

Introduction to God and Design

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This introduction has two functions. First, it apprises readers of some of the basic data, terminology, and formalisms used in contemporary discussions of the design argument while also giving a sense of the argument's history. Other pieces in this anthology – particularly those of Elliott Sober, John Leslie, Paul Davies, and Michael Ruse – cover some of the same ground. Second, it gives readers some idea of what the various contributors will say and why their contributions are important for understanding the design argument.¹ Though I will raise my own concerns at various points, I will (so far as I can) leave the philosophical and scientific heavy lifting to the distinguished contributors.

CLASSIFYING THE DESIGN ARGUMENT

Design arguments involve reasoning from seemingly purposeful features of the observable world to the existence of at least one supernatural designer. Because of this appeal to purpose, design arguments are teleological (from the Greek word '*telos*', meaning 'goal' or 'end'). Though design arguments almost always are mounted for the ultimate purpose of proving the existence of God (as opposed to some other being), in most versions of the argument the inference is not directly to God, but rather just to the existence of some supernatural designer(s) or other; further arguments are needed to identify the supernatural designer(s) with God.² Since the design argument relies on a premise that can be known only through observation of the empirical world, it counts as an *a posteriori* argument. In this way it contrasts with *a priori* arguments for the existence of God – arguments all of the premises of which can be known to be true independent of sense experience. Ontological arguments are the most notable example of *a priori* arguments for the existence of God.

Cosmological arguments for the existence of God are also *a posteriori*. The causal version of the cosmological argument moves from the existence of causal sequences in the observable world to the existence of a first cause. The contingency version of the cosmological argument moves from the existence of things that might not have existed to the existence of a necessary being. Cosmological arguments differ from the design argument, however, in that their *a posteriori* premises are highly general and apparently incorrigible. The passage of time and the development of scientific knowledge will presumably provide neither more nor less reason to believe that there are sequences of cause-and-effect relationships or that there are things that might not have existed.

The eutaxiological argument (from the Greek word '*eutaxia*', meaning 'good order') moves from the lawful regularity and comprehensibility of the world to the existence of an ordering being.³ In addition to the wealth of historical and scientific facts it displays, the argument by Paul Davies is interesting for its strong eutaxiological flavor – its emphasis on the fact that "the physical world is both ordered and intelligible." Unlike the cosmological argument, the eutaxiological argument's *a posteriori* premise can get support from science. As science progresses, the world does seem to become more orderly and comprehensible, at least insofar as phenomena that were previously thought to be unrelated (e.g. electricity and magnetism) come to be seen as related. Yet the sort of empirical evidence in favor of the eutaxiological argument is not nearly so detailed as the sort of evidence offered in favor of the design argument. Orderliness, lawfulness, and comprehensibility are quite general features of the world. As we will see, the features of the world to which proponents of the design argument point are much more specific and the allure of the argument depends very much on the state of scientific knowledge during a particular slice of history.⁴

THE RESURGENCE OF THE DESIGN ARGUMENT IN THE LATE TWENTIETH CENTURY

As of half a century ago, that allure was minimal. Darwin's theory of evolution by natural selection, articulated in *On the Origin of Species* [1859], was thought to have robbed proponents of what Elliott Sober calls the "organismic" design argument of the move from apparent design to a designer. The detailed biological observations in William Paley's *Natural Theology* [1802] and in the Bridgewater Treatises of the early nineteenth century were widely thought to be explicable in terms of evolution through natural selection, with no need for a designer. The origin of life, meanwhile, was not even seen as an important scientific problem; this was largely due to the underlying assumption (discussed below) that the Universe is temporally and spatially infinite. The story of the decline of the organismic design argument subsequent to Darwin is a fascinating one, but since Sober, Ruse, and (more briefly) Michael Behe all recount that story in their papers, I will not repeat it here.

The prospects for a "cosmic" design argument, meanwhile, seemed non-existent so long as prevailing attitudes toward the cosmos held sway. The discoveries of modern physical cosmology have permeated contemporary intellectual sensibilities so thoroughly that some of us have a hard time remembering the wariness with which cosmology and its object were viewed even as recently as the 1960s. The tradition of suspicion dates at least to Kant, who claimed in his First Antinomy in the *Critique of Pure Reason* that any talk of the Universe as a unified object (comparable to, say, Jupiter) led to contradiction.⁵ Moving ahead to the early twentieth century, logical positivists advanced the verificationist theory of meaning, according to which statements the truth of which cannot be verified are meaningless. Verificationism prompted doubts about whether the Universe was a legitimate object of scientific inquiry (or even an object at all). Is it a unique whole?

If it is unique, does it make any sense to talk of its following laws? Can we ever observe it (as opposed to observing just part of it)? Can we even have a meaningful concept of the Universe – a concept that succeeds, or could fail to succeed, in picking out something? Like a nominee at a Senate confirmation hearing, the Universe had its ontological candidacy rejected on the grounds that too many questions could be raised.

Because of this aura of disrepute popular among both philosophers and scientists, cosmology was largely disregarded. It was simply assumed that the Universe is eternal and infinite, and that otherwise there is nothing for scientists (or philosophers) to say about it. These assumptions (and the atheism with which they are consonant) were deeply entrenched, which explains the tremendous surprise and hostility with which the Big Bang model was greeted. To get a sense of the reaction, consider the following account C.F. von Weizsäcker gave of a conversation he had in 1938 with Nobel-prize-winning physical chemist Walther Nernst. Nernst reacted to von Weizsäcker's presentation of some calculations he had made regarding the age of the Universe.

He said, the view that there might be an age of the universe was not science. At first I did not understand him. He explained that the infinite duration of time was a basic element of all scientific thought, and to deny this would mean to betray the very foundations of science. I was quite surprised by this idea and I ventured the objection that it was scientific to form hypotheses according to the hints given by experience, and that the idea of an age of the universe was such a hypothesis. He retorted that we could not form a scientific hypothesis which contradicted the very foundations of science. He was just angry, and thus the discussion, which was continued in his private library, could not lead to any result.

[von Weizsäcker 1964: 151]

Nowadays one can hardly surf the Internet or peruse the science section of a chain bookstore without stumbling across a website, article, or book about the design argument. [You chose wisely!] What accounts for the change in fortunes? The answer lies in the spectacular growth in the middle of the last century of (a) physical cosmology and (b) the closely related fields of molecular biology, cell biology, and biochemistry. A series of breakthroughs in physics and observational astronomy led to the development of the Big Bang model and the discovery that the Universe is highly structured, with precisely defined parameters such as age, mass, entropy (degree of disorder), curvature, temperature, density, and rate of expansion. Using clever experimentation and astounding instrumentation, physical cosmologists were able to determine the values of these parameters to remarkably precise degrees. The specificity of the Universe prompted theoretical exploration of how the Universe would have been if the values of its parameters had been different. This led to the discovery of numerous "anthropic coincidences" and supported the claim that the Universe is fine-tuned for life – that is, that the values of its parameters are such that if they differed even slightly, life of any sort could not possibly have arisen in the Universe. Furthermore, the temporal and spatial finitude of the Universe meant that there were not unlimited opportunities for life to originate by chance. So the discovery of the Big Bang did not just resurrect the possibility of mounting a cosmic design argument. It created an opening for biological design arguments as well.

That opening was widened as the inner workings of the cell were made accessible due to the introduction (beginning in the post-World War II period) of powerful new tools and experiments. Prior to that time not much was known about the cell. Though it was

acknowledged to be the most basic form of life and to contain within it the key to reproduction, it was generally regarded as quite simple. Cells were viewed as hunks of protoplasm – things that could have arisen easily enough from an inorganic, pre-biotic soup of the sort that presumably covered the Earth billions of years ago. As Michael Behe notes [1996: 6-13], the development of electron microscopy, X-ray crystallography, and nuclear magnetic resonance (NMR) imaging in the latter half of the twentieth century caused this conception of the cell to topple. The cell itself and the mechanisms for replication contained within it were now seen to be powered by molecular structures of tremendous complexity – a complexity that Behe argues is (in some cases) "irreducible."

Clearly, science has not run its course; just as the fortunes of the design argument rose, they may fall again. Indeed, some will claim that they are *now* falling. As we will see shortly when the topic turns to the multiverse hypothesis, some scientists think the theory of a unique Big Bang and the temporal singularity it implies can and should be discarded. But until these scientific revolutions occur, we cannot fault design proponents for drawing from currently accepted scientific facts and theories. The data in support of the claims of fine-tuning and irreducible complexity – and criticisms of these interpretations of the data – are presented with admirable clarity by several of the contributors to this volume. Robin Collins and William Lane Craig both document extensively the array of force strengths, mass ratios, and other fundamental constants that seem to be fine-tuned, with Collins going into considerable technical detail to provide six solid cases of fine-tuning. Michael Behe, Kenneth Miller, and Michael Ruse, meanwhile, all apply their biological expertise to supporting or debunking claims that particular cellular mechanisms could not have arisen via natural selection. Since the scientific details of the design argument are so ably explained by the aforementioned authors, I will devote

the remainder of this introduction to highlighting the philosophical issues the design argument raises.

THE LOGIC OF THE DESIGN ARGUMENT

Design arguments nowadays typically employ a probabilistic logical apparatus. This distinguishes contemporary design arguments from earlier analogical versions of the sort that Hume criticized in *Dialogues Concerning Natural Religion* [1779]. To say that modern design arguments employ a probabilistic logical apparatus, however, still leaves much room for disagreement as to their precise logical structure. For example, are design arguments Bayesian? Bayes's theorem is a formula in the probability calculus. This theorem provides us with Bayes's rule – a rule that shows how one might revise, in the light of new evidence, the probabilities one initially assigned to competing hypotheses. Many contemporary philosophers think one should always evaluate the impact of new evidence in conformity with Bayes's rule. These "Bayesians" think Bayes's rule is a crucial constraint on scientific reasoning.⁶

To get a sense of Bayesian reasoning, suppose you are tracking the leader board of a men's professional golf tournament in which there are 100 contestants, one of whom you know is Tiger Woods. Unlike the typical golf tournament, however, the players are not identified by name on the leader board, but rather by number. Now consider the following hypothesis, the following datum, and the following statement of background knowledge.

T = Contestant 93 is Tiger Woods

L = Contestant 93 is leading by eight strokes

B = There are 100 numbered contestants, all of them are PGA golf professionals, and one of them is Tiger Woods

What is the relationship between the hypothesis, the datum, and the background knowledge? To answer this, it will be helpful to use the following notation: $P(x|y)$ stands for the probability of x given that ("conditional on") y . Now knowing nothing else about contestant 93 except that he is one of 100 professional golfers, you think he has one chance in 100 of being Tiger. So prior to getting any information about how contestant 93 is doing, you think

$$P(T|B) = 0.01$$

But now you see on the leader board that contestant 93 is leading by eight strokes. This is an extremely large lead for a professional golf tournament; a golfer who could build such a lead would have to be much, much better even than the typical professional golfer. So while you think the probability of an eight-stroke lead's being built by contestant 93 conditional on his being a contestant other than Tiger is extremely low (say, one in ten thousand), you think the probability of an eight-stroke lead's being built by contestant 93 conditional on his being Tiger is fairly high (say, one in a hundred). [Of course, these epistemic probability assignments are artificially precise, but for the purposes of this example we will ignore this problem.] So

$$P(L|\sim T \& B) = 0.0001 \quad [\text{where } '\sim' \text{ stands for 'it is not the case that'}]$$

and

$$P(L|T \& B) = 0.01$$

In light of the evidence L , you realize you should assign a much higher probability to T than you did prior to looking at the leader board. Bayes's rule, many philosophers would think, tells you exactly how much higher. Bayes's rule says the probability that golfer 93 is Tiger given that golfer 93 leads by eight strokes is the *particular probability* – the probability that golfer 93 is Tiger and leads by eight strokes – divided by the *total probability* – the probability that any one of the 100 golfers leads by eight strokes. So

$$P(T|L \& B) = \{P(L|T \& B) \cdot P(T|B)\} / \{P(L|\sim T \& B) \cdot P(\sim T|B) + P(L|T \& B) \cdot P(T|B)\}$$

$$\begin{aligned}
&= \{0.01 \cdot 0.01\} / \{0.0001 \cdot 0.99 + 0.01 \cdot 0.01\} \\
&= 0.0001 / 0.000199 \\
&= 0.5025
\end{aligned}$$

That is, evaluating the evidence in light of Bayes's rule, there is about a one in two chance that golfer 93 is Tiger Woods.

Given our best scientific knowledge, say many contemporary proponents of the design argument, we see that certain special features of the Universe are extremely unlikely if the Universe is not the product of design but are quite likely if it is. In order to get what they say to fit the Bayesian format, they (or we, on their behalf) must articulate three specific propositions: a proposition concerning the relevant scientific background data (K); a proposition about the Universe's having a certain special feature (E); and a proposition identifying a particular design hypothesis (D). For example, a Bayesian design argument might involve the following propositions.

K_1 = Many of the initial conditions and free parameters of a universe need to be finely tuned in order for the development of life in that universe to be possible

E_1 = The Universe is such that the development of life in it is possible

D_1 = There is at least one supernatural designer

The proponent of this sample Bayesian design argument would then make the following claims.

- (1) $P(E_1|K_1 \ \& \ \sim D_1)$ is extremely low
- (2) $P(E_1|K_1 \ \& \ D_1)$ is quite high
- (3) $P(D_1|K_1)$ is considerably greater than $P(E_1|K_1 \ \& \ \sim D_1)$

Claims (1)-(3) provide all of the necessary ingredients for a Bayesian inference. Using Bayes's rule, proponents of this sample design argument reach a profound conclusion.

- (4) $P(D_1|E_1 \ \& \ K_1)$ is quite high

That is, the existence of at least one supernatural designer is quite high given that life is possible in the Universe and given what we know about how the Universe must be if life is to be possible in it. Notice that, for this argument to work, something must be said about $P(D_1|K_1)$ relative to $P(E_1|K_1 \ \& \ \sim D_1)$. That is, something must be said about how the probability of the design hypothesis compares to the probability that life is possible in the Universe given the denial of the design hypothesis. The proponent of a Bayesian design argument cannot remain silent on the issue of the prior probability of the design hypothesis.

Richard Swinburne's version of the design argument is robustly Bayesian. For Swinburne, the relevant background data K is provided by contemporary physical cosmology and life science. The proposition E for Swinburne is that the Universe permits the existence of embodied agents that are sentient, intelligent, and free. The design hypothesis D just is that God exists. Swinburne argues that the prior probability that God exists is quite high – something near 0.5 – because God is the metaphysically simplest being we can conceive. In light of this high prior probability and in light of the restrictions the possibility of embodied agents puts on a universe, Swinburne argues, the posterior probability of theism is very high indeed.

As Elliott Sober presents it, however, the modern design argument is not Bayesian, but is rather an argument from likelihoods. The design arguments Sober considers are silent on the question of the prior probability of the design hypothesis, and so they are incapable of producing the conclusion that the posterior probability of the design hypothesis is high. They are only meant to show that the probability of a designer – whatever that probability is – is raised by the evidence. William Lane Craig, meanwhile, employs the logical apparatus articulated in William Dembski's *The Design Inference* [1998]. As can be seen from reading Craig's presentation of Dembski's Generic Chance Elimination

Argument and Michael Ruse's presentation of Dembski's Explanatory Filter, Dembski is no Bayesian. Instead, his model of design inference is akin to Ronald Fisher's model of scientific inference. In developing his notion of "significance tests," Fisher [1959] explicitly rejects the Bayesian account of what is essential to scientific inference. Fisher says scientists routinely and rightly reject hypotheses for making the data too improbable, doing so without assigning prior probabilities to the hypotheses and without considering any alternative hypotheses.

As we can see, there is considerable disagreement regarding the best way to frame the design argument. Even so, Swinburne, Sober, Craig, and Dembski at least agree that the design argument is best presented as an inference that involves probabilities at some level. Del Ratzsch does not. His intriguing, and disruptive, suggestion is that design is perceived, not inferred. Drawing on some remarks by Scottish Enlightenment philosopher Thomas Reid, Ratzsch proposes that recognizing design is like seeing, smelling, or hearing. Ratzsch even sees signs of a Reidian view of design recognition in the work of Paley. As the range of positions indicates, what is the best framework for formulating the design argument is a matter of considerable philosophical interest.

DEFINING 'FINE-TUNED' AND 'IRREDUCIBLY COMPLEX'

Let us set aside Ratzsch's suggestion for now and consider versions of the design argument that do employ a probabilistic inferential apparatus. With such arguments the evidence of design – whether it be cosmic fine-tuning or biological complexity – must support claims of improbability, whether explicitly or implicitly. As D.H. Mellor argues persuasively, this evidence will have to be *physically* improbable, not just epistemically so. I have maintained elsewhere [Manson 2000b] that even if a cosmic parameter P is such that life could not have arisen had the numerical value of P been slightly different,

that does not imply that it is physically improbable that P takes a value which permits life. Robin Collins, William Lane Craig, Richard Swinburne, and John Leslie all work with just such a "slight difference" or "narrow limits" definition of fine-tuning (though Collins also argues there are circumstances in which the actual value of a parameter could reasonably count as fine-tuned for life even if the life-permitting range of values for that parameter is not narrow). Without the introduction of further assumptions, however, statements about how things would be if other things were slightly different cannot be converted into statements about how physically probable it is that things are the way they are.

For example, a size 10 shoe would not fit its wearer if it were more than half a shoe size larger or smaller, but to move from this 10 percent window of (shoe) fitness to the conclusion that there is a 10 per cent chance the shoe fits would be a bizarre *non sequitur*. To justify that conclusion, one would need to make very odd assumptions regarding the sizes the shoe could have had and, for each of those possible sizes, how likely it was that the shoe would be that size. Again, an approach shot by Tiger Woods would not land within twenty feet of the pin if any component of his swing were slightly different, but that does not make it improbable that an approach shot of his lands within twenty feet of the pin. Unlike the swing of the typical golfer, Tiger's actual swing is extremely unlikely to be more than the slightest bit different from his intended swing. This is true even though (due to his strength and flexibility) the range of possible swings for Tiger is considerably greater than the range of possible swings for the typical golfer.

As Timothy McGrew, Lydia McGrew, and Eric Vestrup argue, what proponents of arguments from fine-tuning need to provide is a normalizable measure of the space of values the cosmic parameters might take; that is, the regions of this space of possibilities must be capable of adding up to one. Only then can there be meaningful talk about the

probability that the cosmic parameters lie within the life-permitting regions; by definition, probabilities lie in the interval $[0,1]$. To get a normalizable space, however, one must assume either that there are limits on the numerical values the cosmic parameters could have taken (rather like the limitations the length of his arms imposes on Tiger's possible swings) or that some possible values are more likely than others (in the way that Tiger's great skill makes good swings more likely for him than bad ones). As I contend in [Manson 2000b], neither of these assumptions – that the possible values are bounded or that a density function should be imposed on the space of possibilities – is (or could be?) warranted by current physical theory.

It is precisely for this reason that the McGrews and Vestrup regard what Robert O'Connor calls "local design arguments" (and what they call "life support arguments") as more promising than cosmic (for O'Connor, "global") design arguments. By focussing on what is possible *within* the arena defined by the Universe as a whole, in principle there is the possibility of providing well-defined probabilities for the items to be used as evidence of design. Taking the Universe as a whole – including the fact that it is fine-tuned for life – as an unexplained given, proponents of local design arguments instead seek evidence of design in scientifically established contingencies. These include such facts as that life has arisen in the Universe (which may be very improbable even if the Universe is fine-tuned for life), that the Earth is a climatologically appropriate distance from the Sun, that several gas giant planets serve to deflect most large asteroids from collision courses with the Earth, and so on.

Whether local design arguments are, indeed, more promising than cosmic ones, however, is not so clear. O'Connor casts doubt on the notion that such local design arguments are far less reliant on controversial philosophical premises than their global counterparts. To the contrary, he says, they presuppose the extra-scientific claims that any scientific

explanations of scientifically established contingencies either are discoverable by us or would have been discovered already. O'Connor cautions that any design argument will presuppose disputed *a priori* philosophical and metaphysical principles. There is no such thing as a "strictly scientific" design argument, whether that design argument be cosmic or local.

One kind of local design argument is the sort advanced by Michael Behe and other advocates of "Intelligent Design Theory." They claim that certain biological structures could not have arisen within the Universe by Darwinian means and so must be explained supernaturally. [Note that, in saying this, they presume that there are no non-Darwinian natural means for the production of these biological structures; this may not be true.] Their arguments rest on the notion of irreducible complexity, but the definition of 'irreducibly complex' is as much a matter of contention as that of 'fine-tuned for life'. Behe defines the phrase as follows.

By irreducibly complex I mean a single system composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning.

(Behe 1996: 39)

What Behe is after is a definition such that if a biological structure meets it, that biological structure could not have arisen by a Darwinian process. And it seems that if a biological structure is irreducibly complex in Behe's sense of the term, it indeed could not have been selected for by a Darwinian process. Evolution selects from functioning systems, yet any precursor to an irreducibly complex structure would, it seems, be nonfunctional. Given that such a biological system could not be explained in Darwinian terms, the next step in the inference to a designer would be to calculate the probability that the system arose by

chance. And as may not be the case with fine-tuning, such calculations could make reference to scientifically established facts about the Universe regarding its age, the number of particles in it, the number of habitable planets in it, and so on in order to establish the number of opportunities that were available for the irreducibly complex structures to arise.

As Kenneth Miller notes, however, it is not enough for Behe's argument that he identify a biological structure the existence of which *currently lacks* a Darwinian explanation. According to Miller, Behe is trying to define the sort of biological structure the existence of which Darwin's theory *could not possibly* explain. Miller says Behe's definition fails to satisfy Behe's own criterion. Behe talks about *the* basic function of a biological system, when in order to tackle Darwinism on its own terms he should be talking about *some function or other* of a biological system. Biological functionality is defined only in the context of an environment, Miller insists. As an environment changes, the function of a system operating within it can change too. Miller argues that selectable functions do exist for the components of allegedly irreducibly complex systems (e.g. eubacterial flagella). Michael Ruse illustrates the same point when he discusses the energy-converting Krebs cycle. Ruse notes as well that Behe's definition does not take simplifying changes into consideration. A biological system could be irreducibly complex in Behe's sense yet be achievable via a Darwinian process if there existed a more complex precursor that was itself not irreducibly complex. Ruse uses the example of an arched stone bridge to illustrate this point. Once the keystone is placed, the bridge builders can remove the scaffolding. The stone bridge then becomes such that the removal of any one of its parts will cause the bridge to collapse, but that does not mean the stone bridge was not the product of a gradual process.

In considering these objections, however, we must not forget the key point of Behe's contribution to this volume. It should be possible to define a biological system such that if it were to exist, its existence could not be explained in Darwinian fashion. If it is impossible to define such a biological system, then it will be impossible to formulate an empirical test that might disconfirm Darwin's theory. Darwinism's claim to be a genuine scientific theory would suffer a serious (if not mortal) blow. Darwin himself, Behe notes, recognized that he needed to provide a criterion for falsifying his theory. Yet Behe claims that in practice the defenders of Darwinism fail to admit the possibility of falsifying Darwinism. Meanwhile they assert in the same breath both that Behe's "Intelligent Design" hypothesis is unfalsifiable and that there is evidence against it! [Miller does not make this mistake; his position is that Behe's hypothesis does make predictions and is falsifiable.] So even if the particular definition of 'irreducibly complex' Behe provides is inadequate (is such that the existence of a biological system which meets it would not necessarily disconfirm Darwinism), it might be in the interest of Darwinists to repair the definition to make it adequate.

SPECIFYING FOR WHAT THE UNIVERSE IS DESIGNED

The design argument involves the claim that the Universe, or some part of it, is designed for something. For example, design arguments from fine-tuning rest on the claim that the Universe is fine-tuned for something. But for what? A range of answers is given. William Lane Craig, Robin Collins, and John Leslie specify intelligent life as that for which the Universe is fine-tuned. Richard Swinburne's design argument from fine-tuning is framed in terms of the necessary conditions for the existence of embodied agents that are sentient, intelligent, and free. Timothy McGrew, Lydia McGrew, and Eric Vestrup speak of fine-tuning for carbon-based life, while D.H. Mellor and Martin Rees talk of fine-tuning for mere life.⁷ Paul Davies, meanwhile, sees the Universe as set up for the production of

complex, self-organizing systems, though he does also talk about consciousness being written into the laws of nature.

As I have noted elsewhere [Manson 2000a], the design argument is almost always characterized by its critics as involving anthropocentrism or (to use J.J.C. Smart's term) "psychocentrism" [Smart and Haldane 1996: 26-7]. Hume, for example, claimed proponents of the design argument made the mistake of applying a particular mode of explanation – namely, explanation in terms of the possession of particular thoughts – to the Universe as a whole just because that mode of explanation often works with respect to humans. In doing this, he said, proponents of the design argument make humans "the model of the whole universe."

But allowing that we were to take the *operations* of one part of nature upon another for the foundation of our judgment concerning the *origin* of the whole (which never can be admitted), yet why select so minute, so weak, so bounded a principle as the reason and design of animals is found to be upon this planet? What peculiar privilege has this little agitation of the brain which we call *thought*, that we must thus make it the model of the whole universe? Our partiality in our own favor does indeed present it on all occasions, but sound philosophy ought carefully to guard against so natural an illusion.

[Hume 1779: 28]

Similarly, Bertrand Russell criticizes the design argument for resting on an inequalitarian ethical picture.

Is there not something a trifle absurd in the spectacle of human beings holding a mirror before themselves, and thinking what they behold so excellent as to prove that a Cosmic Purpose must have been aiming at it all along? Why, in any case, this glorification of Man? How about lions and tigers? They destroy fewer animal or human lives than we do, and they are much more beautiful than we are... Would not a world of nightingales and larks and deer be better than our human world of cruelty and injustice and war?

[Russell 1961: 221]

As we can see, specifying for what the Universe is designed is not ethically unproblematic. For one thing, there is the risk of causing offense by leaving out of the specification important kinds of beings. For example, specifying the Universe as fine-tuned for intelligent life suggests that nothing that is not both living and intelligent would be a worthy end for a designer. Contemporary environmentalists and animal advocates would likely take exception to such a specification.

Proponents of the argument from fine-tuning could buy themselves some room for maneuver, however, if the probabilities on chance of the Universe's being suitable for life, intelligent life, carbon-based life, self-organizing complex systems, Gaia, nightingales, larks, deer, and so on were all effectively the same. This does seem to be the case. As indicated by the accounts of fine-tuning Collins and Craig provide, had any of the free cosmic parameters been the slightest bit different, the Universe would have been *radically* different. It would have lasted only a microsecond, or its matter would have been a billion times more diffuse, or its mean temperature would have been a million times greater. It appears the Universe would not have allowed for *any* of the beings specified if the values of its free parameters had been even slightly different.

In connection with this point, Simon Conway Morris argues that the chances of *human-like* life eventually arising in the Universe are effectively the same as the chances of life eventually arising in the Universe. He would agree with Paul Davies that "the emergence of life and consciousness somewhere and somewhen in the cosmos is ... assured by the underlying laws of nature." The widespread phenomenon of convergent evolution suggests to Conway Morris that the eventual emergence in a biosphere of human-like biological properties is extremely likely given a reasonable amount of time. In taking this line he rejects the popular view that evolution is a "random walk" in which the evolution of humans is not to be expected. What is *really* not to be expected, says Conway Morris, is the existence of such a biosphere. Recent discoveries indicate such biospheres are (cosmically speaking) few and far between.

This suggests a picture of our place in the Universe that runs contrary to the "cosmic accident" view, according to which science – especially since Copernicus and Darwin – has shown our cosmic insignificance. Indeed, there are those for whom the teachings of Darwin and Copernicus are the organizing principles of an ethical cause on behalf of which they proselytize. Consider, again, Russell.

Man, as a curious accident in a backwater, is intelligible: his mixture of virtues and vices is such as might be expected to result from a fortuitous origin. But only abysmal self-complacency can see in Man a reason which Omniscience could consider adequate as a motive for the Creator. The Copernican revolution will not have done its work until it has taught men more modesty than is to be found among those who think Man sufficient evidence of Cosmic Purpose.

[Russell 1961: 222]

Russell is not the only one who sees science as putting humanity in its place. The idea that a heliocentric model of the Solar System and an evolutionary account of humanity's existence have some sort of homiletic "work" to do has wide currency. Contrary to Russell's claim that we are "a curious accident in a backwater," however, one of the key discoveries of contemporary science is that our evolution depends crucially on the broad-scale features of the Universe and on specific phenomena such as star formation and star death. The papers by Craig, Collins, and Conway Morris make this abundantly clear. So insofar as the "cosmic accident" view is mistaken – insofar as it is plausible to maintain the Universe is *for* something – the design argument has a chance of getting off the ground.

WHAT SHOULD WE EXPECT FROM A SUPERNATURAL DESIGNER?

Even if the existence of intelligent life now is radically contingent, does that necessarily disqualify the Universe and the intelligent life within it from counting as products of design? Kenneth Miller, Michael Ruse, John Leslie, and Peter van Inwagen say no. Van Inwagen searches for, but cannot find, a good reason for thinking God would not use the mechanism of natural selection to produce rational beings. He sees Darwin's account of evolution as wholly compatible with the claim that living beings (including rational beings such as ourselves) are the products of intelligent design, even though the evolution of intelligent life is not guaranteed in a universe with the laws and initial conditions of ours. Miller makes the same point in *Finding Darwin's God*, claiming that "the notion that we must find historical inevitability in a process in order to square it with the intent of a Creator makes absolutely no sense" [Miller 1999: 273].

Can we really say that no Creator would have chosen an indeterminate, natural process as His workbench to fashion intelligent beings? Gould argues that if we were to go back to the Cambrian era and start over a second time, the emergence of

intelligent life exactly 530 million years later would not be certain. I think he is right, but I also think this is less important than he believes. Is there some reason to expect that the God we know from Western theology had to preordain a timetable for our appearance? After 4.5 billion years, can we be sure He wouldn't have been happy to wait a few million longer? And, to ask the big question, do we have to assume that from the beginning He planned intelligence and consciousness to develop in a bunch of nearly hairless, bipedal, African primates? If another group of animals had evolved to self-awareness, if another creature had shown itself worthy of a soul, can we really say for certain that God would have been less than pleased with His new Eve and Adam? I don't think so.

[Miller 1999: 274]

Leslie agrees with Miller, saying that the Universe is designed, not for our species in particular, but for intelligent life more generally.⁸

Likewise, Ruse claims not to see why God would not use evolution as His means for producing intelligent life. Like several of the contributors to this volume, Ruse finds *most* attractive a theological picture according to which God does not intervene in the Universe subsequent to bringing it into existence. Leslie opines that "any deity who supplemented laws of physics by life-forces and acts of interference would have produced a disappointingly untidy universe." Paul Davies agrees, saying he "would rather that nature can take care of itself." According to this line of thought (which is similar to deism, but is now often referred to as "theistic evolutionism"), it is to be expected that God would frontload into the Universe all that He wanted it eventually to produce. God, according to theistic evolutionists, would be expected to let evolution do the (dirty) work of bringing about the existence of intelligent life. Though theistic evolutionism is not the standard view regarding God's relationship to His creation, it is an increasingly popular one.

It is precisely with respect to the "Why?" and "How?" of creation, however, that sceptics such as Jan Narveson object to the design argument. The hypothesized designer of this universe will need a motive for having designed it, yet Narveson sees no reason for thinking there is such a motive. He takes the argued-for designer just to be God. Being absolutely perfect, however, speaks against God's having a motive. In saying this, Narveson echoes Spinoza, who thought that "if God acts with an end in view, he must necessarily be seeking something that he lacks" [Spinoza 1677 (1982): 59] and hence must be incomplete and imperfect. Possessing omnipotence but lacking a motive, then, means God is no more likely to create one conceivable universe than any other. Yes, God *might* use evolution as a means to produce intelligent life (although sceptics will be quick to contend that evolution is an amazingly cruel and wasteful process – one that produces an amount of suffering no supremely good being would allow). God also might create the world in seven days, with humans being fashioned out of dust. He might create a universe hostile to life, then overcome that hostility and create beings like us. God might even create a universe that lasts a microsecond. Or God might simply not create anything at all. All of these are possible, but why think one is preferred? Proponents of the design argument are trying to argue from the way the world is to God, not just to reconcile the way the world is with God.⁹ So unless proponents of the design argument can show why we should expect God to create our sort of universe, the hypothesis that God exists makes it no more likely that our universe exists. Because of this intractable problem, says Narveson, the design argument fails. Elliott Sober levels a similar criticism, saying "the assumption that God can do anything is part of the problem, not the solution. An engineer who is more limited would be more predictable."

As I note in [Manson 2000a], one might think this objection can be avoided simply by refusing to identify straightaway the designer(s) with God. Most proponents of the

design argument do just this, maintaining (as Michael Behe does explicitly at the beginning of his paper) that the design hypothesis with which they operate is much weaker than theism.

...while I argue for design, the question of the identity of the designer is left open. Possible candidates for the role of designer include: the God of Christianity; an angel – fallen or not; Plato’s demi-urge; some mystical new age force; space aliens from Alpha Centauri; time travelers; or some utterly unknown intelligent being.

Behe thinks this more modest version of the design hypothesis keeps the design argument from falling afoul of issues such as the problem of evil and the paradox of omnipotence. But the increased plausibility of Behe's modest design hypothesis is purchased at the cost of explanatory power. At least the notion of moral perfection is included within the concept of God. To say, however, that a powerful supernatural being exists is to say nothing about that being's motivations, unless a set of preferences can somehow be teased out of the very concept of rationality. The prospects for doing so are dim if we accept the dominant view in contemporary philosophy of mind and action, according to which rationality just is effectiveness at using means to achieve desired ends. Being rational, according to this view, does not imply preferring the good. [Kantians will surely see this as a defect of purely means-ends accounts of rationality.] What all this shows is that proponents of design hypotheses weaker than theism will find themselves in deep philosophical waters when they try to explain why their hypotheses make the existence of a universe like ours more probable.

An analogy will be helpful in grasping this point. Compare the proponent of a non-theistic design hypothesis to a poker player who accuses the dealer of having fixed the deck on a particular hand. The allegation of cheating is credible when the dealer gets a

valuable hand (e.g. a Royal Flush) but not when the dealer gets a worthless hand (e.g. the two of clubs, the five of diamonds, the seven of spades, the nine of hearts, and the queen of clubs). The ability to fix decks alone does not raise the probability that the dealer will get the worthless hand. The player could remedy this problem by attributing to the dealer a fetish for that particular worthless sequence of cards. But that move is no good either, for while it is highly probable that a dealer with such a fetish would deal herself just that sequence, it is highly improbable that any dealer has such a fetish. Likewise, the hypothesis that there exists a designer with the power to design a universe such as ours does not raise the probability of the existence of a universe such as ours unless the designer also has a motive for creating such a universe. Yet building enough of a motive into a non-theistic design hypothesis for it to make the existence of a universe like ours more probable risks driving down the prior probability of that hypothesis.

Unlike many proponents of the design argument, Richard Swinburne takes up the challenge of explaining in detail why God would be expected to create a universe like ours. In his paper he argues that: (i) it follows from God's nature that He will try to bring about a great amount of the greatest sort of good; (ii) bringing about a great amount of the greatest sort of good requires bringing about the existence of free beings; (iii) free beings need an arena in which to develop morally and interact socially; and (iv) this arena requires the creation of a fine-tuned and law-governed universe. Notice, however, that Swinburne begins by working with a theistic design hypothesis rather than a weaker design hypothesis of the sort Behe and others advocate. In giving reasons for expecting a designer to create a universe like ours, proponents of such design hypotheses cannot help themselves to the greater resources the theistic design hypothesis provides.

THE MUCH-MALIGNED MULTIVERSE

Our discussion of the design argument would not be complete without mention of the multiverse hypothesis. "I really do believe that the case for design stands or falls upon whether we can find another explanation in terms of multiple universes," Paul Davies said in a recent interview [Davies 2002]. According to the multiverse hypothesis, there are very many (if not infinitely many) things like the Universe. Though these huge physical systems share certain basic lawful structures (e.g. they all follow quantum-mechanical laws), the free cosmic parameters randomly take different values in the different universes. Given this multiverse, it is unsurprising that at least one universe in the vast ensemble is fit for the production of life. Furthermore, with respect to irreducible complexity and the origin of life, if vastly many universes in the ensemble are fit for life, then the "probabilistic resources" (to use William Dembski's term) for attributing the origin of life and the existence of irreducibly complex biological structures to chance might be inflated sufficiently to render appeal to the design hypothesis unnecessary. Thus the multiverse is (to use another of Dembski's terms) an "inflaton" – "some entity, process, or stuff outside the known universe that in addition to solving some problem also has associated with it numerous probabilistic resources as a by-product. These resources in turn help to shore up chance when otherwise chance would seem unreasonable in explaining some event."

How, exactly, is the multiverse hypothesis supposed to explain fine-tuning? According to the weak version of what physicist Brandon Carter dubbed "the anthropic principle," observers should expect the Universe to meet whatever conditions are necessary for the existence of observers.¹⁰ As Leslie notes, the anthropic principle calls to our attention an "observational selection effect" at work in cosmology – a feature of our methods of observation that systematically selects from only a subset of the set of observations we might have made.¹¹ To take an example from the social sciences, conducting a telephone poll introduces an observational selection effect. The method of telephone polling

guarantees that one's survey will neglect certain segments of the population (e.g. those without telephones). So the multiverse hypothesis, when considered in light of the observational selection effect to which the anthropic principle calls our attention, is thought to provide a plausible naturalistic alternative to the claim that the apparent design in and of the Universe was produced by a supernatural designer. As Martin Rees suggests, "the cosmos maybe has something in common with an 'off the shelf' clothes shop: if the shop has a large stock, we're not surprised to find one suit that fits. Likewise, if our universe is selected from a multiverse, its seemingly designed or fine-tuned features wouldn't be surprising."

As the papers by D.H. Mellor, William Dembski, William Lane Craig, and Roger White indicate, there is considerable hostility towards the multiverse hypothesis. Perhaps the most common reactions to it are that it is *ad hoc* – "a sort of backhanded compliment to the design hypothesis," as Craig claims – and that it is metaphysically extravagant. The only motivation for believing it, goes the first complaint, is to avoid the obvious religious implications of the discovery of fine-tuning. The multiverse hypothesis is alleged to be the last resort for the desperate atheist. According to the second, the multiverse hypothesis violates Ockham's Razor, the philosophical injunction not to multiply entities beyond necessity when giving explanations. Assuming two hypotheses have the same explanatory power, Ockham's Razor dictates that we pick the simpler one. Swinburne and Craig claim the design hypothesis involves postulating a relatively simple entity. A multiverse, on the other hand, is (they claim) a vast, jumbled, arbitrary mess.

Regarding the first common objection, while it is certainly possible that what prompts some proponents of the multiverse hypothesis is a desire to avoid theism, it would be wrong to reject the multiverse hypothesis on that basis alone. The multiverse hypothesis may be false, but the fact (if it is a fact) that its originators developed it and its

proponents defend it in order to avoid believing in God does not make it false. The key question is whether the multiverse hypothesis has independent support. Rees insists it could. The multiverse hypothesis, he says, is scientifically testable; those who deny this on the grounds that other universes are unobservable must explain why hypotheses about objects that lie beyond the detection of current telescopes or that cannot be detected during the current cosmic era are not likewise unscientific. And if there is independent scientific evidence for the multiverse hypothesis, says Rees, who could object to appealing to that hypothesis to explain the fine-tuning of the Universe for life?

Regarding the second common objection to the multiverse hypothesis, we should be wary of measuring simplicity too simplistically and of taking simplicity as the sole criterion of the merit of a hypothesis. The simplicity of a hypothesis is not merely a function of the raw number of entities it posits. The Standard Model in particle physics posits a small number of types of subatomic particle, but of course there are countless tokens (instances) of each of these types. Yet the Standard Model is rightly regarded as a good scientific explanation – one perfectly in accord with Ockham's Razor – because of its symmetry and because it invokes a small number of types. Depending on how it is fleshed out, the multiverse hypothesis, too, could exhibit simplicity in these regards. What multiverse critics need here is a comprehensive account of simplicity and clear, detailed statements of both the design and multiverse hypotheses before they deem the latter metaphysically extravagant.¹² With regard to this last point, sceptics like Narveson will retort that the design hypothesis is hardly simple if it just is the hypothesis that there exists an eternal, personal being of unlimited power, knowledge, and goodness. They find such a being incomprehensibly complex.

An increasingly popular objection to the multiverse hypothesis is that it fails to explain why *this* universe is fine-tuned. The "This Universe" objection is well-expressed by Alan Olding.

...the 'world-ensemble' theory provides no explanatory comfort whatsoever. The situation is this. We have our own universe with planets occasionally, if not always, producing life; and, to escape explaining this fact, we surround it with a host of other universes, most limp and halting efforts and some, perhaps, bursting at the seam with creatures. But where is the comfort in such numbers? The logical situation is unchanged – *our* universe, the one that begat and nourished us, is put together with as unlikely a set of fine-tuned physical values whether it exists in isolation or lost in a dense scatter of worlds. So, then, by itself or surrounded by others, the existence of our universe still cries out for explanation.

[Olding 1991: 123]

Craig, Dembski, Mellor, and Elliott Sober all raise the "This Universe" objection in their papers in one form or another, but it is spelled out in a particularly detailed way by Roger White. He argues that the multiverse hypothesis ("M") merely "screens off" the probabilistic support that fine-tuning lends to the design hypothesis. That is, if there are many universes, then the probability that *this* one is life-permitting will be no greater on the supposition that there is a designer than on the supposition that there is not. To use the notation we introduced earlier, White says

$$P(E|D \& M \& K) = P(E|\sim D \& M \& K)$$

This is because there is no reason, White thinks, why a designer would single out *this* universe (as opposed to one of the others) to be the one that permits life. Despite this, the multiverse hypothesis fails to raise the probability that our universe is fine-tuned and so is not confirmed by the fact that our universe is fine-tuned. To appreciate this point,

suppose for the sake of argument that 1 per cent of all the universes that are possible within the multiverse scenario are such as to permit life, and that, according to the multiverse hypothesis, there are exactly 1,000 universes, all chosen at random from the set of possible universes. White would say that the probability that our universe permits life is still just 1 per cent, because what goes on in the other 999 universes does not affect what goes on in ours. Of course, on this particular multiverse scenario, the probability that *some universe or other* permits life is much higher: 99.99%.¹³ But that is not relevant, White would say.

Dembski gets at the same point when he asks us to consider the hypothesis that there are infinitely many Arthur Rubinstein lookalikes. If we postulate enough such impostors then we can be confident that somewhere in all of reality there is a Rubinstein impostor who by pure luck plunks down his fingers so that Liszt's "Hungarian Rhapsody" is played. How do we avoid the conclusion that the multiRubinsteins hypothesis explains our observing that a person who looks just like Arthur Rubinstein is performing Liszt's "Hungarian Rhapsody"? Dembski says we do this by demanding that our explanation make the performance likely on a local scale. That is, our explanation must make it likely that *this* person who looks like Rubinstein – the person in front of *us* – is performing Liszt's "Hungarian Rhapsody." The best explanation of that fact, Dembski urges, is that the performer *really is* Arthur Rubinstein. The multiRubinsteins hypothesis makes it likely that *some Rubinstein lookalike or another* is (by pure luck) giving a great performance, but makes it no more likely that *this* Rubinstein lookalike is doing so.

Michael Thrush and I [2003] see several problems with the "This Universe" objection. First, the sort of question to which its proponents demand an answer – "Why is *this* universe fit for life?" – is not asked with respect to comparable explanations in terms of great replicational resources. For example, when it comes to explaining the fitness of the

Earth for life, accounts that appeal to the vast number of planets in our universe (and hence the vast number of chances for conditions to be just right) surely are not to be faulted for failing to explain why *this* planet is the fit one. One reason why is that, when we set aside all of the features of the Earth that are essential to its ability to produce living creatures (including relational properties such as distance from the right sort of star), there is otherwise nothing special about it. There *might* have been something special about the Earth. For example, it could have been that only from the vantage point of the Earth could an observer see that the constellations spell out "THIS UNIVERSE IS GOD'S HANDIWORK." But absent such a special feature, there is no motivation for the demand to explain why this planet in particular is fit for life. So why think the "This Universe" objection is any more worrisome than the "This Planet" objection?¹⁴

Furthermore, Thrush and I argue, the "This Universe" objection helps itself to some non-obvious metaphysical assumptions, the most important of which is that the Universe could have taken different values for its free parameters. Yet whether the values of its free parameters are among the essential properties of a universe will depend, we think, on what a given multiverse theory says a universe is. In fairness to proponents of the "This Universe" objection, however, we acknowledge that multiverse proponents are generally silent on the identity conditions of the type of object they postulate. We conclude that much more scientific and philosophical groundwork must be laid before the multiverse hypothesis can rightly be regarded as explaining – or failing to explain – apparent design. Whether cosmic fine-tuning and biological complexity require any explanation at all is a question we leave for the reader.

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¹ Unless otherwise indicated, references to the works of the contributors are to their papers in this volume. Thus when you read that a contributor says so-and-so, take that to mean the contributor says so-and-so in his or her contribution to this book.

² Richard Swinburne's argument is a notable exception to this rule.

³ See Barrow and Tipler [1986: 29] for a definition of 'eutaxiological argument'. Swinburne [1979: ch. 8] provides another good example of the eutaxiological argument when he reasons to the existence of God from the "temporal order" of the world. G.K. Chesterton's story of Elfland [Chesterton 1936: ch. 4] provides another good illustration of the argument.

⁴ To say that the design argument is distinct from the cosmological and eutaxiological arguments, however, is not to say there are no logical connections amongst those arguments. In "The Poverty of Theistic Explanations of the Laws of Nature" (forthcoming in *Philo: the journal of the Society of Humanist Philosophers*) Adolf Grünbaum claims that the theistic design and eutaxiological arguments take as their explanatory framework a theistic cosmological scenario of *creation ex nihilo*. According to the doctrine of *creation ex nihilo*, God is the creator of all logically contingent existing entities and of the laws that those entities follow; no concrete beings and no laws exist independently of Him. If theists are committed to the doctrine of *creation ex nihilo* and if

the design and eutaxiological arguments are arguments for the existence of God, then the picture at work in those arguments cannot be one of God designing or imparting order to an independently existing world – to material for the existence of which He is not responsible. Grünbaum argues that the cosmological argument fails and that, because the theological explanation of the laws is inseparable from the theological explanation of the contents of the world, proponents of the design argument are burdened with the need to support as well the *creation ex nihilo* framework on which their argument depends.

⁵ Throughout this book the term 'the Universe' has been capitalized to indicate it is being used as a proper name for a unique astronomical object. The reason for doing so will be apparent later when we consider the multiverse hypothesis, according to which the Universe is just one instance or token of a particular natural kind. One exception to this rule is the paper by D.H. Mellor; in it he uses 'the Universe' to mean 'everything that exists in some spacetime or other'.

⁶ For a comprehensive history, explication, and defense of Bayesianism, see [Howson and Urbach 1993].

⁷ This is how Paley saw biological design. Throughout *Natural Theology* he appeals to the intricacy of life and the "works of nature," with nary a mention of intelligence or consciousness and with humanity mentioned only with respect to its anatomy. The evidence for Paley's argument would be just as strong were it drawn from cases more than several million years old – well before we humans came on the scene.

⁸ As Leslie points out, one sobering consequence of this view is that cosmic design is compatible with the eventual extinction of our species.

⁹ Hume's Philo makes precisely this point; see [Hume 1779 (1970): 94-5].

¹⁰ The term 'anthropic' misleadingly suggests the principle refers to humans only, as opposed to observers more generally (e.g. Martians, Arcturans, or very smart dolphins); since the term 'anthropic principle' is so entrenched, however, most people who write about cosmic fine-tuning continue to use it.

¹¹ For a detailed and vigorous presentation and discussion of observational selection effects, see [Bostrom 2002].

¹² Swinburne tried to provide just such a criterion of simplicity in his 1997 Aquinas Lecture [Swinburne 1997].

¹³ The probability that at least one of the 1,000 universes permits life is equal to 1 minus $(0.99)^{1000}$ – the probability that none of the 1,000 universes permits life.

¹⁴ On hearing news reports that a lone family in a remote Armenian village survived a devastating earthquake in December 1988 (nearly 50,000 Armenians were killed by that earthquake), a friend of mine said at the time "It's a miracle." When I noted that, given the size of the area, it wasn't unlikely that some family occupied a protected position in a fortified cellar at the time of the quake, she replied "Well, it's a miracle that *they* survived." When I retorted that this was (from her point of view) equivalent to saying "Well, it's a miracle that *the survivors* survived" and that there was nothing the least surprising about *that*, she made a few choice comments about how philosophers ruin everything.