A posteriori arguments for the existence of God can be arranged in an order by the generality of their premises. The cosmological argument argues from the fact that there is a universe at all; one form of argument from design argues from the operation of laws of nature (i.e. that all the constituents of the Universe behave in a law-like way), and another form of argument from design argues from the laws and boundary conditions of the Universe being such as to lead to the evolution of humans, claiming that rather special laws and boundary conditions are required if the Universe is to be human-life-evolving. The normal way in which this latter is expressed is to claim that the constants and variables of those laws and boundary conditions have to lie within very narrow limits in order to be human-life-evolving. This argument is therefore called the argument from fine-tuning. There are, then, many other arguments that begin from narrower premises. The arguments are, I believe, cumulative. That is, the existence of a universe raises the probability of the existence of God above its intrinsic probability, its probability on zero contingent evidence. The operation of laws of nature raises it a bit more, and so on. Counter-evidence, e.g. from the existence of evil, might lower that probability. I have argued elsewhere that the total evidence (i.e. everything we—theists and atheists—agree that we know about the Universe) makes the existence of God more probable than not. My concern in this chapter is solely with the force of the argument from fine-tuning: how much more probable the human-life-producing character of the laws and boundary conditions makes it that there is a God than does the fact that there is a law-governed universe.

By the “boundary conditions” I mean, if the Universe began a finite time ago, its initial conditions, such as the density of mass-energy and the initial velocity of its expansion at the instant of the Big Bang. If the Universe has lasted for an infinite time, I mean those overall features of the Universe not determined by the laws that characterize it at all periods of time—e.g. perhaps the total quantity of its matter-energy. But having made the point that the argument need not depend on the Universe having lasted only a finite time, I shall assume—for the sake of simplicity of exposition—that it has only lasted a finite time, and that it began
with the Big Bang. The argument might prove to be somewhat weaker if the Universe has lasted for an infinite time (because the range of boundary conditions conducive to human evolution would then be wider), but my guess is that it would not be very much weaker. By “the Universe” I mean our universe; and by that I mean the system of physical objects spatiotemporally related to us. (Two things are spatially related if they are at some distance in some direction from each other. Two things are temporally related if they are before, after, or simultaneous with each other. I shall assume that both the relation of being spatially related and the relation of being temporally related are reflexive, symmetric, and transitive.) Any other actual systems of spatially and/or temporally related objects I shall classify as another universe.

I shall understand by a “person” a being with a capacity to have sensations and thoughts, desires, beliefs, and purposes (of a certain degree of sophistication). I shall understand by a “human being” a special kind of person—one with a capacity to learn about the world through perception, and to make a difference (on his own or through co-operation with others) to all aspects of his own life, that of others, and the world, with free will to choose which differences, good or bad, to make. Such a person will have good and bad desires (inclinations)—good desires to enable him to recognize the good, and bad desires in order to have a choice between good and evil. (To be able to choose the good, you need to be able to recognize it, and, if you can, that will give you a minimum inclination to pursue it. But without any desire for the bad, a creature will inevitably pursue the good.)3 I include also in my concept of a human being a capacity to reason, including to reason (in at least a primitive way) about metaphysics, and to have the concept of God. I emphasize that this sense of “human being” as that of a person with all these capacities is not the ordinary sense, but one stipulated for the purposes of this chapter.

We, I and my readers, are essentially persons (if we didn’t have a capacity to have desires, beliefs, etc., we wouldn’t exist), but not essentially humans (we could continue to exist, for example, even if we ceased to have bad desires). I shall assume, however, that we are humans in my sense.4 We are not merely humans but humans with bodies, although on my definition embodiedness is not an essential attribute of humanity. My body is that public object, a chunk of matter through natural processes in which I learn about the world and retain beliefs about it, through natural processes in which I make differences to the world, and natural processes in which cause me pleasant or unpleasant sensations. I learn about the world through light, sound, etc., impinging on my body; I make differences to the world by moving my arms, legs, mouth, and so on. I have no other means of learning about and influencing the world except by using my body, and it is the detailed processes within my body that enable me to perceive and act. Nerves translate the pattern of light impinging on my retina into a pattern of neural firings, which interacts with the neural networks established in
the brain, through previous perceptions and genetically, to yield a new pattern of neural firings, which causes me to have the perceptions I do. Events in my body cause me pleasure or pain. And the purposes that I seek to execute cause brain states that interact with brain states resulting from beliefs about which actions will realize my purposes, to cause the motions of my limbs. A human body is a functioning public object of this kind suitable as a vehicle for human perception and action. A human being embodied involves there being such a public object through which alone that human perceives and acts, and in which alone that human feels. I shall assume that it is logically possible that humans could exist without bodies; and that human bodies could exist and behave as ours do without being the vehicles of human perception and action. We can now characterize the “argument from finetuning” more precisely than I did in my opening paragraph, as the argument from the world being such as to permit the existence of human bodies; and so—if the world contains only one universe—from that universe’s laws and boundary conditions being such as to permit the evolution of human bodies, public vehicles which make possible human perception and action.

An argument from fine-tuning will be a strong argument to the extent to which it is not too improbable that there should be such fine-tuning if there is a God, but very improbable that it should exist if there is no God. In attempting to compare these probabilities, I shall, for the sake of simplicity of exposition, assume that the only God up for consideration is the traditional theistic one. I shall not consider the possibility of evil gods or lesser gods, my reason being one for which I have argued elsewhere—that hypotheses that such beings exist are more complicated hypotheses than the hypothesis of the existence of the God of traditional theism, and so have lower prior probabilities than the latter. The God of traditional theism, as I construe it, is a being essentially eternal, omnipotent (in the sense that He can do anything logically possible), omniscient, perfectly free, and perfectly good.

Why a world with human bodies is likely if God exists

So what sort of a world will God’s perfect goodness lead him to make? An omnipotent God can only do what is logically possible; one thing, for example, which it is not logically possible for God to do is both to create creatures with a libertarian freedom to choose between two alternatives, and at the same time to determine how they will choose. So our question must be—in so far as it is logically possible for God to determine what sort of a world there shall be, what sort of a world will He bring about? A perfectly good being will try to realize goodness as much as He can. So in so far as there is a unique best possible world, God will surely make it. If there is no one best of all possible worlds but a number of incompatible equal best worlds, He will surely make one of them. But if every possible world is less good than some other incompatible possible
world, all that He can do in virtue of His perfect goodness is to create a very good world. In any of these cases, the goodness of a world may be greater for including some bad aspects or the possibility unprevented (by God) of some bad aspects. God will therefore necessarily create any state of affairs that belongs to any best of all possible worlds, or to all the equal best possible worlds, or to all the good possible worlds. But what can we say about the certainty or probability of God bringing about some state of affairs that belongs only to some of the equal best possible worlds, or to some members of the series of ever better worlds? I suggest that it follows from His perfect goodness (as explicated above) that if it is better that a state of a certain kind exist than that it should not (whatever else is the case), then God will bring about a state of that kind; and if it is as good that a state of a certain kind should exist as that it should not (whatever else is the case) then there is a probability of 0.5 that God will bring about a state of that kind. For states of a kind that belong to a series, each less good than the next, where their relative goodness can be measured, it will be enormously probable that God will bring about a state greater than any one you care to name. That is because there will be an infinitely larger range of states above that state than below it. Perfect goodness that cannot produce the best will very probably be very generous.

Now God, being essentially perfectly good, cannot but choose the good; He has no free choice between good and evil. But it is plausibly a good thing that there shall be beings that have this great choice, and the responsibility significantly to benefit or harm themselves, their fellows, and the world. We recognize this as a good when we ourselves have children and seek to make them free and responsible; and there would seem to be good in God creating free creatures with a finite limit to the amount of harm they can do to each other. Yet this good carries with it a risk of much evil. Any significant degree of freedom and responsibility will involve a significant risk of much harm being done; and God must—I suggest—impose some limits on the possible harm that creatures can do to each other (e.g. a limit constituted by creatures having a short finite life). Whether a perfectly good God will create such creatures (even within the limits of the harm they can do to each other) must depend on the extent of responsibility to be possessed by the creatures and the degree of risk of their misusing it; and the exact weighing-up of the moral worth of the different states that God must do is not easy for us to do. But, to oversimplify vastly, I suggest that, because of the risk of the evil that might result from significant freedom, any world in which creatures have significant freedom (within certain limits) would be as good as the same world without a state of this kind, whatever else might be the case—in which case, there would be a probability of 0.5 that God would create such a state. But the complexities are such that perhaps all that one can reasonably say is that since freedom and responsibility are such good things, then there is a significant (say between 0.2 and 0.8) probability that God will
create a world containing such creatures. Such creatures I have called human beings.

If creatures are to have significant responsibility for themselves and for others, they must be able to affect their own and each other’s mental lives of sensation and belief. They need to be able to cause in themselves and others pleasant or unpleasant sensations, investigate the world and acquire true beliefs (which I shall call knowledge), and tell others about it. But significant responsibility involves also a capacity for long-term influence over those capacities themselves. They must be able through choice to influence the capacities of themselves and others to acquire these beliefs and cause sensations, to influence what they find pleasant or unpleasant, and to influence the ways (for good or evil) in which they are naturally inclined to use their powers. They must thus be able to help each other to grow—in knowledge, factual and moral; in the capacity to influence things; and in the desire to use their powers and knowledge for good. And they must also, in order to have significant responsibility, be able—if they so choose—to restrict their own and each other’s knowledge, capacities, and desire for good. So creatures must start life with (or acquire by natural processes) limited unchosen power and knowledge and desires for good and bad, and the choice of whether to extend that power and knowledge and improve those desires, or not to bother. And if that choice is to be a serious one it must involve some difficulty; time, effort, and no guarantee of success must be involved in the search for new knowledge, power, and improved desires. So creatures need an initial range of basic actions. (Basic actions are intentional actions that we just do—that we do not do by doing any other action. I may kill you by shooting, shoot by pulling the trigger, and pull the trigger by squeezing my finger. But if I don’t squeeze my finger by doing any other intentional action—whether or not things of which I may have no knowledge have to happen in my body if I am to perform that intentional action—squeezing my finger is a basic action.) We may call the kinds of effects that a creature can (at some time) intentionally bring about by his basic actions his region of basic control. Creatures need an initial region of basic control, and creatures need, too, as we have noted, an initial range within which they can acquire largely true beliefs about what is the case. Let us call the kinds of such beliefs that a creature can acquire his region of basic perception. Creatures need an initial region of basic perception. The region of basic perception will have to include the region of basic control. For we cannot bring about effects intentionally unless we know which effects we are bringing about.

Extending our region of control beyond the basic region will involve discovering (that is, acquiring true beliefs about) which of our basic actions will have further effects. For the possibility of a large extension of our region of control, it needs to be the case that our basic actions will have different effects beyond the basic region that vary with the circumstances in which they are done.
What these circumstances are must themselves be alterable by our basic actions; and if we are to affect the region of control of others, we must be able to alter the circumstances in which those others are to be found. Effects “beyond” the basic region mean in some sense effects more “distant” than it; and altering “the circumstances” involves in some sense “movement.” We can learn what effects we have when we change circumstances if our region of basic perception moves with our region of basic control—though that may not always be necessary if the former region is much larger than the latter region. We can learn how to produce some effect in another room by moving into the room, and when we are there (but not here) we can see the effects of our actions there—our region of basic perception has moved with our region of basic control. But we can learn how to hit some distant person with a stone without altering our region of basic perception, for it is large enough for us to discover without moving the effects of throwing stones in different ways. The region of our control may be increased not merely by movement at a time, but also by discovering by previous movements what distant effects some kind of basic action normally has. By going to see where our bullet lands when we fire our gun at different angles, we can learn the distant effects of firing a gun at different angles and in this way, again, extend our region of control. And the region of perception may be increased by discovering (through previous movement) which basic perceptions are normally evidence of more distant phenomena. We can learn to see things far away through a telescope where we have discovered (through going to see) the correlation of things a little way away with their images in the telescope, and extrapolating from that to a similar connection between their images in the telescope and things at a great distance. Control may be widened so as to include events well in the future; and perception may be widened so as to include events well in the past.

So, in order to have significant freedom and responsibility, humans need at any time to be situated in a “space” in which there is a region of basic control and perception, and a wider region into which we can extend our perception and control by learning which of our basic actions and perceptions have which more distant effects and causes when we are stationary, and by learning which of our basic actions cause movement into which part of the wider region. If we are to learn which of our basic actions done where have which more distant effects (including which ones move us into which parts of the wider region), and which distant events will have which basically perceptible effects, the spatial world must be governed by laws of nature. For only if there are such regularities will there be recipes for changing things and recipes for extending knowledge that creatures can learn and utilize. So humans need a spatial location in a law-governed universe in which to exercise their capacities, and so there is an argument from our being thus situated to God.

Now, if humans are not merely to find themselves with beliefs about each other’s beliefs and purposes (which they will need to do if they are to be able to
influence them), but are also to be able to choose to learn about each other’s beliefs and purposes and to communicate with them in the public way needed for co-operative action and co-operative rational discussion (which will involve language), then they need to be able to re-identify humans. That means that there need to be public objects—human bodies—which they can re-identify and the behavior of which manifests their beliefs and purposes. Those bodies need to behave in such a way that the simplest explanation of their behavior is often in terms of some combination of belief-and-purpose. In consequence, for example, we must be able to attribute to each other (on the grounds of being the simplest explanation) beliefs sensitive to input, e.g. beliefs that some object is present when light comes from that object on to their eyes, and purposes that—although not fully determined by brain states—do show some constancy We can, for example, only come to understand the language of another human if we assume that he normally seeks to tell the truth, that he has some language constant over time by which he expresses his beliefs, and that his beliefs are often sensitive to incoming stimuli in the ways our own are. We then notice that he says “*il pleît*” when input to his eyes and ears is caused by rain, and so infer that he means by “*il pleît*” “it is raining.”

This public communication of a kind that can be learned and refined can be achieved, as it is achieved in our world, by our having spatially extended bodies formed of constituents, some of which are stable (and so permit a continuing organized body) and some of which are metastable (i.e. change their states quickly in response to new input, e.g. of sensory stimuli) and so store new memories. Given such constituents, there can be machines sensitive to input that produce an output (out of a large variety of possible outputs), which is such as—given the input—will more probably attain some goal than will any other output. That allows us, if we thought that the machine was conscious, to attribute to it the belief that the means being used would attain the goal, and to attribute to it the purpose of attaining the goal. Given stable bits and metastable bits such machines can be constructed, and can—plausibly—occasionally arise, through endless reassembling of the bits. All this, though, does not ensure that there are humans embodied in these bodies, but only if humans have extended bodies of this kind rather than any other will they be able to have public knowledge about each other and public communication with each other of a kind that they can learn and refine.

But if humans had only spatial location and not extension, they would have just “particle-bodies.” Some of the constituents of the physical world would be then “particle-bodies,” and it is they (not combinations of them) that would need to exhibit the requisite input-output behavior that would be required to understand other humans.

It would be good that we should have the power not merely to extend the region of our control and perceptions beyond the basic, but also that we should
have the power to extend or restrict (or prevent being restricted by others or by natural processes) the region of basic perception and control (including the ability to move) itself of ourselves and others, and the pleasant or unpleasant sensations that we have. There need to be basic actions that we can do, or non-basic actions that we can learn to do, which under various circumstances will make differences to our capacities for basic action and perception, and to our sensations. That involves there being natural processes that we can discover and so affect, which enable us to perform our basic actions, to acquire and retain in memory basic perceptions, and to diminish or increase pain or pleasure. And if these processes are to be manipulable not merely by the human whose they are, but by other humans as well, they must be public processes. The obvious way in which our capacities for basic action and perception can depend on public processes is again by our having a spatially extended body.

We actual humans do have a range of basic control: it is what we can do with our limbs, mouths, and tongues—"just like that," not by doing anything else. The region of basic control varies with the age of a human; it increases and then decreases again with time, even unhelped by other humans (how fast we can move our arms and legs does not depend too much on learning or help from others). But we can discover or be taught how to increase that region of control in many respects—above all, to influence others by uttering sentences of a language. And we have a range of basic perception—increasing or decreasing with the age of a human independently of intentional action. Recognizing inanimate objects is a perceptual capacity that develops without much help; learning to understand people’s words needs more by way of help from others. We learn by our basic actions to hurt or benefit others, to use tools, build houses, or cut down trees. We utilize principles of what is evidence for what to detect the previous presence of others from footprints and remains of fires, and to detect the passage of elementary particles from tracks in cloud chambers. Through our growth of knowledge and control, we learn how to cause pleasure and pain, to give knowledge and control to others or to refuse to do so. We can allow ourselves to get into situations where it is difficult to do good, and so fall into bad habits—or, alternatively, prevent this happening. And, through learning, we can acquire the ability to influence the ways in which others are naturally inclined to use their powers—we can educate them morally or immorally.

But, as well as learning how to extend the region of control and perception (of ourselves and others) beyond the basic, we can also learn how to extend or restrict (or prevent being restricted) the region of basic control and perception itself. By starving ourselves or others, we can restrict basic abilities and perceptual capacities; as we can by cutting off arms or tongues or eyes. In ways unintended by us or others, our powers may diminish through disease, and we can learn to prevent the effects of disease by using medicine and surgery; or we can not bother to take the trouble to discover how to do so. And our present
capacities to affect our basic capacities and perceptual powers seem fairly small compared with what medical science will surely provide for us in the course of the present millennium. Medical intervention will surely enable us even within the next century to grow new limbs and sense organs, and to slow down memory decay. Having a body thus involves the surface of mind-brain interaction lying within the body (i.e. in the brain); it also involves events elsewhere within the body affecting what we basically perceive and how we can act basically. Having a body thus allows us to diminish or extend the basic capacities and perceptual powers of each other, or to prevent such diminution being produced by natural processes. With such powers we have very much more substantial power over each other than we would have otherwise.

It would also be possible for our basic capacities for perception and action to depend on public processes if we had a “particle-body.” The public processes would then need to consist of temporally extended input to a spatially unextended object. The latter would be like a totally impenetrable black box. We would discover how to improve or damage our sight, or weaken or strengthen our memories, by giving a certain input to the box over a long period of time. But the box could not be opened; indeed, it would have no spatial extension. Our memories would not then depend on a brain; they would depend on input over time that affected memory by action at a temporal distance (as far as the physical was concerned—there could be processes within the “mental” realm, the “soul,” which the physical input affected and on which the mental life more directly depended). This would provide a less immediate kind of embodiment—for the dependence of the mental on the physical would not be instantaneous. But it might seem, nevertheless, to be an alternative way in which humans could have the ability to affect their and each other’s basic capacities without the normal kind of embodiment.

So if humans are to have the great goods of being able to learn to communicate with each other and of being able to extend or restrict the range of their basic perception and control, human embodiment needs more than spatial location in an orderly world. Humans need to have extended bodies, made of stable and metastable constituents, or alternatively particle-bodies of special kinds.

I suggested earlier that if God brings about the world there is a significant probability (say between 0.2 and 0.8) that He will bring about an orderly, spatially extended world in which humans have a location. This is because He has a reason for giving to humans responsibility for themselves and each other. I have now argued that if humans are to be able publicly to learn about each other (or choose not to do so), and co-operatively to affect their and each other’s basic capacities for action and perception, the embodiment will have to be of a more specific kind; and this means that some universe must have laws and conditions allowing the existence of constituents, either of the stable and metastable kind
permitting the occurrence of (spatially extended) human bodies, or particle-like ones of a kind that would evince patterns of stimulus and response interpretable in terms of purpose and belief. Either way, the bodies must not be totally deterministic in their behavior, and probably there would be some scope for reproduction. Perhaps it is somewhat more risky for God to give to humans the more significant kind of responsibility involved in embodiment. Yet the harm they are likely to do to each other does not seem to be greatly increased. (It is less in the respect that they have to choose to learn how to harm rather than being born with the knowledge; but greater in the respect that, if they acquire the knowledge, they can harm each other’s basic capacities.) And, above all, surely a God who created creatures capable of choosing freely to love each other (as these with their good and evil desires etc. would be) would make them capable of entering into a loving relation with H...
Why a world with human bodies is unlikely if there is no God

Now what is the probability of there being human bodies, or human “particle-bodies” with the required properties, if there is no God? While science is as yet in no position to discuss the probability of the occurrence of some of the features of extended human bodies (such as the ability to exhibit the physical correlate of moral awareness), it can discuss and has discussed the necessary conditions for the existence of bodies with most of the features required for human bodies. We saw earlier that extended bodies require stable and metastable constituents. It seems to be generally agreed that given the kinds of law presently believed to be operative in our Universe (the laws of quantum theory, the four forces, etc.), the constants of laws of nature and the values of the variables of the initial conditions needed to lie within very narrow limits if such constituents were to evolve. If the initial velocity of the Big Bang had been slightly greater than the actual velocity, stars and thus the heavier elements would not have formed; if it had been slightly less, the Universe would have collapsed before it was cool enough for the elements to form. And there had to have been a slight excess of baryons over antibaryons. If the proportion had been slightly less, there would not have been enough matter for galaxies or stars to form; and if it had been greater, there would have been too much radiation to allow planets to form. 11 Similar constraints would apply to a universe that had a beginning of a less concentrated and violent kind than our universe seems to have had. An everlasting universe would also have to have features additional to the values of the physical constants mentioned, if planets and the heavy elements were to be formed at any time at all—although these constraints would be less than the constraints on a universe with a beginning.

It may be that the kinds of postulated laws for which the fine-tuning of initial conditions at the time of the Big Bang would be required will prove mere approximations to the true laws for which far less fine-tuning of their conditions would be required. One could postulate laws that would yield values for the expansion of the Universe after a few seconds, and thus to the evolution of planets and the heavy elements, starting from more or less any initial conditions. But for those laws to fit all our other data, they would probably have to contain some very fine-tuned constants, even more finetuned than if you suppose rather special initial conditions. The “inflation” hypothesis, in its many variants, looks as though it might be successful in removing the need for fine-tuning from the initial conditions only by putting it into the laws. 12 But maybe it won’t turn out that way, and the inflation hypothesis will reduce somewhat the need for fine-tuning.

More deeply, it may prove that those laws that we presently believe to be fundamental are derivative from more fundamental laws which have the consequence that the values of one or two of the physical constants of the former
laws uniquely constrain the values of all the others; and that the true fundamental laws permit only a restricted set of boundary conditions. In that case, the need for the “fine-tuning” of values of constants and variables in a literal sense would be much diminished. But it would remain the case that the Universe needed to be “fine-tuned” in the very wide sense that rather special laws and boundary conditions were required if the Universe was to be life-evolving. It will be evident that many possible universes with laws of a kind different from our own would not be hospitable to embodied creatures, whatever the constants of their laws—for example, a universe in which all atoms lasted for ever and the only forces were forces of repulsion between them. Other universes (say, universes with seven kinds of force instead of four) could still be hospitable, but only given certain values of the constants of their laws.

So what are the principles for determining the prior probability, that is, the probability on solely a priori grounds (which I call the “intrinsic probability”), of a universe governed by laws having laws and boundary conditions that are life-evolving? Laws and boundary conditions of universes have intrinsic probabilities that vary with their simplicity, and so do ranges of laws. That must be the case, because if they did not then, any hypothesis (however complex and ad hoc) about the nature of our universe that predicted what we have observed so far would be equally probable on the evidence of observation. That is clearly not so, and hence a priori factors enter into the assessment of the probability of hypotheses on evidence. These factors, I have argued, are scope and simplicity. The “scope” of a hypothesis is a function of how much it tells you—how detailed are its claims about how many objects; but, as all hypotheses about the laws and boundary conditions of universes will have the same scope, we can ignore this factor. Simplicity alone will determine the intrinsic probabilities of universe-explaining hypotheses. A full study of the criteria which are used, and we think it right to use, to judge the relative probabilities of hypotheses of equal scope that have had equal success in their predictions so far (when there is no other empirical evidence, or “background evidence”) should make it possible to develop a set of criteria for how simplicity determines intrinsic probability.

Note that the same laws of nature can be expressed in innumerable logically equivalent forms. The criteria for determining the simplicity of a hypothesis are criteria for determining its simplicity by means of the simplicity of its simplest formulation—that is, the one in which the variables designate properties as close as can be to being observable, and the equations connect these by fewer laws involving fewer terms in mathematically simpler, i.e. more primitive, ways. It will in general be the case that these criteria have the consequence that a hypothesis so formulated in which the constants and variables lie within a certain range will be as probable intrinsically as one in which the constants and variables lie within a different range of equal length. That is, the density of the intrinsic probability of values of physical constants and variables of boundary conditions
is constant for hypotheses of a given kind (i.e. which vary only in respect of these constants and variables).\textsuperscript{15}

It is beyond my ability to calculate, using these criteria, what is the intrinsic probability that a universe belongs to the set of possible universes hospitable to embodied humans, and—I suspect—it is beyond the ability of any presentday mathematician to calculate this. But the problem seems well defined, and so hopefully is one that can be solved by some mathematician of the future. Given that solution, we would then have a precise proven answer to the question of the prior probability of a sole universe being fine-tuned (in the wide sense). In the absence of a proven solution to the problem of what is the intrinsic probability that a universe belongs to the set of possible universes hospitable to embodied humans, we must conjecture. I suggest that there is no reason to suppose that universes with our kinds of laws and boundary conditions are untypical in the respect that only a minuscule range of them, given probabilities in virtue of their intrinsic natures that I explicate as the relative simplicity of their laws and initial conditions, are fine-tuned.

But, atheists have suggested, perhaps there are very many actual universes; in which case, it would not be surprising if at least one of them was fine-tuned. But to postulate a large number of such universes as a brute uncaused fact merely in order to explain why there is a fine-tuned universe would seem the height of irrationality.\textsuperscript{16} Rational inference requires postulating one simple entity to explain why there are many complex entities. But to postulate many complex entities to explain why there is one no less complex entity is crazy. In terms of probability, this is because the intrinsic probability of there existing a large number of universes uncaused is vastly less than the intrinsic probability of there existing one universe uncaused. If the atheist is to claim that a fine-tuned universe exists because there are innumerable universes of different kinds, what he needs to do to begin to make his claim plausible is postulate a mechanism producing universes of all kinds, including the occasional fine-tuned one.

Let us look at this hypothesis of a “mechanism” in a little more detail. It could be the suggestion of a law operating by itself, dictating the continued coming-into-being of new universes of different kinds. But this is not a kind of “explanation” that we can recognize as such. Scientific explanations by means of laws require states of affairs on which the laws operate in order to produce new states of affairs (or to prevent the occurrence of certain kinds of states). “All copper expands when heated” has no effect on the world unless there is any heated copper. Apparent exceptions, like conservation principles, are really limitations on how states can evolve; they have no consequences by themselves for what exists. (Indeed, in my view, laws of nature are simply generalizations about the powers and liabilities of existing objects. But I don’t press that point here.) There are, it seems to me, two alternative ways to make the hypothesis of a universe-generating mechanism intelligible. One is to suppose that there is a
master-universe governed by the law that it generates daughter-universes with innumerable different laws and initial conditions, either at a first instant or continually. The other is to suppose that there is a law governing all universes, that each old universe generates many new universes all with different laws and initial conditions (but including the law of generation, in most cases). In each case the new universe would be related temporally, though not spatially, to its parent. These hypotheses seem to me coherent. They also seem to me far less simple than the rival theistic hypothesis, which explains the existence of our universe by the action of God. An atheistic hypothesis needs to have a very detailed law ensuring the diversity of universes that result; it would need to have a certain form rather than innumerable possible other forms, and probably constants too that need fine-tuning in the narrow sense (and maybe universes with initial conditions of certain kinds on which to operate) if that diversity of universes is to result. That the law was just like this would be the atheist’s brute fact. Theism simply postulates infinite degrees of the four properties (power, knowledge, freedom, and temporal extension), some amounts of which are essential for persons to be persons, and all else then follows (with significant probability). The detailed atheistic law will have to state that while matter on a universe scale produces other universes, matter within each universe never produces more matter (governed by different laws)—for we do not find any such process of matter generation within our universe. There is no process at work in our universe throwing up little regions not governed by quantum theory. The law has to postulate kinds of processes at work on a large scale that do not operate on a small scale, and is thus complicated in confining the range of its processes. Theism, by contrast, postulates the same kind of causality at work in creating the Universe as we find on a very small scale within the Universe—intentional causality, by agents seeking to bring about their purposes seen in some way as a good thing. And if the universe-generating hypothesis took the form that all universes generate new universes, we’d need an explanation of why the beginnings of such a process have not so far been observed within our universe.

However, if we do postulate a universe-generating mechanism, it is to be expected that there will be at least one fine-tuned universe, and so a universe containing human bodies. But there is no particular reason why we, persons, even if we are human beings in the sense defined at the beginning of the chapter, should find ourselves in such a universe. Human beings could exist in any orderly universe at all, although they could only have bodies in a fine-tuned universe. In other universes we could have a location on a particle (though not a particle-body in the sense defined earlier) and have a range of control and perception that we could increase through learning, though our doing so would not be dependent on the operation on any process within the particle. The particle itself would be the locus of mind-body interaction. We could not learn about the purposes and beliefs of others by studying their public behavior, but we could
perhaps find ourselves believing that some particles were controlled by other humans; or perhaps we would be solipsists. Furthermore, even if we persons had bodies, we need not be humans in the sense defined at the beginning of this chapter and thus find ourselves in a fine-tuned universe. For being humans, as I defined it, includes having moral beliefs and being able to exert significant influence on ourselves and each other for good or ill (and also having a capacity for conceiving God). We might be encased in hard shells and be unable to cause pain or pleasure to each other; there might be an abundant supply of food and everything else we wanted and so no possibility of depriving others of anything; we might have fixed non-moral characters; and we might not be able to produce descendants—let alone influence them for good or ill. Our universe has all the features God might be interested in giving to some conscious beings, and it has them in a very big way. In our universe the scope for growth of knowledge and control is enormous compared with many a fine-tuned universe. A universe is still fine-tuned, for example, even if it gives rise to only one generation of humans with no power to influence future generations. In our universe humans can influence their children, grandchildren, and many future generations (e.g. by affecting the climate in which the latter live, and the availability to them of raw materials). Our universe is also untypical in that the kind of orderliness that makes possible the evolution of human-like beings is characteristic not merely of a small spatial region and of a small temporal region, but also of every observable part of an enormous universe over a very long period of time. If it is good that God gives us some freedom and responsibility, and degrees of freedom and amounts of responsibility can be measured, and the goodness of God’s gift is proportional to the measure, it follows from an earlier result that even if there is no limit to the amount which He could give us and that the more, the better, He will very probably give us a lot (within limits of the harm we can do to particular individuals, such as the limits provided by the length of a human life). But on the atheist hypothesis, we are very lucky to have any descendants at all. So the atheistic generating hypothesis, as well as not being very simple, is pretty poor in predicting the particular features of our universe. Given all these other possibilities, the probability, bared on the hypothesis of a universe-generating mechanism, that a given human being would find itself in a fine-tuned universe would be small. So if there is a better explanation of why the Universe in which we are situated is fine-tuned, we should prefer that. Theism provides that in a way sketched in the first part of this chapter, for it gives a reason why God should put us in a fine-tuned universe (and is not in any way committed to there being any other universes).

Similar results follow, I suggest, with respect to the possibility of humans being embodied in “particle-bodies.” Special kinds of law would be required for these bodies to be such that other humans could infer from their behavior what are the purposes and beliefs of the embodied humans, and to be able to influence
their basic capacities. As far as I know, no detailed mathematical work has been done on what, by way of fundamental laws and initial conditions, would be required for this; and so the great improbability of such a state of affairs is a conjecture. But it is a reasonable conjecture, if only for the reason that no possible universe currently investigated by physicists could contain any such states. In none of them are particles sensitive to streams of stimuli over time in such a way that we can attribute beliefs and purposes to them. By arguments similar to those given earlier with respect to ordinary bodies, a universe-generating mechanism would need to be of a certain complex and so somewhat improbable kind to throw up a universe containing particle-bodies of the kind discussed. And, again, even if it did, there is not much probability that we humans would find ourselves in such a universe—since, whether as humans or not, we could exist in many other universes.

I conclude that while it is significantly probable that there would be a universe fine-tuned for the occurrence of human bodies or “particle-bodies” if there is a God, it is not at all probable that there would be such a universe if there is not a God. Hence “fine-tuning” (in the sense in which I have defined it) contributes significantly to a cumulative case for the existence of God.

Notes

1 This chapter meets various deficiencies in my previous account of this matter—“Argument from the fine-tuning of the universe,” first published in Leslie (1989) and (in large part) republished as Appendix B to Swinburne (1991). I am most grateful to Dr Pedro Ferreira for guidance on the physical theories discussed in this chapter.

2 See Swinburne (1991) and Swinburne (1996).

3 For argument in defense of this claim, see (e.g.) Swinburne (1994:65–71).

4 The only controversial element in this assumption is that we have libertarian freedom—that is, the uncaused freedom to choose between alternative actions, given the state of the world (and in particular of our brains) in all its detail at the time of our choice. I give a (probabilistic) argument in favor of this in Swinburne (1997: Ch. 13).

5 It seems fairly obvious to many people that there is no logical inconsistency in supposing that they could exist without their bodies, or that their bodies could exist as robots unconnected with any conscious life. For detailed defense of this claim and generally of my substance dualist view of the nature of humans, see Swinburne (1997).

6 For my claim that polytheism is a more complicated hypothesis than traditional theism, see Swinburnae (1991:141). My grounds for holding the hypothesis of an omnipotent evil deity to be more complicated than traditional theism are that (see note 7) perfect goodness follows from omniscience and perfect freedom, and so one or other of knowledge or freedom would need to be limited in an omnipotent
evil deity—which would make the hypothesis more complicated than traditional theism.

7 For analysis of what it means to say that God has such properties, and a demonstration of how the divine properties fit together, see Swinburne (1993) and Swinburne (1994: Chs 6 and 7). For the argument that perfect goodness follows from omniscience and perfect freedom, see Swinburne (1994:65–71, 134–6).

8 In Plantinga’s terminology, the question is what kind of a world God will “strongly actualize” (1974:173). I use the word “world” to include all that exists apart from God, and its way of behaving—whether (in part or totally) indeterministic or determined by its intrinsic powers and liabilities to act codified in natural laws. A world may or may not include many universes. Possible worlds are, however, to be individuated, as stated in the text, only by those features that it is logically possible for an omnipotent being to bring about. In this terminology (which is not standard) a world counts as a possible world if God given only His omnipotence and not His other properties could bring it about. There are, therefore, possible worlds that God could not bring about in virtue of His other properties—e.g. in virtue of His essential moral goodness.

9 I owe this suggestion to Joseph Jedwab and Tim Mawson.

10 And—I should add—if humans are to reproduce in such ways that their characteristics are in part inherited (through some DNA-like constituents).

11 For full details of constraints on physical constants and initial conditions, see Barrow and Tipler (1986), especially Chapters 5 and 6.

12 For the suggestion that the inflation hypothesis does not solve the alleged problems that it was devised to solve, without it becoming quite unnaturally complex, see Earman and Mosterin (1999).

13 It is possible that the derivation of the fundamental laws of nature from string theory would greatly reduce the need for fine-tuning. This has been argued by Kane et al. (2000). They suggest that all string theories are equivalent, and different possible “vacua” uniquely determine all the constants and initial values of the variables of laws of nature. They acknowledge that much work needs to be done before (if ever) string theory is established and their result can be demonstrated. But, even granted all this tentative speculation, they acknowledge that “there will be a large number of possible vacua”; and that means both having string theory rather than any other fundamental laws and requiring special variables of initial conditions.

14 For an attempt at an analysis of the various facets that determine the relative simplicity of hypotheses, see Swinburne (2001: Ch. 4).

15 My insistence that the probability of a constant or the value of a variable lying within any interval of the same length of possible values thereof be the same (and thus there be a constant probability density distribution) and be determined in respect of the laws in their simplest and so most fundamental form avoids versions of Bertrand’s paradox. To take a very simple example of the problems that might otherwise arise—Newton’s law of gravitational attraction $F=G \frac{mm’}{r^2}$ could be expressed as $F=mm’/d^3r^2$, where $d$ is defined as $G^{-1/3}$. A constant probability density distribution for $d$ will not yield a constant probability density distribution for $G$, and conversely. Expressing the laws of nature in very complicated forms, logically equivalent to their simplest forms, and assuming a constant probability density for the constants and variables of these forms, could have the consequence
that much greater variations of these (much less “fine-tuning”) would be required for the Universe to be human-life producing. But laws are judged simpler and so to have greater prior probability in virtue of the features of their simplest forms. Since a constant is simpler than a constant to the power \((-1/3)\), the traditional form of Newton’s law is the simplest and so most fundamental form. And, more generally, insistence on the simplest form of a law should yield a unique probability density distribution for the constants and variables of laws of that kind (or, at most, if there are a number of equally simple forms of a law, a few different probability density distributions that should not make much difference to the extent of the need for fine-tuning).

16 However, some writers have proposed just this. For example, Tegmark says:

Our TOE [Theory of Everything]…postulates that all structures that exist in the mathematical sense…exist in the physical sense as well. The elegance of this theory lies in its extreme simplicity, since it contains neither any free parameters nor any arbitrary assumptions about which of all mathematical equations are assumed to be “the real ones”.

(1998:38)

He explicitly assumes an account of simplicity according to which a theory is simpler the fewer the number of computational symbols needed to express that theory (Tegmark 1998:44). This “algorithmic” account has the consequence that, for example:

the set of all perfect fluid solutions to the Einstein field equations has a smaller algorithmic complexity than a generic particular solution, since the former is specified simply by giving a few equations and the latter requires the specification of vast amounts of initial data on some hypersurface.

(Tegmark 1998:44)

So it is simplest of all to postulate that every possible universe exists, since that needs very few computational symbols indeed to state!

This seems to me a bizarre account of simplicity, totally out of line with our inductive practice. If we are postulating entities to explain phenomena, we postulate the fewest number of entities (possessing some causal interconnectedness) needed for the job. (For a more detailed criticism of the “computational” account of simplicity that Tegmark is using, see Additional Note F in Swinburne (2001). And just how seriously is Tegmark taking “every possible universe”? The only ones he discusses are governed by natural laws, and he assumes that persons are embodied. But there is a vast infinity of possible universes in which neither of these conditions is satisfied. And the possibility of our being disembodied and/or being non-human persons has the consequence that
we (particular individuals—you, me, and Tegmark) could have existed in innumerable universes that are not in my sense “fine-tuned.” But it is not logically possible for an actually embodied individual to exist in more than one universe at a given time? So why do we exist in a fine-tuned universe? For Tegmark, that must be just something very improbable. The theist can explain this in terms of the goodness of our existing as embodied humans along the lines developed earlier in this chapter.

References


