.lrb.co.uk/v35/n02/peter-godfrey-smith/not-sufficiently-reassuring). The Guardian named “Mind and Cosmos” the [“most despised science book of 2012.”](http://www.guardian.co.uk/commentisfree/belief/2013/jan/04/most-despised-science-book-2012) Even the more tolerant responses have tended to come with headlines like [“Thomas Nagel Is Not Crazy.”](http://www.prospectmagazine.co.uk/blog/philosophy/thomas-nagel-mind-and-cosmos-review-leiter-nation/)

So far Mr. Nagel, a professor of philosophy and law at New York University and a fellow of the prestigious American Academy of Arts and Sciences, has not responded publicly to his critics, and declined to answer questions about the book and its reception submitted via e-mail. But some of his supporters paint him as the victim of an ideological pile-on.

“He is questioning a certain kind of orthodoxy, and they are responding in the way the orthodox respond,” said Alva Noë, a philosopher at the University of California, Berkeley, who gave the book a rare positive, if not uncritical, notice on [NPR’s Web site.](http://www.npr.org/blogs/13.7/2012/10/12/162725315/are-the-mind-and-life-natural)

To others, however, the vigorous response reflects the fact that even the best-supported science, empirically speaking, is still enmeshed in unsettled metaphysical questions.

“Nagel always makes formidable arguments, even when he’s wrong,” said Jim Holt, the author of [“Why Does the World Exist?,”](http://www.nytimes.com/2012/08/03/books/why-does-the-world-exist-by-jim-holt.html) a recent best seller about efforts by philosophers and cosmologists to explain the origins of the universe. “Here he’s pointing out that there are important things in the world we live in, as opposed to the scientific image of the world, that science pretends to have a grasp of but doesn’t.”

“Mind and Cosmos,” weighing in at 128 closely argued pages, is hardly a barn-burning polemic. But in his cool style Mr. Nagel extends his ideas about consciousness into a sweeping critique of the modern scientific worldview, which he calls a “heroic triumph of ideological theory over common sense.” Consciousness, meaning and moral value, he argues, aren’t just incidental features of life on earth, but fundamental aspects of the universe. Instead of random evolution Mr. Nagel sees the unfolding of a “cosmic predisposition.”

Such ideas are anathema to modern evolutionary theorists. Mr. Nagel calls for an entirely new kind of science, one based on what he calls “natural teleology” — a tendency for the universe to produce certain outcomes, like consciousness, but without any help from a Godlike agent.

To many reviewers, however, including some who have themselves been critical of efforts to find Darwinian explanations for all aspects of human behavior, Mr. Nagel’s own arguments fail to grapple with some well-established scientific facts.

After all, they argue, the evolutionary record shows plenty of lineages moving from complex structures to simpler ones, to say nothing of extinction — both of which throw cold water on the notion of [teleology](http://www.ascensionhealth.org/index.php?option=com_content&view=article&id=218&Itemid=172). As for Mr. Nagel’s “untutored reaction of incredulity” (as he himself puts it in the book) that random evolution could have produced conscious beings capable, say, of doing science and philosophy in the 3.8 billion years since life on earth began, some point out that he fails to consider the vast size and age of the universe and the likelihood that consciousness might have emerged somewhere, at some time.

“I wouldn’t criticize him for not knowing a lot of details about evolutionary biology,” said Elliott Sober, a philosopher of biology at the University of Wisconsin, Madison, who was highly critical of “Mind and Cosmos” in [Boston Review](http://www.bostonreview.net/BR37.6/elliott_sober_thomas_nagel_mind_cosmos.php). But Mr. Nagel’s arguments, he continued, are marred by flawed reasoning about probability: “He sees the origins of life and consciousness as remarkable facts which had to have had a high probability of happening. I don’t buy that.”

The fiercest criticism, however, has come from people who fault Mr. Nagel not just for the specifics of his arguments but also for what they see as a dangerous sympathy for intelligent design.

“The book is going to have pernicious real-world effects,” said Mr. Leiter, a philosopher at the University of Chicago, who has frequently chided Mr. Nagel on his widely read [blog](http://leiterreports.typepad.com/blog/). He added, “It’s going to be used as a weapon to do damage to the education of biology students.”

It’s a charge Mr. Nagel has met with before. In 2009 he caused a [furor](http://www.the-tls.co.uk/tls/public/article706905.ece) when he praised Stephen C. Meyer’s “Signature in the Cell: DNA and the Evidence for Intelligent Design” in The Times Literary Supplement of London. This came hot on the heels of Mr. Nagel’s 2008 scholarly article [criticizing](http://philosophy.fas.nyu.edu/docs/IO/1172/papa_132.pdf) the federal court decision, in Kitzmiller v. Dover Area School District, banning the teaching of intelligent design in public school biology classes. (“The political urge to defend science education against the threats of religious orthodoxy, understandable though it may be,” Mr. Nagel wrote, “has resulted in a counter-orthodoxy, supported by bad arguments.”)

Mr. Nagel’s depiction of a universe “gradually waking up” through the emergence of consciousness can sound oddly mystical — the atheist analytic philosopher’s version of “spiritual, not religious.” And even some readers who admire Mr. Nagel’s philosophical boldness see a very fuzzy line between his natural teleology and the creator God of theists like the Christian philosopher [Alvin Plantinga](http://www.nytimes.com/2011/12/14/books/alvin-plantingas-new-book-on-god-and-science.html?pagewanted=all) (who reviewed Mr. Nagel’s book favorably in [The New Republic](http://www.newrepublic.com/article/books-and-arts/magazine/110189/why-darwinist-materialism-wrong), throwing more red meat to his detractors).

In his conclusion Mr. Nagel declares that the present “right-thinking consensus” on evolution “will come to seem laughable in a generation or two.” But few of his colleagues seem to see much sign that a radical paradigm shift is imminent, let alone necessary.

“It’s perfectly fair game for philosophers to say scientists are wrong about stuff,” Mr. Sober said. “Everything depends on whether the arguments are good.”

“Tom is a provocative philosopher, and his book will interest people,” he continued. But when it comes to changing actual science, he said, “it’s a hiccup.”

## Do You Only Have a Brain? On Thomas Nagel

The Nation

[Brian Leiter](http://www.thenation.com/authors/brian-leiter) and [Michael Weisberg](http://www.thenation.com/authors/michael-weisberg)

October 3, 2012   |    [This article appeared in the October 22, 2012 edition of The Nation.](http://www.thenation.com/issue/october-22-2012)

## http://www.thenation.com/article/170334/do-you-only-have-brain-thomas-nagel

Thomas Nagel, a professor of philosophy and of law at New York University, has made his reputation over the last fifty years as a leading contributor to moral and political philosophy, with occasional forays into the philosophy of mind. Most famously, and most relevant to his new book, Mind and Cosmos, he wrote an influential paper in the 1970s with the memorable title “What Is It Like to Be a Bat?” Nagel tried to demonstrate the implausibility of the notion that, even if one knew all the relevant physical facts about the brains of bats, one could have any idea what it felt like to be a bat. How could the subjective feeling of this experience be captured by a set of cold, objective biological and chemical facts about neurons? Nagel’s new book revisits some of these ideas and aims to “develop the rival alternative conceptions” to what he calls the “materialism and Darwinism” of our age.

Nagel’s is the latest in what has become a small cottage industry involving a handful of prominent senior philosophers expressing skepticism about aspects of Darwin’s theory of evolution by natural selection. Some, like the overtly Christian philosopher Alvin Plantinga, have made a career of dialectical ingenuity in support of the rationality of religious faith. Others, such as Jerry Fodor, are avowed atheists like Nagel, and have only tried to raise challenges to discrete aspects of evolutionary explanations for biological phenomena. Plantinga’s influence has largely been limited to other religious believers, while Fodor’s challenge was exposed rather quickly by philosophers as trading on confusions (even Nagel disowns it in a footnote). Nagel now enters the fray with a far-reaching broadside against Darwin and materialism worthy of the true-believing Plantinga (whom Nagel cites favorably). We suspect that philosophers—even philosophers sympathetic to some of Nagel’s concerns—will be disappointed by the actual quality of the argument.

Nagel opposes two main components of the “materialist” view inspired by Darwin’s theory of evolution by natural selection. The first is what we will call theoretical reductionism, the view that there is an order of priority among the sciences, with all theories ultimately derivable from physics and all phenomena ultimately explicable in physical terms. We believe, along with most philosophers, that Nagel is right to reject theoretical reductionism, because the sciences have not progressed in a way consistent with it. We have not witnessed the reduction of psychology to biology, biology to chemistry, and chemistry to physics, but rather the proliferation of fields like neuroscience and evolutionary biology that explain psychological and biological phenomena in terms unrecognizable by physics. As the philosopher of biology Philip Kitcher pointed out some thirty years ago, even classical genetics has not been fully reduced to molecular genetics, and that reduction would have been wholly within one field. We simply do not see any serious attempts to reduce all the “higher” sciences to the laws of physics.

Yet Nagel argues in his book as if this kind of reductive materialism really were driving the scientific community. The only named target is the Nobel Prize–winning physicist Steven Weinberg, famous for his defense of the primacy of physics in such popular works as Dreams of a Final Theory (1992). Here is what Nagel writes in describing Weinberg’s view:

My target is a comprehensive, speculative world picture that is reached by extrapolation from some of the discoveries of biology, chemistry, and physics—a particular naturalistic Weltanschauung that postulates a hierarchical relation among the subjects of those sciences, and the completeness in principle of an explanation of everything in the universe through their unification. Such a world view is not a necessary condition of the practice of any of those sciences, and its acceptance or nonacceptance would have no effect on most scientific research.

Nagel here aligns himself, as best we can tell, with the majority view among both philosophers and practicing scientists. Just to take one obvious example, very little of the actual work in biology inspired by Darwin depends on reductive materialism of this sort; evolutionary explanations do not typically appeal to Newton’s laws or general relativity. Given this general consensus (the rhetoric of some popular science writing by Weinberg and others aside), it is puzzling that Nagel thinks he needs to bother attacking theoretical reductionism.

The second component of the thesis Nagel opposes is what we will call naturalism, the view that features of our world—including “consciousness, intentionality, meaning, purpose, thought, and value”—can ultimately be accounted for in terms of the natural processes described by the various sciences (whether or not they are ever “reduced” to physics). Nagel’s arguments here are aimed at a more substantial target, although he gives us few specifics about the kind of naturalism he opposes. He does characterize it as the attempt to explain everything “at the most basic level by the physical sciences, extended to include biology,” and the one named proponent of this view is the philosopher Daniel Dennett. Although Dennett would not characterize his project as trying to explain everything at the “most basic level,” he does aim to show that phenomena such as consciousness, purpose and thought find a natural home in a picture of human beings inspired by Darwin. In the absence of any clearer statement of the argument, we will assume that this is the so-called “neo-Darwinian” picture that Nagel opposes.

Naturalists, including Dennett, defend their view by appealing to the extraordinary fruitfulness of past scientific work, including work growing out of Darwin’s theory of evolution by natural selection. So what should we make of the actual work in biology that supports the “materialist Neo-Darwinian conception of nature” that Nagel thinks “is almost certainly false”? Defending such a sweeping claim might seem to require a detailed engagement with the relevant science, yet in a striking admission early on, Nagel reveals that his book “is just the opinion of a layman who reads widely in the literature that explains contemporary science to the nonspecialist.” And a recurring objection to what he learned from his layman’s reading of popular science writing is that much science “flies in the face of common sense,” that it is inconsistent with “evident facts about ourselves, that it “require[s] us to deny the obvious,” and so on.

This style of argument does not, alas, have a promising history. After all, what could be more common-sensical, obvious or evident than the notion that the earth is flat and the sun revolves around the earth? All ordinary evidence supports that verdict: we know from experience that people fall off things that are spherical, especially when trying to hang upside down from them, and we know that the sun rises in the sky in one direction and sets in the other as it revolves around the seemingly flat earth. Happily, Nagel does not attempt to repudiate the Copernican revolution in astronomy, despite its hostility to common sense. But he displays none of the same humility when it comes to his preferred claims of common sense—the kind of humility that nearly 400 years of nonevident yet true scientific discoveries should engender. Are we really supposed to abandon a massively successful scientific research program because Nagel finds some scientific claims hard to square with what he thinks is obvious and “undeniable,” such as his confidence that his “clearest moral…reasonings are objectively valid”?

In support of his skepticism, Nagel writes: “The world is an astonishing place, and the idea that we have in our possession the basic tools needed to understand it is no more credible now than it was in Aristotle’s day.” This seems to us perhaps the most startling sentence in all of Mind and Cosmos. Epistemic humility—the recognition that we could be wrong—is a virtue in science as it is in daily life, but surely we have some reason for thinking, some four centuries after the start of the scientific revolution, that Aristotle was on the wrong track and that we are not, or at least not yet. Our reasons for thinking this are obvious and uncontroversial: mechanistic explanations and an abandonment of supernatural causality proved enormously fruitful in expanding our ability to predict and control the world around us. The fruits of the scientific revolution, though at odds with common sense, allow us to send probes to Mars and to understand why washing our hands prevents the spread of disease. We may, of course, be wrong in having abandoned teleology and the supernatural as our primary tools for understanding and explaining the natural world, but the fact that “common sense” conflicts with a layman’s reading of popular science writing is not a good reason for thinking so.

Incompatibility with common sense is not Nagel’s only argument against naturalism. A second line of argument begins by appealing to what he takes to be an everyday opinion: that there are objective moral, logical and mathematical truths. He then argues that the existence of these kinds of objective truths is incompatible with naturalism. For the moral case, Nagel asks: If our moral faculties are simply the result of evolution, how can they be reliable measures of objective moral truth? Why should evolution prefer the perception of moral truth to whatever happens to be advantageous for reproduction? Thus, if some of our moral beliefs really are objectively true, then they cannot be the result of evolution. And because he is confident that we do know some objective moral truths, Nagel concludes that “a Darwinian account of the motives underlying moral judgment must be false, in spite of the scientific consensus in its favor.” Recognizing that readers will find this inference jarring, Nagel adds: “I, even more strangely, am relying on a philosophical claim to refute a scientific theory supported by empirical evidence.”

There is, indeed, much that is strange here. To begin, there is nothing remotely common-sensical about Nagel’s confidence in the objectivity of moral truth. While Nagel and his compatriots apparently take very seriously their moral opinions—so seriously that they find it incredible to suggest that their “confidence in the objective truth of [their] moral beliefs” might, in fact, be “completely illusory”—this can hardly claim the mantle of “the common sense view.” Ordinary opinion sometimes tends toward objectivism, to be sure—often by relying on religious assumptions that Nagel explicitly rejects—but it also often veers toward social or cultural relativism about morality. Whether morality is truly objective is a philosopher’s claim (and a controversial one even among philosophers) about which “common sense” is either agnostic or mixed.

We take no stance on Nagel’s hypothesis that if our moral faculties are simply the result of evolution, they cannot be reliable measures of objective moral truth. But we should note that Nagel’s colleague, philosopher Sharon Street, accepts it and draws the opposite conclusion. She argues that because this hypothesis is true, and because we are obviously the products of evolution, we should give up the idea that there are objective moral truths in Nagel’s sense. Given the philosophical plausibility of Street’s alternative response—not to mention the simplistic evolutionary reasoning the whole debate is predicated on—it is hard to see why any biologist should be given pause by Nagel’s argument.

A more interesting challenge—really, the only interesting philosophical point raised in the book—concerns logical and mathematical truths. Is it possible, Nagel asks, to reconcile a naturalistic and biological picture of the evolution of our cognitive capacities with the confidence we have in our ability to do logic and mathematics? Nagel’s argument invokes a contrast with our perceptual capabilities, because our ability to reliably perceive many of the features of our physical environment seems likely to have an evolutionary explanation. (After all, if we could not reliably spot sudden cliffs or saber-toothed tigers, our reproductive fitness would be seriously compromised!) But logical truths are not like that, Nagel argues. It is self-evident that something cannot be both red and not-red at the same time (the “law of non-contradiction”). So, too, it is self-evident that if all men are mortal, and Socrates is a man, then Socates is necessarily mortal. Even if evolution endowed us with the capacity to recognize the law of non-contradiction and to draw valid deductive inferences, how does it explain the obvious truth of these logical claims? Nagel’s response to this question is that evolution cannot—and the problem is even worse than that:

Any evolutionary account of the place of reason presupposes reason’s validity and cannot confirm it without circularity.

Eventually the attempt to understand oneself in evolutionary, naturalistic terms must bottom out in something that is grasped as valid in itself—something without which the evolutionary understanding would not be possible.

In other words, even if one thinks there is an evolutionary explanation for why we recognize the obviousness of logical, mathematical and scientific truths, there would still be the question of why we think evolutionary theory itself is justified. An evolutionary explanation of that latter fact would have to presuppose the correctness of the theory whose justification we are questioning, making the argument circular: we would have to assume that evolutionary theory is true in order to investigate whether it is true!

There is a response to this kind of challenge, one that is widely embraced by philosophical naturalists (though, again, not mentioned by Nagel). This response starts by noting that we determine what is “rational” or “justified” simply by appealing to the most successful forms of inquiry into the world that human beings have developed. Paradigmatic examples of those successful forms of inquiry are, of course, physics, chemistry and biology. They are successful precisely in the way that Aristotelian science was not: they enable us to navigate the world around us, to predict its happenings and control some of them. To confuse one’s intuitive confidence in the logical and epistemic norms that make these sciences possible with some kind of a priori access to the “rational order of the world,” as Nagel puts it, is to forget whence that confidence derives—namely, the very success of these sciences. For philosophical naturalists, the charge of circularity is empty, akin to suggesting that the need for a usable table to have legs requires some justification beyond the fact that the legs actually do a necessary job.

Philosophical naturalists often appeal to the metaphor of “Neurath’s Boat,” named after the philosopher who developed it. Our situation as inquirers trying to understand the world around us, according to Neurath, is like that of sailors who must rebuild their ship while at sea. These sailors do not have the option of abandoning the ship and rebuilding a new one from scratch. They must, instead, try to rebuild it piecemeal, all the time staying afloat on other parts of the ship on which they continue to depend. In epistemological terms, we are also “at sea”: we cannot abandon all the knowledge about the world we have acquired from the sciences and then ask what we really know or what is really rational. The sciences that have worked so well for us are precisely our benchmark for what we know and what is rational; they’re the things that are keeping us “afloat.” Extending this metaphor, we can say that Nagel is the sailor who says, “I know the ideal form a ship should take—it is intuitively obvious, I am confident in it—so let us jump into the ocean and start building it from scratch.”

We agree with Nagel that if the sciences could not explain our capacity to have thoughts about the world around us, that would be a serious failing and a reason to call their findings into question. But they can and they do! It is here that Nagel’s lack of engagement with contemporary cognitive science and his idiosyncratic views about what a scientific explanation should look like make his argument especially perplexing. He writes, in what might seem a massive concession to his naturalistic opponents, “The appearance of animal consciousness is evidently the result of biological evolution, but this well-supported empirical fact is not yet an explanation—it does not provide understanding, or enable us to see why the result was to be expected or how it came about.” On Nagel’s view, consciousness arose from evolution, but despite knowing this fact, we have not explained the origin of consciousness. In a similar vein, Nagel writes:

It is not an explanation to say just that the physical process of evolution has resulted in creatures with eyes, ears, central nervous systems, and so forth, and that it is simply a brute fact of nature that such creatures are conscious in the familiar ways. Merely to identify a cause is not to provide a significant explanation, without some understanding of why the cause produces the effect.

Nagel endorses the idea that explanation and prediction are symmetrical: “An explanation must show why it was likely that an event of that type occurred.” In other words, to explain something is to be in a position to have predicted it if we could go back in time. He also writes, “To explain consciousness, a physical evolutionary history would have to show why it was likely that organisms of the kind that have consciousness would arise.” Indeed, he goes further, claiming that “the propensity for the development of organisms with a subjective point of view must have been there from the beginning.”

This idea, however, is inconsistent with the most plausible views about prediction and explanation, in both philosophy and science. Philosophers of science have long argued that explanation and prediction cannot be fully symmetrical, given the importance of probabilities in explaining natural phenomena. Moreover, we are often in a position to understand the causes of an event, but without knowing enough detail to have predicted it. For example, approximately 1 percent of children born to women over 40 have Down syndrome. This fact is a perfectly adequate explanation of why a particular child has Down syndrome, but it does not mean we could have predicted that this particular child would develop it. Causes alone are frequently deemed sufficient to explain events; knowing enough to predict those events in advance is an important scientific achievement, but not essential to explanation.

Nagel doesn’t think so, and because of that, he advocates the reintroduction of teleological reasoning into science. (Teleology—the idea that natural phenomena have built-in purposes or ends—was central to Aristotelian science, and it remained very influential until the scientific revolution.) In his discussion of the origin of life, Nagel says that natural teleology would mean that, “in addition to physical law of the familiar kind, there are other laws of nature that are ‘biased toward the marvelous.’”

This is an astonishing though certainly evocative phrase (Nagel adapts it from another writer), yet Nagel offers no further explication of it. He does admit that this proposal “flies in the teeth of the authoritative form of explanation that has defined science since the revolution of the seventeenth century.” Unfortunately, he is also extremely unclear about what he means by “natural teleology,” other than assuring the reader that it is neither part of standard physical laws nor the introduction of theology. One might think that “principles of self-organization or of the development of complexity over time,” which Nagel gives as examples of natural teleology, are the sort of things studied by mainstream protein chemists, developmental biologists and condensed-matter physicists. But apparently these sciences, which study how complex order can be built up from simple physical processes, are not on the right track. Nagel never explains why.

We conclude with a comment about truth in advertising. Nagel’s arguments against reductionism are quixotic, and his arguments against naturalism are unconvincing. He aspires to develop “rival alternative conceptions” to what he calls the materialist neo-Darwinian worldview, yet he never clearly articulates this rival conception, nor does he give us any reason to think that “the present right-thinking consensus will come to seem laughable in a generation or two.” Mind and Cosmos is certainly an apt title for Nagel’s philosophical meditations, but his subtitle—”Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False”—is highly misleading. Nagel, by his own admission, relies only on popular science writing and brings to bear idiosyncratic and often outdated views about a whole host of issues, from the objectivity of moral truth to the nature of explanation. No one could possibly think he has shown that a massively successful scientific research program like the one inspired by Darwin’s theory of evolution by natural selection “is almost certainly false.” The subtitle seems intended to market the book to evolution deniers, intelligent-design acolytes, religious fanatics and others who are not really interested in the substantive scientific and philosophical issues. Even a philosopher sympathetic to Nagel’s worries about the naturalistic worldview would not claim this volume comes close to living up to that subtitle. Its only effect will be to make the book an instrument of mischief.

Why has natural selection always been the most contested part of evolutionary theory? asks Jeffrey A. Coyne in “[*The Improbability Pump*](http://www.thenation.com/article/improbability-pump)” (May 10, 2010), reviewing The Greatest Show on Earth, by Richard Dawkins, and Jerry Fodor and Massimo Piattelli-Palmarini’s What Darwin Got Wrong.

## Remarkable Facts, Ending Science As We Know It

Elliott Sober

Boston Review

[NOVEMBER/DECEMBER 2012](http://bostonreview.net/BR37.6/contents.php)

http://www.bostonreview.net/BR37.6/elliott\_sober\_thomas\_nagel\_mind\_cosmos.php

[Heather Clemons](http://heatherclemons.com/)

Thomas Nagel, a distinguished philosopher at NYU, is well known for his critique of “materialistic reductionism” as an account of the mind-body relationship. In his new and far-reaching book Mind and Cosmos, Nagel extends his attack on materialistic reductionism—which he describes as the thesis that physics provides a complete explanation of everything—well beyond the mind-body problem. He argues that evolutionary biology is fundamentally flawed and that physics also needs to be rethought—that we need a new way to do science.

Nagel’s new way is teleological—scientific explanations need to invoke goals, not just mechanistic causes. The conventional story of the emergence of modern science maintains that Galileo and Newton forever banished Aristotle’s teleology. So Mind and Cosmos is an audacious book, bucking the tide. Nagel acknowledges that he has no teleological theory of his own to offer. His job, as he sees it, is to point to a need; creative scientists, he hopes, will do the heavy lifting.

Nagel’s rejection of materialistic reductionism does not stem from religious conviction. He says that he doesn’t have a religious bone in his body. The new, teleological science he wants is naturalistic, not supernaturalistic. This point needs to be remembered, given that the book begins with kind words for proponents of intelligent design. Nagel applauds them for identifying problems in evolutionary theory, but he does not endorse their solution.

Nagel’s main goal in this book is not to argue against materialistic reductionism, but to explore the consequences of its being false. He has argued against the -ism elsewhere, and those who know their Nagel will be able to fill in the details. But new readers may be puzzled, so a little backstory may help.

In his famous 1974 article “What is it like to be a bat?” Nagel argues that current science lacks the concepts that would allow us to understand how subjective experience is possible. Present-day science can give us information about the bat’s brain, but it cannot answer the titular question of Nagel’s article—what is it like, how does it feel from the inside, to be a bat? Nagel chooses bats as his example because they have a sensory system (echolocation) that we lack. This choice makes the problem vivid, but Nagel thinks the difficulty arises at home: each of us knows what sugar tastes like, yet current science lacks the vocabulary to understand and explain what that peculiar subjective experience is like. Nagel is cautious in the bat article; he hopes that a future materialistic science might be able to do better.

In Mind and Cosmos, Nagel holds that materialism can’t deliver the goods. Drawing on his bolder and more recent paper “The Psychophysical Nexus,” he now says that materialistic reductionism is false, not that we currently don’t understand how it could be true. For Nagel, perception and other psychological processes involve irreducibly subjective facts; important aspects of the mind are, therefore, forever beyond the reach of physical explanation.

This position is compatible with many doctrines that are associated with materialism. For example, Nagel doesn’t gainsay the slogan “no difference without a physical difference”—if you and I have different psychological properties, then we must be physically different. Indeed, Nagel’s position is even compatible with the idea that every mental property is identical with some physical property—for example, it may be that being in pain and being in some neurophysiological state X are identical in the same way that being made of water and being made of H2O are identical properties. The problem, Nagel thinks, is that this identity claim, if true, cannot in principle be explained by physics. Mind and Cosmos begins with the thesis that materialistic reductionism hits a roadblock with the mind-body problem, but there are others ahead. Although Nagel has more to say about the mind-body problem than I have just outlined, the most novel part of his book, and my focus, lies elsewhere.

**Evolution**
Nagel believes that evolutionary biology is in trouble, but what sort of trouble is it in? There are two possibilities. Evolutionary theory could be in trouble just because it is committed to materialistic reductionism; if so, the theory would be perfectly okay if it dropped that commitment. Understood in this way, it’s the philosophy that has gone wrong, not the biology. But much of what Nagel says is not in this vein. He thinks that the biology itself is flawed. Even without a commitment to materialistic reductionism, the theory would be in bad shape. For Nagel, the combination of evolutionary theory and materialistic reductionism is false, while evolutionary theory taken on its own (without the philosophical add-on) is incomplete. Incompleteness means that the theory cannot fully explain important biological events.

For Nagel, important aspects of the mind are forever beyond the reach of physical explanation.

Here I want to consider two criticisms that Nagel makes of evolutionary theory. The first concerns probability, the second, ethics. Neither criticism depends on the idea that evolutionary theory is committed to materialistic reductionism.

Nagel thinks that adequate explanations of the origins of life, intelligence, and consciousness must show that those events had a “significant likelihood” of occurring: these origins must be shown to be “unsurprising if not inevitable.” A complete account of consciousness must show that consciousness was “something to be expected.” Nagel thinks that evolutionary theory as we now have it fails in this regard, so it needs to be supplemented.

Nagel doesn’t impose this condition of adequate explanation on all the events that science might address. He is prepared to live with the fact that some events are just flukes or accidents or improbable coincidences. For example, it may just be an improbable coincidence that in the mid-1980s Evelyn Marie Adams won the New Jersey lottery twice in the span of four months. But the existence of life, intelligence, and consciousness are not in the same category. Why do Nagel’s standards go up when he contemplates facts that he deems “remarkable”? Maybe the answer falls under what Nagel refers to, in a different context, as his “ungrounded intellectual preference.” It isn’t theistic conviction that is doing the work here, but rather Nagel’s faith that the remarkable facts he mentions must be “intelligible,” where intelligibility requires that these facts had a significant probability of being true.

My philosophical feelings diverge from Nagel’s. I think that Beethoven’s existence is remarkable, but I regard it as a fluke. He could easily have failed to exist. Indeed, my jaded complacency about Beethoven scales up. I don’t think that life, intelligence, and consciousness had to be in the cards from the universe’s beginning. I am happy to leave this question to the scientists. If they tell me that these events were improbable, I do not shake my head and insist that the scientists must be missing something. There is no such must. Something can be both remarkable and improbable.

Moreover, if an improbable state of affairs comes to pass, this does not mean that the state of affairs is unintelligible. Consider: mom and dad have two daughters. Why are both children female? A simple Mendelian answer is that all of mom’s eggs had an X chromosome while half of dad’s sperm had an X and half had a Y. The process of fertilization randomly combines an egg from mom with a sperm from dad. This means that the chance of a daughter is 1/2, so the chance of two daughters is 1/4. We explain the two-daughter outcome not by showing that it was to be expected, but by elucidating the process that produced the outcome with a certain probability. Before you insist that the Mendelian story doesn’t really explain the outcome, reflect on whether you think that the Mendelian story sheds no light at all on why the parents had two daughters. Surely it does not leave us totally in the dark.

In thinking about Nagel’s probability argument, we need to be careful about which facts we are considering. The fact that life on earth started some 3.8 billion years ago, and that intelligence and consciousness made their terrestrial appearances more recently—this is a local fact about our planet, and maybe it was very improbable, given how the universe got started. But consider the more global fact that the universe contains life and intelligence and consciousness at some time in its total history. What’s the probability of that, given the universe’s initial state? Science doesn’t really have much of a clue (yet), but this gap in our present knowledge does not show that fundamental presuppositions of the sciences need rethinking. After all, conventional science does tell us that the universe is a very big place with lots of planets that are about as close to their stars as our planet is to the sun. Maybe life and intelligence and consciousness had a high probability of arising (someplace and sometime, not necessarily on earth in the last 3.8 billion years). If this global fact is the remarkable fact that Nagel has in mind, he should not conclude that biology needs to be supplied with new organizing principles. Do not confuse the proposition that Evelyn Marie Adams won the New Jersey lottery twice in four months with the proposition that someone won some state lottery or other twice, at some time or other. The first was very improbable, the second much less so.

Before leaving the topic of probability, I want to highlight what is involved in Nagel’s requirement that the facts he says are remarkable must be shown to be unsurprising. For the sake of concreteness, let’s take this to mean that the probability must be greater than 1/2. Suppose that to get from the universe’s first moment to the origin of consciousness, 200 stages must be traversed. The universe starts at stage S1, then it needs to pass to S2, then to S3, and so on, until it reaches S200, at which time consciousness makes its first appearance. Suppose further that we have a theory that says that the probability of going from each of these stages to the next is 99/100: this means that each individual step is very likely. Still, the probability of going from S1 all the way to S200 is (99/100)199, or about 1/10. The demand that the origin of consciousness must have had a probability greater than 1/2 entails that the theory I just described must be wrong or seriously incomplete.

I agree that it might be wrong or incomplete, but this is not because it violates Nagel’s demand that we must show remarkable facts to be likely. In addition, I think that a theory of this sort could shed considerable light on why consciousness arose. It doesn’t show that the event was to be expected, given the universe’s initial state. Instead, if true, it elucidates the step-wise process that produced the outcome we observe. When a theory says that X was improbable, this does not mean that the theory says that X is unintelligible: the final result could be improbable even though each step in the process was highly likely.

The words ‘belief’ and ‘desire’ do not occur in theories in physics, yet you and I have beliefs and desires.

What makes more sense than Nagel’s probability requirement is one about possibility—that an adequate theory must allow that the origin of life, mind, and consciousness all were possible, given the initial state of the universe. If this were all that Nagel meant by his claim that “the propensity for the development of organisms with a subjective point of view must have been there from the beginning,” I would have no quarrel. But then there would be no objection to the sciences we now have.

Not only does Nagel require that remarkable facts be fairly probable; he also insists that they can’t be byproducts (a.k.a. side effects). He applies this requirement to the appearance of minds, consciousness, and reasoning. Nagel doesn’t reject all byproduct explanations. For example, he is comfortable with the standard evolutionary account of why vertebrate blood is red. This didn’t happen because there was an adaptive advantage in having red blood. Rather, the hemoglobin molecule was selected because it transports oxygen to tissues, and hemoglobin just happens to make our blood red. And it isn’t only useless traits such as the color of blood that evolutionary biology says are byproducts. Sea turtles use their limbs to dig nests in the sand when they come out of the water to lay their eggs, but the tetrapod arrangement evolved long before turtles developed this behavior. Being able to build nests in sand is a side effect. Evolution often recruits old structures to new uses.

Evolutionary biology leaves open the possibility that even Nagel’s remarkable facts are byproducts. For instance, the co-discoverers of the theory of evolution by natural selection, Darwin and Alfred Russel Wallace, disagreed about how the human capacity for abstract theoretical reasoning should be explained. Darwin saw it as a byproduct. There was selection for reasoning well in situations that made a difference for survival and reproduction, and our capacity to reason about mathematics and natural science and philosophy is a happy byproduct. Wallace, on the other hand, thought that a spiritualistic explanation was needed. Nagel finds Darwin’s side effect account “very far-fetched,” but he does not say why.

I now turn to Nagel’s second reason for thinking that something is seriously amiss with current evolutionary theory. Nagel is what philosophers call a “moral realist.” This doesn’t mean he has the cynicism of a Humphrey Bogart character. It means he thinks that some statements about right and wrong are true and that what makes them true isn’t anyone’s say-so. Nor are they made true by the fact that we would come to believe them if we engaged in a certain type of deliberation. For Nagel, the statement that causing suffering is bad is like the statement that the Rocky Mountains are more than 10,000 feet tall—both are true independently of whether anyone thinks they are true. Nagel thinks “moral realism is incompatible with a Darwinian account of the evolutionary influence on our faculties of moral and evaluative judgment.” He resolves the conflict as follows: “since moral realism is true, a Darwinian account of the motives underlying moral judgment must be false.”

Why does Nagel think that evolutionary theory conflicts with moral realism? His reasoning is based on Occam’s razor, the principle of parsimony. It seems pretty clear that some of our psychological capacities evolved because they provided our ancestors with reliable information about the world they inhabited. Perceptual beliefs are the clearest example. Our ability to use our sensory systems to form beliefs about our immediate surroundings evolved because the beliefs they generated were largely true. Nagel thinks that no such explanation can be offered for why we have the moral beliefs we have. Indeed, biologists don’t often make such offers. For example, Darwin argued that moral norms enjoining altruistic behavior are now widespread in human societies because groups that internalized and complied with these norms outcompeted groups that did not. Whether it is true that we ought to act altruistically isn’t something that Darwin or more recent biologists need to take a stand on to explain why people accept such norms.

Okay, you may be thinking, why is the evolutionary explanation of our moral beliefs an argument against moral realism? Here you need to reach for your razor. Nagel’s idea is that if you don’t need to postulate the existence of moral facts to explain why we have the moral beliefs we have, then you should slice those alleged facts away. This doesn’t just mean that you should decline to believe that there are moral facts of the sort that moral realism postulates. It means that you should believe that there are no such things. The razor doesn’t tell you to suspend judgment; it tells you to deny. That is Nagel’s reason for thinking that there is a conflict between evolutionary theory and moral realism: evolutionary theory underwrites a parsimony argument against moral realism.

I don’t buy this argument. I agree that you don’t need to postulate moral truths to have an evolutionary explanation for why we have the moral beliefs we do. But that doesn’t mean that evolutionary theory justifies denying that there are such truths. Nagel is assuming that if moral realism is true, then the truth of moral propositions must be part of the explanation for why we believe those propositions. I disagree; the point of ethics is to guide our behavior, not to explain it, a thesis that Nagel defended in The View from Nowhere (1989) but has now apparently abandoned.

Nagel demands that we show remarkable facts to be likely, but Beethoven is remarkable, and he could easily have failed to exist.

I said before that Nagel thinks evolutionary theory, shorn of its commitment to materialistic reductionism, is incomplete, not false. Nagel’s probability argument conforms to this pattern, but his argument about ethics does not, at least not when it involves a claim of incompatibility. If evolutionary theory and moral realism are incompatible and moral realism is true, then what follows is that evolutionary theory is false, not that it is incomplete. This suggests that we should set this talk of incompatibility to one side. Nagel’s considered position is that evolutionary theory, construed as proposing a complete explanation of why we have the moral convictions we have, would conflict with moral realism. The upshot is that something needs to be added to the evolutionary explanation.

**Teleology**
So Nagel thinks that an adequate scientific account of the existence of life, mind, and consciousness must show that those events had significant probabilities. He holds that current science does not do that and therefore needs to be supplemented. But with what? Nagel’s answer is that science should go teleological: concepts of goal and purpose need to be used in new scientific theories. This suggestion conflicts with the dominant scientific tradition of Galileo, Newton, and their successors. Teleology is the most radical idea in Nagel’s book.

Nagel says that teleology means that “things happen because they are on a path that leads to certain outcomes.” Suppose that X caused Y and that Y then caused Z. A teleological explanation of Y will say that it occurred because it was on the path from X to Z. This explanation of Y cites Z, which occurs later than Y. However, the teleological explanation does not say that the later event caused the earlier one; for Nagel, teleological explanations are non-causal. In addition, Nagel wants a naturalistic and non-intentional teleology, one that does not involve God or any other intelligent designer directing the universe toward a goal.

According to Nagel a teleological theory says that things tend to change in the direction of certain types of outcome. This is right, but, as Nagel realizes, it isn’t sufficient for a theory to be teleological. The second law of thermodynamics says that closed chambers of gas tend to evolve in the direction of increasing entropy, but that doesn’t mean that they are goal-directed systems. Nagel also says that conventional (non-teleological) physics describes “how each state of the universe evolved from its immediate predecessor,” but a teleological science will be different: “teleology requires that [some] successor states . . . have a significantly higher probability than is entailed by the laws of physics alone.” Whether or not this is a necessary condition for teleology, it too is insufficient. Suppose I buy a lottery ticket on Monday, win the lottery on Tuesday, and splurge on luxury goods and big charitable donations on Wednesday. The probability of my winning on Tuesday, given that I bought the ticket on Monday, is low, but the probability that I win on Tuesday, given that I bought the ticket on Monday and was a big spender on Wednesday, is much higher. This isn’t teleological, however, since it isn’t true that my spending on Wednesday explains why I won the day before.

I do not reject teleology wholesale. I do not reject claims such as “flowers have bright petals because they attract pollinators” and “Sally went to the park at 8:30 because there were fireworks at 9 o’clock.” These statements do not say that a later event caused an earlier one, but they are true because certain causal facts are in place. The statement about flowers is true because there was selection for bright colors among plants that gained from the services of pollinators that used color vision. The statement about fireworks is true because Sally knew there would be fireworks at 9 o’clock, and she wanted to arrive in time to get a good seat. Maybe there are true teleological statements about life, mind, or consciousness. But if there are causal underpinnings for those teleological statements, as there are for the teleological statements about flowers and fireworks, the materialist need not object.

Nagel’s thesis is not just that there are true teleological statements about the emergence of life, mind, and consciousness, but that these statements cannot be explained by a purely causal/materialistic science. Only then does his teleology go beyond what materialistic reductionism allows. I see no reason to think that there are true teleological statements of this sort. If readers are to take seriously the possibility of teleological explanations that are both true and causally inexplicable, it would help if Nagel identified some modest phenomenon that clearly has that sort of explanation. He never does. That raises the worry that the kind of explanation for which Nagel hankers is a pipe dream.

Nagel wants a teleological science partly because he is moved by probability considerations. If conventional science says that remarkable facts had low probabilities, given what came before, the probabilities of these facts can be boosted by adding information about what came after. In this respect, the emergence of life resembles my winning the lottery on Tuesday. Each event is quite probable, given what happened later. The problem is why we should regard that as an explanation.

**Anti-Reductionism**
Nagel is hardly unique in being an anti-reductionist. Most philosophers nowadays would probably say that they are against reductionism.

What sets Nagel apart is his idea that current biological and physical theories need to be fundamentally overhauled. Why do other anti-reductionists decline to take this radical step? It is not that they are faint of heart. Mostly they decline because they endorse the following picture. When an organism has a new visual experience, the physical state of the organism has changed. And when an economy goes into recession, the physical state of that social object also has changed. These examples obey the slogan I mentioned before: no difference without a physical difference.

That science should go teleological—incorporate concepts of goal and purpose—is a radical idea.

However, when it comes to understanding visual perception and economic change, the best explanations are not to be found in relativity theory or quantum mechanics. Sciences outside of physics can explain things that physics is not equipped to explain. But this doesn’t mean that physics needs to be revised. The philosophers and scientists I am describing disagree with Nagel’s claim that evolution is more than a physical process, though they agree that physics is not the best tool to use in understanding evolution.

**Brute Facts**
A true and well-confirmed causal statement such as “smoking cigarettes causes lung cancer” calls for explanation. We want to know how inhaling the smoke causes the tumor to grow. If someone said that this causal statement is just a brute fact—that it is true but has no explanation—we would raise our eyebrows. When one event causes another, we expect there to be intervening events. We explain why C causes E by showing that C causes I1, that I1 causes I2, and so on, up to some further I that causes E.

But materialism should not assume that this must always be the case; maybe there are occasions where C causes E without there being an intervening event between C and E. Materialism should be open to the possibility that some causal relationships are brute facts. This is one reason to be suspicious of the view that Nagel calls materialistic reductionism—that physics provides a complete explanation of everything. Scientists already leave room for brute facts in another context. When they say that a law is “fundamental,” they mean that it can’t be explained by anything deeper.

If there can be brute facts about purely physical causation, why can’t there be brute facts about physical events having mental effects? Suppose event C is the hammer hitting your thumb and E is the pain you feel. Science explains why C caused E by interpolating causes. The chain of events that goes from C to E passes (perhaps gradually) from the physical to the mental. The idea that there can’t be brute facts about physical-to-mental causation is just as misguided as the idea that there can’t be brute facts about physical-to-physical causation.

Nagel writes, “All explanations come to an end.” This could point to a practical matter: when we run out of time or patience, we settle for what we have. But the limitation may also be forced on us by the world. Maybe there are brute causal facts. Maybe some scientific laws are fundamental. And maybe some crucial facts about the mind-body relation are brute as well. Not that we should be complacent. If smoking causes lung cancer, it makes sense to expect that there is an explanation as to why. But we should not over-generalize, turning a good heuristic into a metaphysical principle that brooks no exceptions. Whereas the materialistic reductionism that Nagel criticizes says that everything has a complete physical explanation, a more circumspect materialism would assert that everything that has an explanation has a complete physical explanation.

Mind and Cosmos is dominated by a set of very strong assumptions about explanation: remarkable facts must have explanations; those explanations must show that the remarkable facts have fairly high probabilities; and remarkable facts cannot be byproducts. Nagel does not take seriously the possibility that the world may not be so obliging.

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Current science may suffer from fundamental flaws, but Nagel has not made a convincing case that this is so. And even if there are serious explanatory defects in our world picture, I don’t see how Nagel’s causally inexplicable teleology can be a plausible remedy. In saying this, I realize that Nagel is trying to point the way to a scientific revolution and that my reactions may be mired in presuppositions that Nagel is trying to transcend. If Nagel is right, our descendants will look back on him as a prophet—a prophet whom naysayers such as me were unable to recognize.

## Awaiting a New Darwin

New York Review of Books

##### [February 7, 2013](http://www.nybooks.com/issues/2013/feb/07/)

### [H. Allen Orr](http://www.nybooks.com/contributors/h-allen-orr/)

http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false

Erin Pauwels Collection/Art Archive/Art Resource

‘A Sun of the Nineteenth Century’; cartoon from *Puck* magazine showing Charles Darwin as a shining sun, chasing the clouds of religion and superstition from the sky, 1882

### 1.

The history of science is partly the history of an idea that is by now so familiar that it no longer astounds: the universe, including our own existence, can be explained by the interactions of little bits of matter. We scientists are in the business of discovering the laws that characterize this matter. We do so, to some extent at least, by a kind of reduction. The stuff of biology, for instance, can be reduced to chemistry and the stuff of chemistry can be reduced to physics.

Thomas Nagel has never been at ease with this view. Nagel, University Professor of Philosophy and Law at New York University, is one of our most distinguished philosophers. He is perhaps best known for his 1974 paper, “What Is It Like to Be a Bat?,” a modern classic in the philosophy of mind. In that paper, Nagel argued that reductionist, materialist accounts of the mind leave some things unexplained. And one of those things is what it would actually *feel* like to be, say, a bat, a creature that navigates its environment via the odd (to us) sense of echolocation. To Nagel, then, reductionist attempts to ground everything in matter fail partly for a reason that couldn’t be any nearer to us: subjective experience. While not denying that our conscious experiences have everything to do with brains, neurons, and matter, Nagel finds it hard to see how these experiences can be fully reduced with the conceptual tools of physical science.

In *Mind and Cosmos*, Nagel continues his attacks on reductionism. Though the book is brief its claims are big. Nagel insists that the mind-body problem “is not just a local problem” but “invades our understanding of the entire cosmos and its history.” If what he calls “materialist naturalism” or just “materialism” can’t explain consciousness, then it can’t fully account for life since consciousness is a feature of life. And if it can’t explain life, then it can’t fully account for the chemical and physical universe since life is a feature of that universe. Subjective experience is not, to Nagel, some detail that materialist science can hand-wave away. It’s a deal breaker. Nagel believes that any future science that grapples seriously with the mind-body problem will be one that is radically reconceived.

As Nagel makes clear in the subtitle of *Mind and Cosmos*, part of what he thinks must be reconceived is our reigning theory of evolutionary biology, neo-Darwinism. Neo-Darwinism maintains, or at least implies, that the origin and history of life can be explained by materialist means. Once the first life arose on earth, the fate of the resulting evolutionary lineage was, neo-Darwinists argued, shaped by a combination of random mutation and natural selection. Biological types that survive or reproduce better than others will ultimately replace those others. While natural selection ensures that species constantly adapt to the changing environments around them, the process has no foresight: natural selection responds only to the present environment and evolution cannot, therefore, be aiming for any goal. This view, Nagel tells us, is “almost certainly false.”

Before creationists grow too excited, it’s important to see what Nagel is not claiming. He is not claiming that life is six thousand years old, that it did not evolve, or that natural selection played no part in this evolution. He believes that life has a long evolutionary history and that natural selection had a part in it. And while he does believe that intelligent design creationists have asked some incisive questions, Nagel rejects their answers. Indeed he is an atheist. Instead Nagel’s view is that neo-Darwinism, and in fact the whole materialist view elaborated by science since the seventeenth century, is radically incomplete. The materialist laws of nature must, he says, be supplemented by something else if we are to fold ourselves and our minds fully into our science.

His leading contender for this something else is teleology, a tendency of the universe to aim for certain goals as it unfolds through time. Nagel believes that (currently unknown) teleological laws of nature might mean that life and consciousness arise with greater probability than would result from the known laws of physics, chemistry, and biology.

Scientists shouldn’t be shocked by Nagel’s claim that present science might not be up to cracking the mind-brain problem or that a profoundly different science might lie on the horizon. The history of science is filled with such surprising transformations. Nor should we dismiss Nagel’s claims merely because they originate from outside science, from a philosopher. Much the same thing happened when natural theology—the scientific attempt to discern God’s attributes from His biological handiwork—gave way to Darwinism.

It was the philosopher David Hume who began to dismantle important aspects of natural theology. In a devastating set of arguments, Hume identified grievous problems with the argument from design (which claims, roughly, that a designer must exist because organisms show intricate design). Hume was not, however, able to offer an alternative account for the apparent design in organisms. Darwin worked in Hume’s wake and finally provided the required missing theory, natural selection. Nagel, consciously or not, now aspires to play the part of Hume in the demise of neo-Darwinism. He has, he believes, identified serious shortcomings in neo-Darwinism. And while he suspects that teleological laws of nature may exist, he recognizes that he hasn’t provided anything like a full theory. He awaits his Darwin.

*Mind and Cosmos* is certainly provocative and it reflects the efforts of a fiercely independent mind. In important places, however, I believe that it is wrong. Because Nagel’s book sits at the intersection of philosophy and science it will surely attract the attention of both communities.[1](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-1) As a biologist, I will perhaps inevitably focus on Nagel’s more scientific claims. But these are, it appears, the claims that are most responsible for the excitement over the book.

I begin by considering the reasons Nagel believes that materialist science, including neo-Darwinism, is false. I then turn to his alternative theory, teleology.

### 2.

Nagel believes that materialism confronts two classes of problems. One, which is new to Nagel’s thought, concerns purported empirical problems with neo-Darwinism. The other, which is more familiar to philosophers, is the alleged failure of materialism to explain consciousness and allied mental phenomena.

Nagel argues that there are purely “empirical reasons” to be skeptical about reductionism in biology and, in particular, about the plausibility of neo-Darwinism. Nagel’s claims here are so surprising that it’s best to quote them at length:

I would like to defend the untutored reaction of incredulity to the reductionist neo-Darwinian account of the origin and evolution of life. It is prima facie highly implausible that life as we know it is the result of a sequence of physical accidents together with the mechanism of natural selection. We are expected to abandon this naïve response, not in favor of a fully worked out physical/chemical explanation but in favor of an alternative that is really a schema for explanation, supported by some examples. What is lacking, to my knowledge, is a credible argument that the story has a nonnegligible probability of being true. There are two questions. First, given what is known about the chemical basis of biology and genetics, what is the likelihood that self-reproducing life forms should have come into existence spontaneously on the early earth, solely through the operation of the laws of physics and chemistry? The second question is about the sources of variation in the evolutionary process that was set in motion once life began: In the available geological time since the first life forms appeared on earth, what is the likelihood that, as a result of physical accident, a sequence of viable genetic mutations should have occurred that was sufficient to permit natural selection to produce the organisms that actually exist?

Nagel claims that both questions concern “highly specific events over a long historical period in the distant past, the available evidence is very indirect, and general assumptions have to play an important part.” He therefore concludes that “the available scientific evidence, in spite of the consensus of scientific opinion, does not in this matter rationally require us to subordinate the incredulity of common sense.”

This conclusion is remarkable in a couple ways. For one thing, there’s not much of an argument here. Instead Nagel’s conclusion rests largely on the strength of his intuition. His intuition recoils from the claimed plausibility of neo-Darwinism and that, it seems, is that. (Richard Dawkins has called this sort of move the argument from personal incredulity.) But plenty of scientific truths are counterintuitive (does anyone find it intuitive that we’re hurtling around the sun at 67,000 miles per hour?) and a scientific education is, to a considerable extent, an exercise in taming the authority of one’s intuition. Nagel never explains why his intuition should count for so much here.

As for his claim that evolutionary theory is somewhat schematic and that it concerns events that happened long ago, leaving indirect evidence, this is partly true of any historical science, including any alternative to neo-Darwinism, e.g., the one that Nagel himself suggests. In any case, a good part of the evidence for neo-Darwinism is not indirect but involves experiments in which evolutionary change is monitored in real time.[2](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-2)

More important, Nagel’s conclusions about evolution are almost certainly wrong. The origin of life is admittedly a hard problem and we don’t know exactly how the first self-replicating system arose. But big progress has been made. The discovery of so-called ribozymes in the 1980s plausibly cracked the main principled problem at the heart of the origin of life. Research on life’s origin had always faced a chicken and egg dilemma: DNA, our hereditary material, can’t replicate without the assistance of proteins, but one can’t get the required proteins unless they’re encoded by DNA. So how could the whole system get off the ground?

Answer: the first genetic material was probably RNA, not DNA. This might sound like a distinction without a difference but it isn’t. The point is that RNA molecules can *both* act as a hereditary material (as DNA does) and catalyze certain chemical reactions (as some proteins do), possibly including their own replication. (An RNA molecule that can catalyze a reaction is called a ribozyme.) Consequently, many researchers into the origins of life now believe in an “RNA world,” in which early life on earth was RNA-based. “Physical accidents” were likely still required to produce the first RNA molecules, but we can now begin to see how these molecules might then self-replicate.

Nagel’s astonishment that a “sequence of viable genetic mutations” has been available to evolution over billions of years is also unfounded.[3](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-3) His concern appears to be that evolution requires an unbroken chain of viable genetic variants that connect the first living creature to, say, human beings. How could nature ensure that a viable mutation was always available to evolution? The answer is that it didn’t. That’s why species go extinct. Indeed that’s what extinction is. The world changes and a species can’t find a mutation fast enough to let it live. Extinction is the *norm* in evolution: the vast majority of all species have gone extinct. Nagel has, I think, been led astray by a big survivorship bias: the evolutionary lineage that led to us always found a viable mutation, ergo one must, it seems, always be available. *Tyrannosaurus rex* would presumably be less impressed by nature’s munificence.[4](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-4)



### 3.

While Nagel’s worries about neo-Darwinism are misplaced, he’s on somewhat firmer (or at least more familiar) ground when he turns to mental phenomena like consciousness. These are, after all, separate problems. A science might explain the evolution of life but leave consciousness—the subjective experience of the saltiness of popcorn, the shock of cold water, or the sting of pain—unaccounted for. Consciousness is Nagel’s big problem:

Consciousness is the most conspicuous obstacle to a comprehensive naturalism that relies only on the resources of physical science. The existence of consciousness seems to imply that the physical description of the universe, in spite of its richness and explanatory power, is only part of the truth, and that the natural order is far less austere than it would be if physics and chemistry accounted for everything.

Nagel’s story here starts, as it must, with Descartes. As Nagel writes, Descartes posited that matter and mind are “both fully real and irreducibly distinct, though they interact.” Given this, science was, from the outset, concerned solely with matter; mind belonged to a different domain. While scientists happily toiled under Cartesian dualism, giving rise to a recognizably modern science, philosophers often demurred. Instead, thinkers like Berkeley favored various forms of idealism, which maintains that nature is at bottom mind. Under idealism, then, any reductionist program would be in the business of collapsing matter to mind.

Nagel argues that as a result of a rapid shift whose causes are unclear, these idealist philosophies were “largely displaced in later twentieth-century analytic philosophy by attempts at unification in the opposite direction, starting from the physical.” This approach likely seems natural to most of us. But we live with a tension. Though the materialist program of reducing mind to matter would appear the properly “scientific” approach, we haven’t the slightest idea how it would work. And it’s not for lack of trying. Philosophers have, Nagel reminds us, attempted many ways of tying mind to matter: conceptual behaviorism, physical identity theory, causal behaviorism, and functionalism, to name a few. To Nagel all these approaches have failed “for the same old reason”:

Even with the brain added to the picture, they clearly leave out something essential, without which there would be no mind. And what they leave out is just what was deliberately left out of the physical world by Descartes and Galileo in order to form the modern concept of the physical, namely, subjective appearances.

Nagel is deeply skeptical that any species of materialist reductionism can work. Instead, he concludes, progress on consciousness will require an intellectual revolution at least as radical as Einstein’s theory of relativity.

Nagel’s chapter on consciousness is a concise and critical survey of a literature that is both vast and fascinating. He further extends his survey to other mental phenomena, including reason and value, that he also finds recalcitrant to materialism. (Nagel concludes that the existence of objective moral truths is incompatible with materialist evolutionary theory; because he is sure that moral truths exist, he again concludes that evolutionary theory is incomplete.)

Nagel concedes that many philosophers do not share his skepticism about the plausibility of reducing mind to matter. And I can assure readers that most scientists don’t. I, however, share Nagel’s sense of mystery here. Brains and neurons obviously have everything to do with consciousness but how such mere *objects* can give rise to the eerily different phenomenon of subjective experience seems utterly incomprehensible.

Despite this, I can’t go so far as to conclude that mind poses some insurmountable barrier to materialism. There are two reasons. The first is, frankly, more a sociological observation than an actual argument. Science has, since the seventeenth century, proved remarkably adept at incorporating initially alien ideas (like electromagnetic fields) into its thinking. Yet most people, apparently including Nagel, find the resulting science sufficiently materialist. The unusual way in which physicists understand the weirdness of quantum mechanics might be especially instructive as a crude template for how the consciousness story could play out. Physicists describe quantum mechanics by writing equations. The fact that no one, including them, can quite intuit the meaning of these equations is often deemed beside the point. The solution *is* the equation. One can imagine a similar course for consciousness research: the solution is X, whether you can intuit X or not. Indeed the fact that you can’t intuit X might say more about you than it does about consciousness.

And this brings me to the second reason. For there might be perfectly good reasons why you can’t imagine a solution to the problem of consciousness. As the philosopher Colin McGinn has emphasized, your very inability to imagine a solution might reflect your cognitive limitations as an evolved creature. The point is that we have no reason to believe that we, as organisms whose brains are evolved and finite, can fathom the answer to every question that we can ask. All other species have cognitive limitations, why not us? So even if matter does give rise to mind, we might not be able to understand how.

To McGinn, then, the mysteriousness of consciousness may not be so much a challenge to neo-Darwinism as a result of it. Nagel obviously draws the opposite conclusion. But the availability of both conclusions gives pause.

### 4.

Given the problems that Nagel has with materialism, the obvious question is, What’s the alternative? In the most provocative part of *Mind and Cosmos*, he suggests one, teleology. While we often associate teleology with a God-like mind—events occur because an agent wills them as means to an end—Nagel finds theism unattractive. But he insists that materialism and theism do not exhaust the possibilities.

Instead he proposes a special species of teleology that he calls natural teleology. Natural teleology doesn’t depend on any agent’s intentions; it’s just the way the world is. There are teleological laws of nature that we don’t yet know about and they bias the unfolding of the universe in certain desirable directions, including the formation of complex organisms and consciousness. The existence of teleological laws means that certain physical outcomes “have a significantly higher probability than is entailed by the laws of physics alone—simply because they are on the path toward a certain outcome.”

Nagel intends natural teleology to be, among other things, a biological theory. It would explain not only the “appearance of physical organisms” but the “development of consciousness and ultimately of reason in those organisms.” Teleology would also provide an “account of the existence of the biological possibilities on which natural selection can operate.”

Nagel concedes that his new theory isn’t fully fleshed out. He hopes merely to sketch the outlines of a plausible alternative to materialism. It’s unfortunate, though, that *Mind and Cosmos* is too brief to allow consideration of problems that attend natural teleology. For it seems to me that there are some, especially where the view confronts biology.

Darwin himself wrestled with attempts to reconcile his theory with teleology and concluded, reluctantly, that it seemed implausible. While Darwin published almost nothing on such philosophical matters they loom large in his correspondence, particularly with Asa Gray, an American champion of evolution and a Christian. Gray, like Nagel, wanted to believe that, while Darwin had identified an important force in the history of life, nature also features teleology. In particular, Gray suggested that the variation provided by nature to natural selection biases the process in desirable directions.

Darwin, though sometimes vacillating, argued that Gray’s reconciliation was implausible. Exercising his uncanny ability to discern deep truths in prosaic facts—in this case the artificial selection of a pigeon breed by a few fanciers—Darwin wrote Gray:

But I grieve to say that I cannot honestly go as far as you do about Design…. You lead me to infer that you believe “that variation has been led along certain beneficial lines”.—I cannot believe this; & I think you would have to believe, that the tail of the Fan-tail was led to vary in the number & direction of its feathers in order to gratify the caprice of a few men.[5](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-5)

Here’s another problem. Nagel’s teleological biology is heavily human-centric or at least animal-centric. Organisms, it seems, are in the business of secreting sentience, reason, and values. Real biology looks little like this and, from the outset, must face the staggering facts of organismal diversity. There are millions of species of fungi and bacteria and nearly 300,000 species of flowering plants. None of these groups is sentient and each is spectacularly successful. Indeed mindless species outnumber we sentient ones by any sensible measure (biomass, number of individuals, or number of species; there are only about 5,500 species of mammals). More fundamentally, each of these species is every bit as much the end product of evolution as we are. The point is that, if nature has goals, it certainly seems to have many and consciousness would appear to be fairly far down on the list.

Similarly, Nagel’s teleological biology is run through with talk about the “higher forms of organization toward which nature tends” and progress toward “more complex systems.” Again, real biology looks little like this. The history of evolutionary lineages is replete with reversals, which often move from greater complexity to less. A lineage will evolve a complex feature (an eye, for example) that later gets dismantled, evolutionarily deconstructed after the species moves into a new environment (dark caves, say). Parasites often begin as “normal” complicated organisms and then lose evolutionarily many of their complex traits after taking up their new parasitic way of life. Such reversals are easily explained under Darwinism but less so under teleology. If nature is trying to get somewhere, why does it keep changing its mind about the destination?[6](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fn-6)

I’ll be the first to admit that these problems may not be fatal. But they represent the sorts of awkward facts that occur immediately to any biologist. Minimally, they pose serious challenges to teleology, challenges that deserve, but do not receive, consideration in *Mind and Cosmos*.

### 5.

I will also be the first to admit that we cannot rule out the formal possibility of teleology in nature. It *could* turn out that teleological laws affect how the universe unfolds through time. While I suspect some might regard such heterodoxy as a crime against science, Nagel is right that there’s nothing intrinsically unscientific about teleology. If that’s the way nature is, that’s the way it is, and we scientists would need to get on with the business of characterizing these surprising laws. Teleological science is, in fact, more than imaginable. It’s actual, at least historically. Aristotelian science, with its concern for final cause, was thoroughly teleological. And the biological tradition that Darwinism displaced, natural theology, also featured a good deal of teleological thinking.

The question, then, is not whether teleology is formally compatible with the practice of science. The question is whether the practice of science leads to taking teleology seriously. Nagel may find this question unfair. He is, he says, engaging in a “philosophical task,” not the “internal pursuit of science.” But it seems clear that he is doing more than this. He’s emphasizing purported “empirical reasons” for finding neo-Darwinism “almost certainly false” and he’s suggesting the existence of new scientific laws. These represent moves, however halting, into science proper. But science, finally, isn’t about defining the space of all formally possible explanations of nature. It’s about inference to the most likely hypothesis. And on these grounds there’s simply no comparison between neo-Darwinism (for which there is overwhelming evidence) and natural teleology (for which there is none). While one might complain that it’s unfair to stack up the empirical successes of neo-Darwinism with those of a new theory, this, again, gets the history wrong. Teleology is the traditional view; neo-Darwinism is the new kid on the block.

None of this is to suggest that evolutionary biology will not, someday, change radically. Of course it might; any science might. Nor is it to suggest that materialism represents some final unassailable view and that teleology or, for that matter, theism will inevitably be spoken of in the past tense by many scientists. It is to say that the way to any such alternative view will have to acknowledge the full powers of present science. I cannot conclude that *Mind and Cosmos* does this.

Notes:

1 Nagel’s work has long attracted the attention of both philosophers and scientists. Indeed the careful reader will notice that I’m mentioned in his new book as a scientist-participant in a workshop that he organized on some of the topics covered in the book; many of the other participants were philosophers. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-1)

2 The field of “experimental evolution” is concerned with watching evolution as it occurs. Because of their short generation time, microbes are the focus of much of this work. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-2)

3 While I’ve heard this concern before, I must admit that I think I only now understand it. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-3)

4 This is not to say that adaptation is rare or that natural selection doesn’t modify the DNA sequences of species. Even species that ultimately go extinct have experienced many previous bouts of successful adaptation. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-4)

5 November 26, 1860; see www.darwinp roject.ac.uk/entry-2998. Historians of science do not all agree that Darwin wholly banished teleology from his thinking; see the exchange between James G. Lennox (1993, 1994) and Michael T. Ghiselin (1994) in *Biology and Philosophy*. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-5)

6 It’s true that organisms are on average more complex now than they were three billion years ago. But as biologists have long recognized, this doesn’t require any inexorable bias toward complexity. If life starts from a floor of zero complexity, it can on average only get more complicated. [↩](http://www.nybooks.com/articles/archives/2013/feb/07/awaiting-new-darwin/?pagination=false#fnr-6)

## Why Darwinist Materialism is Wrong

Alvin Plantinga

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I.

ACCORDING TO a semi-established consensus among the intellectual elite in the West, there is no such person as God or any other supernatural being. Life on our planet arose by way of ill-understood but completely naturalistic processes involving only the working of natural law. Given life, natural selection has taken over, and produced all the enormous variety that we find in the living world. Human beings, like the rest of the world, are material objects through and through; they have no soul or ego or self of any immaterial sort. At bottom, what there is in our world are the elementary particles described in physics, together with things composed of these particles.

I say that this is a semi-established consensus, but of course there are some people, scientists and others, who disagree. There are also agnostics, who hold no opinion one way or the other on one or another of the above theses. And there are variations on the above themes, and also halfway houses of one sort or another. Still, by and large those are the views of academics and intellectuals in America now. Call this constellation of views scientific naturalism—or don’t call it that, since there is nothing particularly scientific about it, except that those who champion it tend to wrap themselves in science like a politician in the flag. By any name, however, we could call it the orthodoxy of the academy—or if not the orthodoxy, certainly the majority opinion.

The eminent philosopher Thomas Nagel would call it something else: an idol of the academic tribe, perhaps, or a sacred cow: “I find this view antecedently unbelievable—a heroic triumph of ideological theory over common sense. ... I would be willing to bet that the present right-thinking consensus will come to seem laughable in a generation or two.” Nagel is an atheist; even so, however, he does not accept the above consensus, which he calls materialist naturalism; far from it. His important new book is a brief but powerful assault on materialist naturalism.

NAGEL IS NOT AFRAID to take unpopular positions, and he does not seem to mind the obloquy that goes with that territory. “In the present climate of a dominant scientific naturalism,” he writes, “heavily dependent on speculative Darwinian explanations of practically everything, and armed to the teeth against attacks from religion, I have thought it useful to speculate about possible alternatives. Above all, I would like to extend the boundaries of what is not regarded as unthinkable, in light of how little we really understand about the world.” Nagel has endorsed the negative conclusions of the much-maligned Intelligent Design movement, and he has defended it from the charge that it is inherently unscientific. In 2009 he even went so far as to recommend Stephen Meyer’s book [Signature in the Cell: DNA and the Evidence for Intelligent Design](http://www.signatureinthecell.com/about-the-book.php), a flagship declaration of Intelligent Design, as a book of the year. For that piece of blasphemy Nagel paid the predictable price; he was said to be arrogant, dangerous to children, a disgrace, hypocritical, ignorant, mind-polluting, reprehensible, stupid, unscientific, and in general a less than wholly upstanding citizen of the republic of letters.

His new book will probably call forth similar denunciations: except for atheism, Nagel rejects nearly every contention of materialist naturalism. Mind and Cosmos rejects, first, the claim that life has come to be just by the workings of the laws of physics and chemistry. As Nagel points out, this is extremely improbable, at least given current evidence: no one has suggested any reasonably plausible process whereby this could have happened. As Nagel remarks, “It is an assumption governing the scientific project rather than a well-confirmed scientific hypothesis.”

The second plank of materialist naturalism that Nagel rejects is the idea that, once life was established on our planet, all the enormous variety of contemporary life came to be by way of the processes evolutionary science tells us about: natural selection operating on genetic mutation, but also genetic drift, and perhaps other processes as well. These processes, moreover, are unguided: neither God nor any other being has directed or orchestrated them. Nagel seems a bit less doubtful of this plank than of the first; but still he thinks it incredible that the fantastic diversity of life, including we human beings, should have come to be in this way: “the more details we learn about the chemical basis of life and the intricacy of the genetic code, the more unbelievable the standard historical account becomes.” Nagel supports the commonsense view that the probability of this happening in the time available is extremely low, and he believes that nothing like sufficient evidence to overturn this verdict has been produced.

So far Nagel seems to me to be right on target. The probability, with respect to our current evidence, that life has somehow come to be from non-life just by the working of the laws of physics and chemistry is vanishingly small. And given the existence of a primitive life form, the probability that all the current variety of life should have come to be by unguided evolution, while perhaps not quite as small, is nevertheless minuscule. These two conceptions of materialist naturalism are very likely false.

But, someone will say, the improbable happens all the time. It is not at all improbable that something improbable should happen. Consider an example. You play a rubber of bridge involving, say, five deals. The probability that the cards should fall just as they do for those five deals is tiny—something like one out of ten to the 140th power. Still, they did. Right. It happened. The improbable does indeed happen. In any fair lottery, each ticket is unlikely to win; but it is certain that one of them will win, and so it is certain that something improbable will happen. But how is this relevant in the present context? In a fit of unbridled optimism, I claim that I will win the Nobel Prize in chemistry. You quite sensibly point out that this is extremely unlikely, given that I have never studied chemistry and know nothing about the subject. Could I defend my belief by pointing out that the improbable regularly happens? Of course not: you cannot sensibly hold a belief that is improbable with respect to all of your evidence.

NAGEL GOES ON: he thinks it is especially improbable that consciousness and reason should come to be if materialist naturalism is true. “Consciousness is the most conspicuous obstacle to a comprehensive naturalism that relies only on the resources of physical science.” Why so? Nagel’s point seems to be that the physical sciences—physics, chemistry, biology, neurology—cannot explain or account for the fact that we human beings and presumably some other animals are conscious. Physical science can explain the tides, and why birds have hollow bones, and why the sky is blue; but it cannot explain consciousness. Physical science can perhaps demonstrate correlations between physical conditions of one sort or another and conscious states of one sort or another; but of course this is not to explain consciousness. Correlation is not explanation. As Nagel puts it, “The appearance of animal consciousness is evidently the result of biological evolution, but this well-supported empirical fact is not yet an explanation—it does not provide understanding, or enable us to see why the result was to be expected or how it came about.”

Nagel next turns his attention to belief and cognition: “the problem that I want to take up now concerns mental functions such as thought, reasoning, and evaluation that are limited to humans, though their beginnings may be found in a few other species.” We human beings and perhaps some other animals are not merely conscious, we also hold beliefs, many of which are in fact true. It is one thing to feel pain; it is quite another to believe, say, that pain can be a useful signal of dysfunction. According to Nagel, materialist naturalism has great difficulty with consciousness, but it has even greater difficulty with cognition. He thinks it monumentally unlikely that unguided natural selection should have “generated creatures with the capacity to discover by reason the truth about a reality that extends vastly beyond the initial appearances.” He is thinking in particular of science itself.

Natural selection is interested in behavior, not in the truth of belief, except as that latter is related to behavior. So concede for the moment that natural selection might perhaps be expected to produce creatures with cognitive faculties that are reliable when it comes to beliefs about the physical environment: beliefs, for example, about the presence of predators, or food, or potential mates. But what about beliefs that go far beyond anything with survival value? What about physics, or neurology, or molecular biology, or evolutionary theory? What is the probability, given materialist naturalism, that our cognitive faculties should be reliable in such areas? It is very small indeed. It follows—in a wonderful irony—that a materialistic naturalist should be skeptical about science, or at any rate about those parts of it far removed from everyday life.

This certainly seems right, and perhaps we can go even further. Perhaps it is not initially implausible to think that unguided natural selection could have produced creatures with cognitive faculties who are reliable about matters relevant to survival and reproduction. But what about metaphysical beliefs, such as theism, or determinism, or materialism, or atheism? Such beliefs have little bearing on behavior related to survival and reproduction, and unguided natural selection couldn’t care less about them or their truth-value. After all, it is only the occasional member of the Young Humanist Society whose reproductive prospects are enhanced by accepting atheism. Given materialist naturalism, the probability that my cognitive faculties are reliable with respect to metaphysical beliefs would be low. So take any metaphysical belief I have: the probability that it is true, given materialist naturalism, cannot be much above .5. But of course materialist naturalism is itself a metaphysical belief. So the materialistic naturalist should think the probability of materialist naturalism is about .5. But that means that she cannot sensibly believe her own doctrine. If she believes it, she shouldn’t believe it. In this way materialist naturalism is self-defeating.

II.

THE NEGATIVE CASE that Nagel makes against materialist naturalism seems to me to be strong and persuasive. I do have the occasional reservation. Most materialists apparently believe that mental states are caused by physical states. According to Nagel, however, the materialistic naturalist cannot stop there. Why not? Because the idea that there is such a causal connection between the physical and the mental doesn’t really explain the occurrence of the mental in a physical world. It doesn’t make the mental intelligible. It doesn’t show that the existence of the mental is probable, given our physical world.

Some materialists, however, seek to evade this difficulty by suggesting that there is some sort of logical connection between physical states and mental states. It is a logically necessary truth, they say, that when a given physical state occurs, a certain mental state also occurs. If this is true, then the existence of the mental is certainly probable, given our physical world; indeed, its existence is necessary. Nagel himself suggests that there are such necessary connections. So wouldn’t that be enough to make intelligible the occurrence of the mental in our physical world?

I suspect that his answer would be no. Perhaps the reason would be that we cannot just see these alleged necessities, in the way we can just see that 2+1=3. These postulated necessary connections are not self-evident to us. And the existence of the mental would be intelligible only if those connections were self-evident. But isn’t this a bit too strong? Why think that the mental is intelligible, understandable, only if there are self-evident necessary connections between the physical and the mental? Doesn’t that require too much? And if intelligibility does require that sort of connection between the physical and the mental, why think the world is intelligible in that extremely strong sense?

Now you might think someone with Nagel’s views would be sympathetic to theism, the belief that there is such a person as the God of the Abrahamic religions. Materialist naturalism, says Nagel, cannot account for the appearance of life, or the variety we find in the living world, or consciousness, or cognition, or mind—but theism has no problem accounting for any of these. As for life, God himself is living, and in one way or another has created the biological life to be found on Earth (and perhaps elsewhere as well). As for the diversity of life: God has brought that about, whether through a guided process of evolution or in some other way. As for consciousness, again theism has no problem: according to theism the fundamental and basic reality is God, who is conscious. And what about the existence of creatures with cognition and reason, creatures who, like us, are capable of scientific investigation of our world? Well, according to theism, God has created us human beings in his image; part of being in the image of God (Aquinas thought it the most important part) is being able to know something about ourselves and our world and God himself, just as God does. Hence theism implies that the world is indeed intelligible to us, even if not quite intelligible in Nagel’s glorified sense. Indeed, modern empirical science was nurtured in the womb of Christian theism, which implies that there is a certain match or fit between the world and our cognitive faculties.

Given theism, there is no surprise at all that there should be creatures like us who are capable of atomic physics, relativity theory, quantum mechanics, and the like. Materialist naturalism, on the other hand, as Nagel points out, has great difficulty accounting for the existence of such creatures. For this and other reasons, theism is vastly more welcoming to science than materialist naturalism. So theism would seem to be a natural alternative to the materialist naturalism Nagel rejects: it has virtues where the latter has vices, and we might therefore expect Nagel, at least on these grounds, to be sympathetic to theism.

 SADLY ENOUGH (at least for me), Nagel rejects theism. “I confess to an ungrounded assumption of my own, in not finding it possible to regard the design alternative [i.e., theism] as a real option. I lack the sensus divinitatis that enables—indeed, compels so many people to see in the world the expression of divine purpose.” But it isn’t just that Nagel is more or less neutral about theism but lacks that sensus divinitatis. In The Last Word, which appeared in 1997, he offered a candid account of his philosophical inclinations:

I am talking about something much deeper—namely, the fear of religion itself. I speak from experience, being strongly subject to this fear myself: I want atheism to be true and am made uneasy by the fact that some of the most intelligent and well-informed people I know are religious believers.... It isn’t just that I don’t believe in God and, naturally, hope that I’m right in my belief. It’s that I hope there is no God! I don’t want there to be a God; I don’t want the universe to be like that.

Here we have discomfort and distress at the thought that there might be such a being as God; but this discomfort seems more emotional than philosophical or rational.

So is there a strictly philosophical problem with theism, according to Nagel? As far as I can see, the main substantive objection that he offers is an appeal to that notion of unity. A successful worldview will see the world as intelligible; and intelligibility, as Nagel conceives it, involves a high degree of unity. The world is intelligible only if there are no fundamental breaks in it, only if it contains no fundamentally different kinds of things. Descartes, that great dualist, thought that the world displays two quite different sorts of things: matter and mind, neither reducible to the other. Nagel rejects this dualism: his reason is just that such dualism fails to secure the unity necessary for the world’s being intelligible.

Yet is there any reason to think that the world really is intelligible in this very strong sense—any good reason to think that there is fundamentally just one kind of thing, with everything being an example of that kind, or reducible to things that are? Here three considerations seem to be necessary. First, we need to know more about this requirement: what is it to say that fundamentally there is just one kind of thing? It is not obvious how this is to be understood. Aren’t there many different sorts of things: houses, horses, hawks, and handsaws? Well, perhaps they are not fundamentally different. But what does “fundamentally” mean here? Is the idea that the world is intelligible only if there is some important property that houses, horses, hawks, and handsaws all share? What kind of property?

Second, how much plausibility is there to the claim that this sort of unity really is required for intelligibility? Clearly we cannot claim that Descartes’s dualism is literally unintelligible—after all, even if you reject it, you can understand it. (How else could you reject it?) Is it really true that the world is more intelligible, in some important sense of “intelligible,” if it does not contain two or more fundamentally different kinds of things? I see little reason to think so.

And third, suppose we concede that the world is genuinely intelligible only if it displays this sort of monistic unity: why should we think that the world really does display such a unity? We might hope that the world would display such unity, but is there any reason to think the world will cooperate? Suppose intelligibility requires that kind of unity: why should we think our world is intelligible in that sense? Is it reasonable to say to a theist, “Well, if theism were true, there would be two quite different sorts of things: God on the one hand, and the creatures he has created on the other. But that cannot really be true: for if it were, the world would not display the sort of unity required for intelligibility”? Won’t the theist be quite properly content to forgo that sort of intelligibility?

III.

I COME FINALLY to Nagel’s positive thesis. Materialist naturalism, he shows, is false, but what does he propose to put in its place? Here he is a little diffident. He thinks that it may take centuries to work out a satisfactory alternative to materialist naturalism (given that theism is not acceptable); he is content to propose a suggestive sketch. He does so in a spirit of modesty: “I am certain that my own attempt to explore alternatives is far too unimaginative. An understanding of the universe as basically prone to generate life and mind will probably require a much more radical departure from the familiar forms of naturalistic explanation than I am at present able to conceive.”

There are two main elements to Nagel’s sketch. There is panpsychism, or the idea that there is mind, or proto-mind, or something like mind, all the way down. In this view, mind never emerges in the universe: it is present from the start, in that even the most elementary particles display some kind of mindedness. The thought is not, of course, that elementary particles are able to do mathematical calculations, or that they are self-conscious; but they do enjoy some kind of mentality. In this way Nagel proposes to avoid the lack of intelligibility he finds in dualism.

Of course someone might wonder how much of a gain there is, from the point of view of unity, in rejecting two fundamentally different kinds of objects in favor of two fundamentally different kinds of properties. And as Nagel recognizes, there is still a problem for him about the existence of minds like ours, minds capable of understanding a fair amount about the universe. We can see (to some degree, anyway) how more complex material objects can be built out of simpler ones: ordinary physical objects are composed of molecules, which are composed of atoms, which are composed of electrons and quarks (at this point things get less than totally clear). But we haven’t the faintest idea how a being with a mind like ours can be composed of or constructed out of smaller entities that have some kind of mindedness. How do those elementary minds get combined into a less than elementary mind?

The second element of Nagel’s sketch is what we can call natural teleology.His idea seems to be something like this. At each stage in the development of our universe (perhaps we can think of that development as starting with the big bang), there are several different possibilities as to what will happen next. Some of these possibilities are steps on the way toward the existence of creatures with minds like ours; others are not. According to Nagel’s natural teleology, there is a sort of intrinsic bias in the universe toward those possibilities that lead to minds. Or perhaps there was an intrinsic bias in the universe toward the sorts of initial conditions that would lead to the existence of minds like ours. Nagel does not elaborate or develop these suggestions. Still, he is not to be criticized for this: he is probably right in believing that it will take a lot of thought and a long time to develop these suggestions into a truly viable alternative to both materialist naturalism and theism.

 I SAID ABOVE THAT Nagel applauds the negative side of Intelligent Design but is doubtful about the positive part; and I find myself in much the same position with respect to Mind and Cosmos. I applaud his formidable attack on materialist naturalism; I am dubious about panpsychism and natural teleology. As Nagel sees, mind could not arise in our world if materialist naturalism were true—but how does it help to suppose that elementary particles in some sense have minds? How does that make it intelligible that there should be creatures capable of physics and philosophy? And of poetry, art, and music?

As for natural teleology: does it really make sense to suppose that the world in itself, without the presence of God, should be doing something we could sensibly call “aiming at” some states of affairs rather than others—that it has as a goal the actuality of some states of affairs as opposed to others? Here the problem isn’t just that this seems fantastic; it does not even make clear sense. A teleological explanation of a state of affairs will refer to some being that aims at this state of affairs and acts in such a way as to bring it about. But a world without God does not aim at states of affairs or anything else. How, then, can we think of this alleged natural teleology?

When it comes to accommodating life and mind, theism seems to do better. According to theism, mind is fundamental in the universe: God himself is the premier person and the premier mind; and he has always existed, and indeed exists necessarily. God could have desired that there be creatures with whom he could be in fellowship. Hence he could have created finite persons in his own image: creatures capable of love, of knowing something about themselves and their world, of science, literature, poetry, music, art, and all the rest. Given theism, this makes eminently good sense. As Nagel points out, the same cannot be said about materialist naturalism. But do panpsychism and natural teleology do much better?

Nagel’s rejection of theism does not seem to be fundamentally philosophical. My guess is this antipathy to theism is rather widely shared. Theism severely limits human autonomy. According to theism, we human beings are also at best very junior partners in the world of mind. We are not autonomous, not a law unto ourselves; we are completely dependent upon God for our being and even for our next breath. Still further, some will find in theism a sort of intolerable invasion of privacy: God knows my every thought, and indeed knows what I will think before I think it. Perhaps hints of this discomfort may be found even [in the Bible itself](http://www.biblegateway.com/passage/?search=Psalm+139&version=NKJV):

Before a word is on my tongue, you know it completely, oh Lord....
Where can I go from your Spirit?
Where can I flee from your presence?
If I go up to the heavens, you are there;
If I make my bed in Sheol, you are there.

This discomfort with theism is to some extent understandable, even to a theist. Still, if Nagel followed his own methodological prescriptions and requirements for sound philosophy, if he followed his own arguments wherever they lead, if he ignored his emotional antipathy to belief in God, then (or so I think) he would wind up a theist. But wherever he winds up, he has already performed an important service with his withering critical examination of some of the most common and oppressive dogmas of our age.

Alvin Plantinga is professor of philosophy emeritus at the University of Notre Dame and is the author, most recently, of Where the Conflict Really Lies: Science, Religion, and Naturalism (Oxford University Press). This article appeared in the December 6,  2012 issue of the magazine under the headline “A Secular Heresy.”