

THE ARGUMENT FROM DESIGN

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The argument from design for God's existence is involved with important questions about the conditions under which it is reasonable to believe that a state of affairs was brought about intentionally. In this paper I shall offer a version of the argument and defend it, if not quite in the sense of trying to show conclusively that it succeeds, then, at least, in the sense of trying to show that it deserves to be taken seriously. In Part I, I shall present a number of objections to the argument that, for the most part, are quite well known and, I think, quite weighty. Most are descendants of objections to be found in the writings of David Hume.¹ Then, in Part II, I shall present the specific version of the argument I wish to offer here and, finally, in Part III, try to show that it does not succumb to the objections raised at the start.

Part I

At the beginning, I would like to distinguish two sorts of argument from design. Arguments of both sorts start with the fact that many natural phenomena look as if they might have been produced by design and try to show that such phenomena really were designed, and from this they hope that it will be concluded that the universe as a whole was produced by the intentional actions of a single being. But then, the arguments conclude, since the universe appears to be good, and since it would take an extraordinarily wise and powerful being to design and create it, the universe must have been created by a wise, powerful, and good being, and this is God. Now I think it is clear that any argument of this type will face difficulties when it tries to conclude, from the claim that many natural phenomena were designed, that the universe as a whole was produced by the design of a single being. For it seems possible that the universe itself was not a product of design, even if many important parts of it were, and, further, even if we are willing to grant that the universe as a whole was designed, it still will not follow that it was created by the design of a single being.

This, however, does not seem to be the most serious objection facing the argument from design. For one thing, even if it is granted, the objection will not rob the argument entirely of its power. It would be a significant achievement to prove that certain natural phenomena were results of intentional action, even if one could not prove that the entire universe was created by a single being, and this achievement, by itself, would be enough to show that something was seriously wrong with the atheist's standard picture of the universe. Also, though, even if a demonstration that important portions of the universe were created by design would not actually entail the hypothesis that God exists, it would seem that, nonetheless, it would render that hypothesis more plausible than any competing one. In a contest with polytheism, monotheism is likely to prevail, and one who comes to hold that many natural phenomena were created intentionally probably will come to believe in God. This objection, then, does not seem to me to be a crucial one, and I shall not deal with it further in what follows. Instead, I shall be concerned with attempts by arguments from design to show that certain features of the natural world are products of design, and it is in the ways that they try to do this that the two sorts of argument I wish to distinguish here differ.

Arguments of the first of the sorts I want to discuss are true analogical arguments. One begins by pointing to ways in which certain natural phenomena resemble human artifacts. An animal's eye, for example, is much like a fine machine. And even where the likeness is not so direct, natural phenomena often share with artifacts what Cleanthes, in Hume's Dialogues, calls '[t]he curious adapting of means to ends'.² That is, in the case of numerous natural phenomena, as in the case of human artifacts, states of affairs which plausibly could be desired as ends are brought about by phenomena that themselves might reasonably have been intended as means to those ends.

Once such resemblances are noted, arguments of the sort I have in mind proceed straightforwardly by induction. Certain natural phenomena have features in common with human artifacts. However, in many cases, namely, in cases of artifacts, phenomena with these features have been discovered to result from the intentional actions of intelligent beings. Further, in no cases have phenomena with the features been discovered not to result from such a cause; for we have not discovered that natural phenomena with the features are not ultimately the result of God's design, and human artifacts all are designed. But then, by induction, we can conclude that all phenomena with the relevant features are products of design and, so, that many natural phenomena are results of intentional action.

This argument, however, I think, must fail. One important principle of inductive reasoning is that, in making inductive inferences; one should not extrapolate from cases of one sort to others that differ too widely from them. For example, if one has studied a great many horses but no other mammals with respect to a certain anatomical feature and has found that all mammals studied have had the feature, one still cannot properly conclude that all mammals and, thus, all dogs have the feature. For the difference between horses and dogs is too great. The point here is not that one can never make inductive inferences from one sort of case to another. If one has examined many animals of numerous mammalian species, though no dogs, with respect to a given feature, and if all mammals studied have had the feature, then it might well be proper to conclude that dogs have the feature, even though there are significant differences between a dog and any of the animals studied. For here the animals that have been studied vary as greatly among themselves as they do from dogs. But when all the cases one has examined for a property are alike in significant respects, and all differ in those respects from a new case that is being considered, then one can have little confidence that the new case will be like the others.

This, however, I think, is exactly the situation in which we find ourselves, if we attempt to infer-from the fact that human artifacts have been designed, and natural phenomena have not been proven not to result from design-that natural phenomena that resemble human artifacts have been designed. It is not that there are not clear analogies between artifacts and some natural phenomena. I think there are. But there are also important respects in which natural phenomena do not resemble artifacts. Consider, for example, the eye. One difference between an eye and a machine is the materials out of which the two are made. But I do not think this is the crucial difference. Suppose that a 'mad scientist' some day should construct eyes exactly like natural ones out of flesh and blood. This, I think, would make us no more inclined than we would be otherwise to think that our own eyes were produced by design, nor would we conclude that the

analogy between natural phenomena and artifacts was finally close enough for the argument from design to go through.

What seems to me a more important difference is this. Human artifacts, even in cases of automated production, result quite directly from intentional actions. Our eyes, on the other hand, while we were developing in the womb, originated from genetically controlled processes that themselves had natural causes, and so on, back as far as we can determine. These processes might have been the results of design, but, if so, the design seems, so to speak, to have been woven into the fabric of nature. And, it would seem, a similar disanalogy can be found in all cases between human artifacts and those natural phenomena that look as if they were produced by design.

This difference between natural phenomena and human artifacts, then, which involves the very features of natural phenomena to which a proponent of the argument from design would be most likely to point to justify his belief that such phenomena, if designed, must have been designed by a divine being, is, I suspect, a sufficiently great difference to block analogical versions of the argument from design. At any rate, I shall not pursue the attempt to work out such a version here. There is, however, another sort of argument from design which is not an analogical argument; and though it also faces serious difficulties, in the end, I think, much can be said for it. Indeed, the version of the argument I shall offer later might be classified as one of this sort.

Arguments of this second sort begin with the claim that, in numerous cases, desirable features of the universe have been brought about by complex states of affairs whose occurrences might seem totally fortuitous, if they were not produced by design. The fact that conditions on earth, for example, were suitable for the development of life probably depended on precise details of the planet's composition and the positioning of its orbit about the sun, and the earth might well have been lifeless, if these had been even slightly different as the planet developed.

Again, basic features of the physical world depend on the fact that bodies of the sort that exist will interact as they do, given the laws of nature that hold. If either the bodies or the laws had been sufficiently unlike what they are, the universe probably would have been quite different and, very possibly, less interesting than it is. Consider, as an example, the forces that bind particles together into bodies and physical systems, for example, the forces binding atoms to form molecules or the force of gravitational attraction. If these forces had been much weaker than they are, matter could not easily have been formed into stable configurations, and the universe might have been little more than a system of particles in flux. On the other hand, if the forces were significantly stronger than they are, it would seem that things would have been overly stable, and discrete, changeable bodies might be at a premium. 3

It seems, then, not to be a matter of course that the universe is as impressive a place as it is. In many cases, desirable features of the universe would not have come about, unless seemingly unconnected states of affairs had come together in the right sort of way. But, also, one would think, it could not simply have been an accident that, in so many cases, things came together in ways that had such impressive results. Cases of this kind need explanation. However, someone who presents an argument of the sort I am describing would argue that such cases could not be explained unless they were results of design

or, at any rate, that they could be better explained in this way than in any other. And if this is true, it would seem that we can conclude that in many noteworthy cases features of the universe were created by design.

Arguments of this second sort, notice, are not analogical arguments. They do not claim that the natural phenomena they hold to have resulted from design are very much like human artifacts. Instead, they hope to show on other grounds that the phenomena need explanation but can only be explained properly as results of design. Thus, these arguments seem to sidestep the problems that beset analogical versions of the argument from design. Nonetheless, arguments of this new sort are open to serious objections, and before presenting my own version of the argument from design I shall mention three that I think are the most serious:

(i) Arguments from design of the second sort depend on the view that certain natural phenomena have features that make it appropriate to explain them as results of intentional action, quite apart from any analogies that hold between them and phenomena that have previously been discovered to be products of design. But this would seem untrue. When we first come by the family of notions that are connected with intending, we are not, it seems, taught logical criteria that allow us to determine whether a state of affairs was brought about intentionally. Instead, we begin by learning to recognize cases of intentional behaviour, and, once we know what it is for a person to act intentionally, it would seem that we come to learn that states of affairs of certain sorts are brought about intentionally, only because we frequently find such states to result from actions we recognize as intentional. That is, it seems that there are no inherent features of a state of affairs that show it to have been produced by design. Rather, we can only know a state to have been brought about intentionally either by knowing directly that it was produced by intentional actions or by knowing it to be sufficiently like states that we have discovered to result from such actions. But if this is true, then the only sorts of argument from design that can succeed are analogical arguments, and we have already seen reasons to think that analogical arguments fail.

(ii) We can reach this same conclusion from more general considerations about causation. A justly celebrated feature of Hume's theory of causation is the thesis that there are no a priori connections between cause and effect. ⁴ One cannot by reason alone discover the cause of any state of affairs. One can only do this by having observed similar states to have been preceded by a given sort of occurrence in repeated instances. But then it will follow, again, that we can only know a state of affairs to have been caused by intentional actions if it is sufficiently like states we have already discovered to have had such causes, and if, as seems likely, the most general features of the universe are too dissimilar from those occurrences whose causes we have discovered for us to be able to reason by analogy from one to the other, then we will have to remain in ignorance about the ultimate causes in nature. These two objections, together with the objection against analogical arguments from design I presented earlier, seem to me to constitute the most serious challenge to the argument from design, and it should be noted that they challenge far more than just this single argument. Indeed, they call into question whether reason ever could provide adequate grounds for believing in the existence of God. For suppose one had adequate reason to believe in God. Then one would thereby have adequate reason to

believe that the universe was caused by design. But if either objections (i) or (ii) succeed, one could not have such reason unless one had discovered states of affairs that both sufficiently closely resemble the universe as a whole and are known to have been produced by design. And, given the difficulties we saw with analogical arguments from design, it would seem that one could not do this. (iii)

(iii) Finally, non-analogical versions of the argument from design ask us to conclude that certain phenomena were produced by design, simply because no other adequate explanations seem to be available. However, even apart from the difficulties above, one should be suspicious of arguments of this form. It might, after all, be that alternative explanations are available but that we just have not been able to think of them. Indeed, it would seem that alternative explanations of many suggestive natural phenomena are available by using the sorts of devices employed by the theory of evolution in biology. For that theory seems to show a way in which purely natural processes can result in the most highly organized and impressive sorts of creatures.

Of course, the theory of evolution applies directly only to examples of seeming design in biological organisms. Nonetheless, the theory counts against the argument from design in two ways. First, it seems to rob the argument of many of its best examples. Using the theory, for example, one can explain why the various parts of the eye developed in just the way that would best promote good vision, without having to make reference to a designer. Second, even where evolutionary explanations cannot be employed directly, they seem to provide a model for explanations of phenomena that look as if they were designed. For it would seem that purely random processes could result in a universe filled with highly organized and, therefore, one would expect, impressive structures, as long as such structures came about on rare occasions and, once in existence, tended to remain in existence, while less highly organized structures tended to be less stable and more short lived.

I shall attempt to answer these three objections in Part III below. However, for now I shall set them aside and turn to the version of the argument from design I wish to offer.

Part II

The version of the argument from design I shall present here trades heavily on a distinction that is very similar to one worked out by Elizabeth Anscombe in a brief, unpublished paper, entitled 'Cause, chance, and hap',⁵ and to a great extent it grew from thoughts stimulated by Miss Anscombe's paper. In 'Cause, chance, and hap' Miss Anscombe distinguishes what she calls 'mere hap' from a sense of 'chance' she defines as 'the unplanned crossing of causes'.⁶ When an event occurs by mere hap, there is an element of randomness in its coming about; it might not have occurred, even if all of the conditions relevant to its production had been the same. To use Miss Anscombe's example, the wind might carry a sycamore seed to a certain spot and let it down, though, perhaps, it could have carried the seed just a bit further without anything relevant having been different. And if so, we can say that it merely happened that the seed dropped where it did and not a bit further on. Notice that in this case we will have a violation of the doctrine of determinism, and indeed determinism might be expressed simply as the thesis that nothing ever occurs by mere hap.

There are other sorts of cases, though, where we would say that something happened by chance, though there need be no violation of determinism. To use another example from 'Cause, chance, and hap', a plane might jettison a bomb which hits a boulder as it rolls down a slope. And here Miss Anscombe will say that it was by chance that the bomb hit the boulder, if it was not intended that it should, even though it may be that no randomness was involved. Perhaps, given sufficient information about the path of the boulder and the manner in which the bomb was jettisoned, one could predict with certainty that the bomb was going to hit the boulder or, at least, that it would if nothing intervened.

The distinction on which the argument I shall present below depends is one between Miss Anscombe's sense of 'mere hap' and a notion of chance quite similar to that of an unplanned or unintended crossing of causes. Consider as an example a typical case in which one would say that it was by chance that a friend and I met in a restaurant. One would not mean, in calling this a chance occurrence, that our meeting had no connexion with antecedent causal factors. It might well be that various occurrences brought it about that my friend was at the restaurant when he was and that others brought it about that I was there at the same time. If you wish, it might have been determined, perhaps it even always had been determined, that we would meet. None of this seems to be ruled out when one says that we met by chance. For if it were ruled out, it would be far easier than it is to refute determinism, or, rather, one would not be able to say that cases of this sort occurred by chance, unless one had refuted determinism.

What one does seem to mean in saying that it was by chance that my friend and I met, I think, is that there was no common cause of our meeting. I came for whatever reasons I did, and my friend for whatever reasons he did. There was nothing in common to the causal chains that got us there. Thus, if we met at the restaurant because we planned to meet, or if one of us went because he heard the other would be there, our meeting would not be a chance one. And, again, if we both went to the restaurant because a great chef was to give a one-night demonstration or because everyone in our circle of friends was there to celebrate a certain occasion, then, even if we had not intended to meet, one would not be inclined to say that we met by chance. These last two examples show, I think, that it need not be intended that two states of affairs occur together for their co-occurrence not to be by chance. It is enough if the causal chains by which the two come about contain a significant part in common.

In what follows I shall use the term 'chance' in the sense I have described here. More precisely, I shall say that the co-occurrence of two states of affairs comes about by chance when neither is a significant part of the cause of the other, and no third state is a significant part of the cause of both; that is, when the two do not come about by causal chains that have a significant part in common. Also, corresponding to the distinction between mere hap and this sense of 'chance', I shall find it useful to distinguish two ways in which one might explain conjunctions of states of affairs.

Suppose that I happen by chance to be standing up at the moment you read this sentence. Can one then hope to explain why I stand as you read? I think it would be natural to answer in the negative. There is no reason why I was standing as you read; things just happened to work out that way. However, someone who takes seriously the principle of sufficient reason, that every truth has an explanation, will not accept this reply as the last word. Rather, I think, he

will want to say that all one has to do to explain the occurrence in question in the sense he has in mind is to conjoin explanations of why, at a certain time, I was standing and why, at the same time, you were reading the sentence you were. Corresponding to these two possible answers, let me say that a conjunction of two or more states of affairs, or the co-occurrence of the states of affairs, has a basic explanation when and only when each state in the conjunction has an explanation, and I shall say that a basic explanation of a conjunction is a conjunction of explanations of its conjuncts. Further, let me say that the states in a conjunction of two or more states of affairs have an explanation in common when and only when explanations of any two states in the conjunction contain a significant part in common. That is, the co-occurrence of a group of states of affairs will be guaranteed a basic explanation whenever no state in the group occurs by mere hap, and the states in the group will have an explanation in common if and only if no two occur together by chance.

Now there are two points I would like to make using these distinctions. First, there would seem to be no logical guarantee that two logically independent states of affairs will have an explanation in common. Things often happen by chance, and a supporter of the principle of sufficient reason can hope for no more than that every conjunction will have a basic explanation. Secondly, however, there are cases in which, as an epistemological matter of fact, we simply would not believe that certain states of affairs had occurred together by chance. And it is on this second point that the argument I shall present is based. For I believe there are natural phenomena which it would be extremely hard to believe occurred together by chance but which, it would seem, could only have an explanation in common if at least some of them were created by design. And thus, I think, by a two-step argument we might be able to prove that some natural phenomena are created intentionally.

I shall not offer an example of the sort of phenomena I have in mind until later. First, let me illustrate the reasoning I hope to use with a fictitious example which, if my memory has not deceived me, is adapted from one I was given a number of years ago by Miss Anscombe.

Suppose that one day a perfect picture, say, of a nativity scene were formed by the frost on someone's window.⁷ I think we almost certainly would believe that this occurrence was brought about by design,⁸ though not necessarily by the design of a divine being. And if we were asked why, I think we would probably respond that if this were not so, there would be no way to explain why ice formed on the window in the pattern it did. However, if by an explanation, we have in mind a basic explanation, this might well not be true.

Supposedly, in normal cases, various facts about weather conditions, the make-up of a pane of glass, the temperature and humidity in the room in which the pane is installed and the like, cause ice to form in the way it does on a window pane. And also, supposedly, there are possible conditions which, if they were to obtain, might cause ice to form a nativity scene on a given pane. Of course, these conditions might be very strange, but we do not know this. Suppose, in fact, that the nativity scene in our example arose by natural means from conditions that appeared quite normal, that those conditions themselves arose from normal-seeming conditions, etc. Then we can imagine that scientists could give a perfectly good basic explanation of why the pattern formed by the ice in our example was one that constituted a nativity scene.

First, one would explain why ice formed in the pattern it did on the relevant window in the way that one might hope to do so in normal cases, that is, by explaining why ice crystals of various sorts formed on various spots of the window. Then one would explain why the pattern that was formed made up a nativity scene, using facts about geometry, about basic human perceptual mechanisms, perhaps, and the like. The result would be a basic explanation of why the pattern that formed was a nativity scene.

What I think is interesting here, though, is this. If we were given such an explanation of the nativity scene in our example, we would still, I think, be no less inclined than before to believe that it resulted from design. If anything, by showing that the scene arose from processes that were, so to speak, part of the course of nature, such an explanation would make us more inclined to believe that it was designed by a being deserving of our worship and not merely by someone who had made a technological breakthrough over ice. 9

The question, then, I think, is: what reasoning do we use when we conclude that the nativity scene in our example was produced by design? And the answer, I believe, is the following. First, I think, we believe that ice could not form a nativity scene on a window merely by chance. That is, in our example, there must be an explanation in common of the fact that ice formed the pattern it did on a certain window and the fact that that pattern constitutes a nativity scene. Why we believe this is not completely clear. Ice very often forms beautiful patterns on window panes, and yet we are content to accept that it is by chance that the patterns that are formed are ones that strike us as beautiful. However, that we would not be content to hold similarly that a nativity scene resulted from chance I think is clear.

But if this is true, then the fact that the ice formed a certain pattern on the pane in our example and the fact that that pattern constitutes a nativity scene must share a significant part of their causes in common. And, therefore, either one of the facts is a significant part of the cause of the other, or a third state of affairs is a significant part of the cause of both. However, the fact that a certain pattern forms a nativity scene is a very general one. It results from facts about geometry, about what counts as a nativity scene, and, perhaps, about what patterns we see when we encounter various sorts of objects. And many of these facts are not caused at all, while the remainder, it would seem, as an empirical matter of fact, could be caused neither by the fact that ice formed in a certain pattern on a particular pane of glass nor by the sort of facts, for example, about local weather conditions and the make-up of a pane, that would cause ice to form in such a pattern. And, therefore, it seems that neither the fact that ice formed in a certain pattern nor causes of that fact could be significant parts of what caused the pattern to be a nativity scene.

However, in this case it must be that the fact that a certain pattern constitutes a nativity scene was an important part of what brought it about that the pattern appeared on the window in our example. And this, again as an empirical matter, seems to be something that could not happen unless the pattern was produced by design. For the fact that a pattern forms a nativity scene could give a designer reason to bring it about that it appeared on a window and, thus, play a significant role in an explanation of such a fact. However, if the pattern in our example was not brought about by design, then it seems out of the question to think that the fact that it constitutes a nativity scene might have been an important part of the cause of the very specific conditions holding in

and around a particular piece of glass on a particular night that caused it to be formed in ice. And, thus, it seems that the nativity scene in our example must have been produced by design.

The case of the nativity scene, of course, is fictitious, but I believe that similar reasoning might well be able to show that in many actual cases natural phenomena have been produced by design. For in many cases complex states of affairs have come together in ways that have produced noteworthy features of the universe, and one might argue that it could not simply be by chance that they came together in ways that had such impressive results. That is, one might think that there must be an explanation in common of the facts that certain states of affairs have occurred and that, by having done so, they have produced the impressive results they have. However, the fact that various states of affairs would produce impressive results, if they occurred together, cannot, it would seem, be explained by the fact that the states actually did occur, nor by the sort of facts that would cause them to occur. And, therefore, the only alternative is that the fact that the states would produce impressive results helps to explain their occurrence. But, again, it would seem that this could not happen unless the states were caused to occur by a designer acting to produce their impressive results.

This, then, in brief, is the version of the argument from design I wish to put forward, and I want to claim that the reasoning employed in it gains plausibility from the fact that similar reasoning explains our intuitions in the case of the nativity scene. However, I think one might want to dispute this last claim. For, first, it might be thought that our intuitions about the example of the nativity scene are based, not on the complex argument I suggested, but on simple analogical reasoning. That is, one might think that, unlike the sorts of natural phenomena to which arguments from design appeal, the nativity scene in our example is sufficiently like works of art created by human beings for one to reason simply by analogy that it too must have been designed. 10

And, secondly, one might want to argue that even if our intuitions about the nativity scene can be explained by the reasoning I proposed, that reasoning itself is only a disguised form of analogical reasoning. For it might seem that there is only one way in which one can discover that a group of phenomena have an explanation in common, assuming that one has not discovered this directly by first having discovered the causes of the various members of the group, and that is to find sufficient similarities between the group and others whose members are already known to have explanations in common. But in this case, it might be thought that the conjunctions of phenomena to which an argument from design points differ enough from those whose origins we have been able to discover to block an argument by analogy that their members have explanations in common.

I think, however, that these two objections fail. First of all, it is true that in many respects the nativity scene in our example closely resembles works of art we know to have been designed by human beings. Indeed, the image formed in the example can be supposed to look just like the sort of image artists put on canvas. Nonetheless, there are also ways in which the nativity scene differs from works of art. Most importantly, the process by which the scene came to be on its window differs greatly from that by which paint comes to be on a canvas, and this is just the sort of difference that earlier made us conclude that we could not claim that eyes were produced by design merely because they resemble machines.

That the similarities between our nativity scene and human works of art are not enough to permit a simple argument by analogy for the design of the scene can be shown, I think, by the following consideration. Frequently frost forms beautiful, symmetrical 'snowflake' patterns on window panes, and these patterns often resemble man-made geometrical designs just as closely as the nativity scene in our example might be supposed to resemble works of art. Yet no one would conclude straight away that such frost patterns are produced by design. More than resemblance to works of art, then, is needed to show that the nativity scene in our example would have to have been created intentionally.

Secondly, it might be true that one can infer that phenomena whose causes are not known have an explanation in common, only if one does so by analogy from cases that already have been discovered to have such explanations, though shortly I shall suggest that this is not true. 'But even if it is true, it does not follow that one cannot infer that a group of phenomena have an explanation in common unless there are no significant disanalogies between that group and others that have been discovered to have explanations in common. For it must be remembered that we know phenomena of many different sorts to have explanations in common and, as a result, if a new group of phenomena has important features in common with those groups that have been discovered to have explanations in common, and if the differences between the new group and the other groups seem no more relevant than the differences between some of the other groups themselves, then one should be able to reason by analogy that the members of the new group have an explanation in common. That is, in this case our inference will be more like one which concludes that dogs have a certain feature from the fact that all mammals studied from a wide range of species do, than it will be like one which concludes that dogs have a feature because horses do and because no other mammals have been studied.

At any rate, the fact that the natural phenomena to which arguments from design point are not enough like human artifacts for one to argue by simple analogy that they came about by design is not sufficient to show that one cannot conclude that there must be an explanation in common of the facts that they took place as they did and that, by doing so, they brought about impressive states of affairs. Again, a case in point here is the eye. We cannot argue by simple analogy to machines that our eyes were designed, but it would be preposterous to maintain that the development of the various parts of the eye could be explained without bringing in the fact that they allow one to see. Indeed, one of the most attractive features of the theory of evolution is that it can provide explanations that meet this sort of requirement.

Earlier I suggested that when we infer that two states of affairs have an explanation in common, we might not be reasoning by analogy. In fact, I am inclined to think that the judgment that certain states of affairs have an explanation in common is not dependent on but, rather, is presupposed by inductive reasoning, and I think it might well be the case that it is certain inherent features of states of affairs that make us judge them to have explanations in common, and, further, that we are justified in doing so, if we are justified in reasoning by induction.

Consider a case in which a coin is tossed 100 times and comes up heads each time. One would, no doubt, conclude from this both that the coin had been rigged and that it was almost certain to come up heads on future tosses. And what I

think is important here is that these two judgments are connected. In particular, if one thought it was merely by chance that the coin came up the same way on each toss, then it would be as irrational to conclude, by induction, that future tosses would be like previous ones as it would be to conclude, by the gambler's fallacy, that a string of heads must be followed by one of tails. In each new toss the probability would still be one in two that the coin would land heads.

And this, I think, is true in general of inductive inferences. We can sensibly hold that unobserved cases will be like observed ones only when we believe the observed cases have had a significant part of their causes in common. Thus, if we do not believe observed emeralds have been green because of general features of the process by which they were formed, then it would not be reasonable to conclude that unobserved emeralds are green. But if this is true, then it seems that we must be able to make judgments that various phenomena have explanations in common before we can reason by induction and, therefore, it seems that such judgments are not based on induction.

Part III

Let me now turn to the three objections against the argument from design that I mentioned at the end of Part I. Objections (i) and (ii) from Part I tried to show that one could come to know that a state of affairs was brought about by design only directly or by straightforward analogical reasoning. However, if my remarks about our example of the nativity scene were correct, one could know that that scene was produced by design but could not do so in either of these ways. Further, even if I am mistaken, and one could infer by analogy that the scene in our example was designed, still, I think, one could also come to know that it was by the more complex reasoning I described, and such reasoning might let one know that a state of affairs was produced by design, even when this could not be shown by analogy.

Objections (i) and (ii), then, fail, and that they do, I think, should not come as too great a surprise. For the two objections hold, plausibly enough, that one cannot know a priori that any given state of affairs was brought about by intentional action. But it does not follow from this that one could know such a thing only directly or by analogy. The objections, then, do not show that there could not be a line of empirical reasoning that is not straightforwardly analogical but that, nonetheless, might allow one to infer that a state of affairs had been brought about by intention. They simply assume that there could be no such line. However, if I am correct, the reasoning I proposed to explain our intuitions about the nativity scene on the window is just such a bit of reasoning, and if the reasoning seems plausible, then objections (i) and (ii) should not stand in its way.

Let me move on, then, to objection (iii). I think many people today are taken by a certain picture of the origin of life in which the theory of evolution plays a large part. As things are represented by this picture, it was simply a matter of good fortune that the earth came to provide an environment suitable for living creatures, though the good fortune here was not particularly 'surprising. For in a universe as vast as ours there are many stars like the sun, and-often enough-such stars should have planets whose size, composition, and orbit are similar to those of the earth. Then, once the earth afforded the proper environment, the first primitive organisms came into existence as results of what, it is hoped,

were not too improbable series of chemical reactions. Again, here, it was simply by chance that the chemical processes that occurred were ones that produced living creatures. Finally, once the first organisms were in existence, it is thought that the theory of evolution can account for the rest and that the mechanisms of chance mutation and natural selection embodied in the theory led to the development of more and more highly developed creatures until, finally, beings evolved that were capable of reason.

This picture of the origin of life seems to be widely held today. Indeed, I believe its popularity is an important feature of the intellectual history of the present age. Nonetheless, I think the picture is flawed. For one thing, we might believe that various chemical processes could produce very simple living creatures, even if the fact that they produced such creatures had nothing to do with the fact that the processes came about. But we would not accept that very complex creatures could come about in this way. However, as Geach has noted,¹¹ the process of natural selection itself seems to presuppose the existence of creatures with highly developed genetic mechanisms and, so, cannot be used to explain their origin. And, therefore, we must find another plausible account of the origin of these mechanisms.

Natural selection can only take place among creatures that bear offspring that closely resemble their parents without resembling them too closely. For if offspring are exactly like their parents, then natural selection can occur only among characteristics already in existence and, thus, will not lead to the development of new characteristics. On the other hand, if offspring do not closely resemble their parents, then even if certain parents have highly adaptive characteristics and bear many more children than others, their children will not be very likely to inherit the characteristics, and the process will stop. Of course, in fact creatures do have genetic mechanisms that facilitate natural selection, but the mechanisms are very complicated, and though they might themselves have evolved to some extent by natural selection, it would seem that any mechanism that led to offspring that resembled their parents closely enough but not too closely would have to be very complicated. And so, one would have to ask how they could come about, if not by design. As Geach writes:

There can be no origin of species, as opposed to an Empedoclean chaos of varied monstrosities, unless creatures reproduce pretty much after their kind; the elaborate and ostensibly teleological mechanism of this reproduction logically cannot be explained as a product of evolution by natural selection from among chance variations, for unless the mechanism is presupposed there cannot be any evolution. ¹²

Thus, there is much that is noteworthy about the development of living beings that cannot be explained by the theory of evolution. But even if this problem can be surmounted without recourse to a designer, there is a second difficulty.

Simplified accounts of the theory of evolution might make it appear inevitable that creatures evolved with the sorts of impressive and obviously adaptive features that might otherwise be thought to have been designed. For over a sufficient period, one might think, a few individuals would develop such features by chance mutation, and once some creatures had them, the obvious desirability of the features would be enough to explain their proliferation. However, this impression of inevitability, I think, is quite misleading.

Evolutionary change generally proceeds very slowly. We can be confident, for example, that no ancestors of birds suddenly came by wings in a single step and, likewise, that no ancestor of man came to have a brain capable of reason because of one chance mutation. Instead, these sorts of noteworthy and obviously adaptive features come about only as results of long series of evolutionary changes, each of which has to be adaptive and has to become dominant among members of a species, and the noteworthy features themselves cannot come about unless all the others do. Further, these smaller evolutionary changes cannot be counted on to be obviously adaptive, nor always to be adaptive for the same reasons that the larger, more noteworthy changes are. And most importantly, as the term 'adaptive' itself suggests, very often these small changes will be adaptive only because of fine details of, and changes in, the relationship between members of a species and their environment.

Consider the following passage from a recent biology textbook, for example :
There is ... good evidence that during the period in which Australopithecus lived there existed considerable expanses of lush savannah with scattered shrubs, trees, and grasses. There were berries and roots in abundance, and because such areas were suitable for grazing, these savannahs were well stocked with game. These areas provided new habitats, abundant in food, and so we surmise the australopithecines came down from the trees in which their own apelike ancestors lived in order to avail themselves of these new sources of food. . . . Although descent from the trees does not always result in evolution of upright posture in primates. . . , through a lucky combination of anatomy and habits, these ape-men became bipedal. Being bipedal meant that the hands were freed from locomotor function and could be employed in manipulative skills such as carrying and dragging objects, fashioning tools and weapons, and so on.¹³

This, in turn, led to improvements 'in the primitive tool-making ability that had preceded upright posture. And finally, 'with the advent of toolmaking, hunting for big game became a possibility, and the brain and the hand were now subject to the molding force of natural selection'.¹⁴

Now whether the precise details of the picture presented in this passage turn out to be true is not important here. What is important is that something of this sort almost certainly was true. Had not the grass in a certain area grown to the proper height, had not a certain food source become available or unavailable, had not various predators been present or absent, had not climatic conditions been what they were, etc. as ancestors of man developed, human beings would not have come into existence. And if they had not, there seems to be no reason to think other beings capable of reason would have evolved instead. After all, useful as intelligence is, no other species has come into existence with such a high level of it.

Furthermore, seemingly chance occurrences like these did not play a role only in the final stages of the evolution of human beings. It is likely that, at nearly every step in the evolutionary chain that led from the most primitive of creatures to people, similar sorts of occurrences played a role. In fact, without specific evidence one cannot assume even that it was inevitable that mammals, vertebrates, or even multi-celled creatures would evolve.

But then, one might ask, again, whether it could have been simply by chance that so many seemingly unconnected occurrences came together in just the way that

would lead to the evolution of creatures capable of reason, and I think that one might well conclude that it could not have been.¹⁵ At least, it would be very strange, if the myriad occurrences needed to produce human beings came about in just the right way simply by chance and equally strange if the occurrences had an explanation in common, but the fact that they would produce intelligent beings had nothing to do with the fact that they came about. However, one might wonder how so many different sorts of occurrences could have an explanation in common and, indeed, have an explanation in common with the fact that they would lead to the evolution of beings capable of reason, unless they were produced by design?

Of course, I must admit that I cannot prove that the occurrences that led to the development of beings capable of reason could not have taken place by chance. To do so in a fully satisfactory manner, I think, would require a method for distinguishing those conjunctions of states of affairs which require explanations in common from those which do not, and this I do not know how to provide. ¹⁶ However, I find it hard to believe that so much could have happened simply by chance, and yet I think this is exactly what one must believe, if one believes that the universe was not created by design. I think, then, that it is safe to conclude that those who fear that the secular view of things, common today among so many intellectuals, robs the world of its mystery are quite mistaken.

Notes

1 See, in particular, the remarks of Philo in the Dialogues Concerning Natural Religion and those put into the mouth of Epicurus in Section XI of An Inquiry Concerning Human Understanding.

2 D. Hume, Dialogues Concerning Natural Religion, ed. Norman Kemp Smith (Bobbs-Merrill, Indianapolis, 1947), Part II, p. 143.

3 This example was adapted from one suggested to me by David Hills, and I am also indebted to Nancy Cartwright and Paul Humphreys for help in its construction.

4 For Hume's presentation of his thesis see, for example, Section IV of An Inquiry Concerning Human Understanding.

5 'Cause, chance and hap' was written by the middle of 1968 and is four pages long in its handwritten manuscript. Much of the material in it, including the notion of 'mere hap', appeared later in Miss Anscombe's 'Causality and determination'. I am relying on a photocopy of the manuscript.

6 This sense of chance and, therefore, the similar one I shall present below seem to be descendants of one discussed by Aristotle. See Physics, II, 4-6. I am indebted to Ian Hacking and Paul Humphreys for pointing this out to me and to Terry Penner for the reference.

7 While writing this paper I learned from Miss Anscombe of a similar example which she definitely has used in which a message is spelled out in perfect lettering in the ice on a window. Another, somewhat similar, example is given by Cleanthes in Part III of Hume's Dialogues: 'Suppose. . . that an articulate voice were heard in the clouds . . . in the same instant over all nations, and spoke to each nation in its own language and dialect . . . ' (D. Hume,

Dialogues, op. cit. p.152). Either of these examples and, no doubt, many others besides could be used to make the points I wish to make. below with the example of the nativity scene.

8 Anyone who believes a nativity scene could appear on a window without having been designed may substitute a more elaborate example for the one I am presenting. For example, it might be supposed that numerous perfect nativity scenes appear one Christmas morning on the windows of many practising Christians living in cold climates. Remarks similar to those I make below could then be made in connection with this example.

9 It should be noted that an analogous point could be made about the argument from design. Someone holding that certain natural phenomena were designed need not deny that the phenomena resulted from a chain of purely natural causes extending indefinitely far in the past. And, again, if a natural phenomenon one believes to have been produced by design turns out to have resulted from such a chain of causes, that fact may count as evidence for the eminence of its designer.

10 In his introductory material to Hume's Dialogues, Norman Kemp Smith makes a similar charge against Cleanthes' use of the example of the voice in the clouds, arguing that the example 'chiefly serves to illustrate Cleanthes' entire failure to recognize the point and force of Philo's criticisms'. (Hume, Dialogues, op. cit. p. 101).

11 P. T. Geach, 'An irrelevance of omnipotence', Philosophy vol. 48, No. 186 (1973), 327-33.

12 P. T. Geach, *ibid.* p. 330.

13 I. W. Sherman and V. G. Sherman, *Biology: A Human Approach* (OUP, New York, 1975), p. 456.

14 I. W. Sherman and V. G. Sherman, *ibid.* p. 456. 15 Of course, one might conclude that such occurrences could have come together by chance. In particular one might argue that, unlikely as it may be that all the conditions needed to produce beings capable of reason should have arisen on earth, still in a universe as vast as ours we can expect that it should have happened somewhere, and earth just happens to be a place where it did happen. However, I think this argument is little more than an appeal to scepticism. One could as well argue that we do not know that the speed of light is constant in a vacuum, because if the speed of light were random one still would expect it to appear constant in some region or other of a large enough universe. The point in both cases is the same. Random processes can be imagined and-in a large enough universe-expected to mimic controlled processes, but when phenomena of the right sort would be sufficiently improbable if they occurred by chance, we have a right to conclude that they did not occur by chance.

16 The problem here, I think, is closely connected with one of the problems of induction. If a coin is tossed 1,000 times, and the results form certain patterns of heads and tails (for example, if the coin lands heads on all and only the prime numbered' tosses), . then we will believe that the pattern that was formed did not occur by chance, and we will expect future tosses to result in a similar pattern. On the other hand, other patterns of heads and tails would

strike us as 'random', and one would not expect them to be repeated by future tosses. But how do we distinguish the random patterns from the others?