

The application-conditions for design inferences: Why the design arguments need the help of other arguments for God's existence*

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Proponents of design arguments attempt to infer the existence of God from various properties or features of the world they take to be evidence of intelligent design. Thus, for example, the fine-tuning argument attempts to infer the existence of a divine designer from the improbable fact that life would not be possible if any of approximately two- to three-dozen fundamental laws and properties of the universe had been even slightly different. Similarly, the argument from biochemical complexity attempts to infer the existence of a divine designer from the improbable fact that living beings frequently instantiate what proponents call irreducible specified complexity.

In this essay, I argue that we are justified in making design inferences only in contexts where there is already strong independent reason to think that there exist intelligent agents with the ability to bring about the occurrence of the relevant entity, feature, or property. Only in such contexts is there sufficient information to justify assigning a probability to the design hypothesis that is higher than the probability that we are presumably justified in assigning to the chance hypothesis. Accordingly, design arguments implicitly presuppose that some other argument for God's existence justifies assigning a probability to the design hypothesis that is larger than the probability we can assign to the chance hypothesis. What this means, *contra* the intentions of proponents, is that design arguments for the existence of God cannot stand by themselves.

1. The distinguishing feature of design arguments

What distinguishes design inferences from other sorts of inference is that the former attempt to infer the claim that some intelligent agency performed some act from the claim that the world instantiates some special kind of event, feature, or property *P*. The underlying idea is that *P* is a reliable predictor of intelligent agency in the following

sense: in any context in which P occurs, it is far more likely that P is the intended result of some sort of purposive intelligent activity than that it is the result of some sort of chance event or occurrence.

There are thus three features of P that are supposed to lend support to an inference of design. First, the hypothesis that the instantiation or occurrence of P is the result of some unintelligent process, usually thought to be some chance-driven process, is highly improbable. Second, P is something that would be valued by an intelligent agent with reasonable purposes, objectives, and values and is hence the sort of thing that such a being would act to bring about. Third, there is something about P (such as, e.g., instantiating complexity of a certain kind) that, in conjunction with P 's value to an intelligent agent, confers a sufficient probability on the design hypothesis to justify preferring it, in the absence of other evidence, to the chance hypothesis.

Design inferences thus have something like the following structure:

1. Entity or event E has feature P .
2. P is the sort of thing that is either likely to be valued by an intelligent agent or conduces to the existence of some event or entity likely to be valued by an intelligent agent.
3. P has some feature that, together with its value, makes it far more likely that P is brought about by an intelligent agent than that P is brought about by some unintelligent (chance-driven) process.
4. Therefore, it is likely that an intelligent agent intentionally brought about the occurrence or instantiation of P .

In making the design argument, it will usually be fairly easy to justify both the claim that the relevant property is instantiated by the world and the claim that the relevant property is the sort of thing that would be valued by intelligent agents. As we will see, the difficult part will be to justify the claim that P has some feature that makes intelligent design a more likely explanation than chance for its occurrence in the world.

At the outset, it would be helpful to consider a couple of examples of design arguments to distinguish the general strategy from a related strategy of argument. In a famous election fraud case, Nicholas Caputo, a county clerk and a Democrat, had given the Democrats the top line on the ballot 40 out of 41 times over a period that spanned decades and was charged with fraud.¹ All of the requisite elements for a design inference are here: (1) it is a fact that the Democrats got the preferred ballot position 40 out of 41 times; (2) the odds that chance explains the Democrats getting the preferred ballot position 40 out

of 41 times is extremely small; (3) the probability that Caputo deliberately brought about this sequence of ballot-position assignments is comparatively high partly because of the obvious value of such a state of affairs to Democrats and partly because Caputo had control over the relevant causal mechanism; and (4) the design hypothesis expressed in (3) is (considerably) more probable than the chance hypothesis expressed in (2). Indeed, it seems clear that we are justified in concluding on the strength of (1) through (4) that Caputo cheated.²

The argument from biochemical complexity also appears to have the requisite elements. Michael Behe and William Dembski argue that the most probable explanation for the existence of certain irreducibly complex biological systems is the existence of an intelligent designer who intentionally brought them about. On this line of analysis, the Darwinian hypothesis that such systems have evolved through a chance-driven process of natural selection is extremely improbable. Given that irreducibly complex systems make possible the performance of various functions that would be valued by an intelligent agent with reasonable and rational purposes, the probability of the design hypothesis is not extremely improbable. Accordingly, the design hypothesis is more probable than the Darwinian hypothesis and is hence the better explanation for such systems. Thus, Behe and Dembski conclude, we are justified in accepting the design hypothesis.

This strategy of argument, however, should be distinguished from the simplistic argument from analogy that David Hume savaged in his *Dialogues Concerning Natural Religion*. As Hume describes the design argument there, it is explicitly grounded in the claim that the universe and any particular human machine are sufficiently alike that they must have similar causes:

Look round the world:... you will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions to a degree beyond what human senses and faculties can trace and explain... The curious adapting of means to ends, throughout all nature, resembles exactly, though it much exceeds, the productions of human contrivance; of human designs, thought, wisdom, and intelligence. Since, therefore, the effects resemble each other, we are led to infer, by all the rules of analogy, that the causes also resemble; and that the Author of Nature is somewhat similar to the mind of man, though possessed of much larger faculties, proportioned to the grandeur of the work which he has executed...³

Since the cause of the existence of any particular machine is the agency of an intelligent designer, we can conclude “by all the rules of analogy” that the cause of the world’s existence is the agency of an intelligent deity.

Contemporary design arguments for the existence of God are no more grounded in an analogy between living things and machines than is the argument that purports to show that Caputo committed election fraud. It should be clear, for example, that contemporary design arguments for the existence of God are not refuted by the observation that there is insufficient similarity between living things and watches to justify an inference that they are like effects having like causes. Contemporary versions, unlike the argument from analogy criticized by Hume, attempt to use the mathematical tools of scientific probabilistic reasoning to detect design.⁴

2. A telling problem with the fine-tuning version of the design argument

2.1. Two different versions of the fine-tuning argument

All versions of the fine-tuning argument rely on the somewhat startling scientific observation that life would not be nomologically possible had any of approximately two- to three-dozen properties and laws of the universe been even slightly different. Life would not be possible, for example, if the explosive force of the big bang had differed in strength by as little as one part in 10^{60} , because the universe would have either collapsed or expanded too rapidly for stars to form. Similarly, life would not be possible if the force binding protons and neutrons together had differed by as little as 5%. Fine-tuning arguments attempt to show that the hypothesis that chance explains the instantiation by the universe of all the necessary properties to support life is considerably less probable than the design hypothesis that God exists and deliberately constructed the universe so as to support life.

Though the general strategy of the fine-tuning argument naturally lends itself to being characterized as a design argument, not every formulation has the requisite structure. For example, Robin Collins assesses the probabilities of the relevant design and chance hypotheses under the following principle:

Prime Principle of Confirmation (PPC): If an observation O is more likely under hypothesis H_1 than under hypotheses H_2, \dots, H_n , then, other things being equal, we have reason to accept H_1 over H_2, \dots, H_n .⁵

Collins's argument proceeds as follows: if the design hypothesis is true, the appearance of fine-tuning is very likely since a perfect God would presumably want free and rational beings in the world. In contrast, if the hypothesis is true that it is just a matter of chance that the universe has the fine-tuned properties needed for life, the appearance of fine-tuning is not very likely.⁶ Since the appearance of fine-tuning is hence more probable under the design hypothesis than under the chance hypothesis, it follows, other things being equal, that we have reason to prefer the design hypothesis over the chance hypothesis.

As Collins formulates it, the fine-tuning argument is not properly construed as a design argument. Instead of identifying some particular property or feature that serves, in general, as a reliable index of intelligent design wherever it occurs, Collins simply applies a general scientific principle of confirmation theory to two competing explanations for the empirical fact that the universe has the needed properties to support life. As is readily evident, PPC is a general epistemic principle that is not limited in application to comparing the relative probabilities of design and non-design hypotheses.⁷ Indeed, it is probably most frequently applied to hypotheses that do not include any hypothesis that explains the relevant fact in terms of intelligent agency.

In contrast, George N. Schlesinger's formulation of the argument has the requisite elements of a design argument.⁸ To understand Schlesinger's formulation, it would be helpful to consider our intuitive reactions to two different events: (1) John Doe wins a 1-in-1,000,000,000 lottery game with a prize of \$1,500,000; and (2) John Doe wins three consecutive 1-in-1000 lottery games with a prize of \$500,000. Though the odds (and total prize money) in each case are the same, it seems reasonable to draw different conclusions about how it was that John came to win. There is nothing about (1) that, by itself, would lead us justifiably to suspect that any intelligent agency was working behind the scenes to deliberately bring it about that John wins. Though winning a cash prize is the kind of thing that is valued by intelligent agents like John, the most reasonable conclusion to draw based on the limited evidence we have is that John got very lucky. In contrast, the fact that John won three consecutive lottery games that pay \$500,000 each, coupled with the fact that winning a cash prize is sensibly valued by intelligent agents like John, leads us justifiably to suspect that some intelligent agency – perhaps someone paid by John – was working behind the scene to ensure that John win each time.

Exactly these features lead us to conclude that Caputo deliberately acted to bring it about that the Democrats received the preferred ballot

position 40 out of 41 times. The fact that the Democrats won 40 of 41 lottery games, coupled with the fact that winning the preferred ballot position is sensibly valued by Democrats like Caputo, leads us to conclude – and justifiably – that Caputo must have done something dishonest to ensure such a fortuitous result. In contrast, had the Democrats simply won those positions by winning a single game with a 1 in 2^{41} chance of winning, we would not, on this line of analysis, be justified in believing that they cheated.

On the strength of such intuitive considerations, Schlesinger argues for the existence of God as follows. The improbability associated with this universe instantiating two- to three-dozen fine-tuned properties is suspicious in exactly the same sense that the improbability associated with John's having won three consecutive lotteries is suspicious: it is, after all, not as if we got lucky with respect to one highly improbable property; we got lucky with respect to as many as three-dozen highly improbable properties. Since the existence of life in the universe is something that an intelligent agent would value, a universe that instantiates every one of the properties necessary to support life is something that an intelligent agent would value. Accordingly, the complex structure of the event that selects the properties of the universe, together with the fact that those properties produce something that an intelligent agent would value, justify concluding that some intelligent agent, God, deliberately brought it about that the universe has those fine-tuned properties.

Schlesinger's argument has each of the three requisite elements of a design argument. First, it identifies a property instantiated by the universe – namely its having all the necessary prerequisites for life. Second, it argues that the universe's having these prerequisites conduces to a state of affairs – namely the existence of life in the universe – that an intelligent agent would value. Third, it identifies a feature of the universe's having all these properties – namely the suspicious character of an event that results, so to speak, in our winning so many highly improbable lotteries – that makes a design hypothesis a far more probable explanation of the fact that the universe is fine-tuned for life than any other hypothesis. Unlike Collins's version of the fine-tuning argument, then, Schlesinger's version is a genuine example of a design argument.

2.2. The problem with the design version of the fine-tuning argument

Though Schlesinger's argument is both beautiful and remarkable for its ingenuity, it is nonetheless problematic as a design argument. Con-

sider again the two cases I described to motivate the discussion. As we saw, whereas a situation in which John wins a 1-in-1,000,000,000 lottery for a valuable prize does not seem to support a justified suspicion that he cheated, a situation in which John wins three consecutive 1-in-1000 lotteries for such prizes does seem to support a justified suspicion. Despite the fact that the odds of the two occurrences are exactly the same – 1-in-1,000,000,000 – it seems reasonable in the second case, but not the first, to suspect that the outcome is explained by intelligent design.

But it is important to note that the justified application of the design inference in this case turns on our having some additional information. Strictly speaking, it is not just the fact that John won three consecutive lottery games that pay \$500,000, coupled with the fact that winning a cash prize is something that is valued by intelligent agents like John, that justifies us in suspecting that someone is cheating. It is also that we know two additional facts: (1) there exist people who value cash prizes and hence have a motive to cheat in lottery games; and (2) such people, as an empirical matter, frequently attempt to cheat in such games. In the absence of claims (1) and (2), we lack sufficient reason to think the design inference is reliable; as was noted above, each of the two situations involving John is, as a mathematical matter, equally improbable.

Notice that exactly the same is true of the Caputo argument. The reason the court was able to rule out chance is that it had considerably more information than just facts about the sheer improbability of producing the sequence by chance. In particular, the court had the following empirical facts: (1) Caputo exists and is an intelligent agent; (2) it is likely that Caputo has political preferences; (3) Caputo is an election commissioner who has control over who appeared first on the ballots in Essex County; (4) intelligent agents with political preferences have strong reason to want that their party be given a certain election advantage, such as the preferred ballot position; and (5) intelligent agents with strong reason to want that their party have a certain election advantage and an opportunity to act in fraudulent ways that would ensure that their party get that advantage frequently act in such ways. Though the court did not explicitly cite such facts, it is clear that their effect is to drastically raise the probability that Caputo had intentionally brought it about that the Democrats received the preferred ballot position 40 of 41 times. Exactly how much these facts increased the probability of the hypothesis that Caputo brought about the result is, of course, not entirely clear. But this much is clear: these

facts justify assigning a probability to the design hypothesis that is much higher than 1 in 2^{41} – which is the probability (assuming that there are only two parties) of producing the precise sequence of ballot selections – and hence enable us to rule out chance with a high degree of epistemic confidence.

The reason, then, that the design inference reliably detects intelligent design in these cases is that we already have strong independent reason to believe that there exists the right kind of intelligent agent who can bring about the relevant outcome. We can be confident that this particular inference reliably detects intelligent design in the Caputo case and John example precisely because we have this additional *empirical* information in both contexts. Indeed, we already *know* – on any reasonably plausible conception of knowledge – that intelligent agents with the right sorts of motive exist; after all, each of us can be quite certain of our own existence, intelligence, and motives.

It is, however, the very existence of the right sort of intelligent agency – namely, God – that the fine-tuning argument purports to show. What this suggests is that the empirical claim that the universe has the fine-tuned properties and the claim that this fact about the world conduces to produce something that is valuable to an intelligent being are not sufficient to justify the conclusion that intelligent design is the most probable explanation for the fine-tuned character of the universe. If the examples discussed above are any indication, we also need independent reason to believe that there exists an intelligent being capable of bringing it about that the universe has these properties. But insofar as Schlesinger’s version of the fine-tuning argument assumes that there is some other evidence (or argument) of God’s existence that gives rise to such a reason, it cannot stand alone as an argument for the existence of God.⁹

3. The argument from biochemical complexity

Following Michael Behe, design theorists have distinguished two types of complexity instantiated by biological structures. A system or structure is *cumulatively complex*, as William Dembski puts it, “if the components of the system can be arranged sequentially so that the successive removal of components never leads to the complete loss of function”¹⁰ (ID 147). A city is an example of a cumulatively complex system: one can successively remove people and services without rendering the community unable to perform its function. In contrast, a system of struc-

ture is *irreducibly complex* “if it consists of several interrelated parts so that removing even one part completely destroys the system’s function” (ID 147). A mousetrap is an example of an irreducibly complex system: removing even one part, for example, from a functional mousetrap results in complete loss of function.

Design proponents have identified a number of biochemical systems that they take to be irreducibly complex. For example, Michael Behe describes one such structure as follows:

The function of the cilium is to be a motorized paddle. In order to achieve this function microtubules, nexin linkers, and motor proteins all have to be ordered in a precise fashion. They have to recognize each other intimately, and interact exactly. The function is not present if any of the components is missing.¹¹

Similarly, he argues that the blood-clotting system is irreducibly complex: “When vitamin K is unavailable or antihemophilic factor is missing, the system crashes just as surely as a Rube Goldberg machine fails if a component is missing” (DBB 204).

Darwinian theories of evolution, according to Behe, cannot account for the existence of irreducibly complex biochemical systems. Since the random mutations that drive evolution can produce only small successive changes in an organism, any mutation in an organism lacking an irreducibly complex system *S* would result in an utterly non-functional precursor to the system. Such changes, then, could not render the organism better able to survive and hence, on Behe’s view, could not provide a bridge to an evolved organism that has *S*:

An irreducibly complex system cannot be produced . . . by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition non-functional Since natural selection can only choose systems that are already working, if a biological system *cannot* be produced gradually it would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on (DBB 39; emphasis added).

Thus, while the organism with the complete system is fitter than the starting organism that lacks any precursor, each intermediary in the evolutionary chain would be no fitter than its predecessor. For this reason, Behe concludes, irreducibly complex systems “*cannot* be produced gradually” along the lines that Darwinian theory suggests.

Behe is incorrect in thinking that there is anything in Darwin's theory that logically or nomologically precludes the gradual evolution of irreducibly complex systems. To see this, let O be an irreducibly complex sense organ that detects some sensory property in the world that we are currently incapable of sensing and let O^* be an utterly non-functional precursor of O possessed by some human beings. The mere fact that O^* is non-functional does not entail that possession of O^* , by itself, makes those human beings appreciably less able to cope with the environment; the appendix, for example, seems to have no significant function, but certainly does not render us appreciably less able to survive. Nor does it entail that possession of O^* makes such humans less likely to reproduce; while it is reasonable to suppose that persons with the precursor will have a harder time finding a mate if the precursor is conspicuous and unattractive, there is nothing in Darwinian theory that entails that they will be unable to mate. Insofar as a person with O^* is otherwise able to thrive and reproduce, that person will survive and transmit her genes to offspring. Accordingly, there is nothing in Darwin's theory that rules out the possibility of gradually evolving an irreducibly complex system.¹²

Behe's claim is most charitably construed as asserting that the evolution of an irreducibly complex system, though theoretically possible, is sufficiently improbable as to warrant an inference of intelligent design.¹³ That is, the claim is that the probability of an irreducibly complex system coming about through evolution is so small that the hypothesis that the system was deliberately brought into existence by an intelligent agency must be higher.

Though Behe does not identify a particular probability value that is so small as to warrant an inference of design, Dembski does: if the probability of the chance occurrence of what he calls "specified complexity"¹⁴ is less than 1 in 10^{150} , then the best explanation for its occurrence is the existence of an intelligent designer who caused that occurrence.¹⁵ Accordingly, the argument from biochemical complexity proceeds as follows: inasmuch as the probability of evolving an irreducibly biochemical complex system, like cells with functional cilia, through chance mechanisms is less than 1 in 10^{150} , we are justified in inferring that system was brought into existence by an intelligent designer.

But why think that a chance explanation for an occurrence of specified complexity can *always* be ruled out in favor of a design explanation if its probability is less than 1 in 10^{150} ? Here it is important to note that one *can never be* epistemically justified in preferring one hypothesis to another on probabilistic grounds if one has

information about only the probability of one hypothesis;¹⁶ to reject one hypothesis in favor of another on probabilistic grounds, one must have some information about the probability of both hypotheses.¹⁷ What we need, then, to be justified in inferring design from the occurrence of specified complexity is a general argument that shows we are justified in believing that, for all x , if x instantiates specified complexity, then the probability that some intelligent agent brought x about is greater than 1 in 10^{150} .¹⁸

To my knowledge, Dembski never gives an argument that justifies attributing a probability of greater than 1 in 10^{150} to the design hypothesis in cases of specified complexity,¹⁹ but he gives instead what he takes to be a general argument that justifies inferring design in every case of irreducible complexity. Dembski observes that we have considerable experience with design inferences in a number of scientific contexts: enforcement of intellectual property laws; forensic science; detection of insurance fraud; detection of data falsification, and so on.²⁰ Indeed, as he points out, the centrality of design inferences to these contexts have given rise to “entire industries [that] are devoted to drawing the distinction between accident and design.”²¹

This large base of experience provides, according to Dembski, overwhelming empirical reason to think that the design inference is warranted in *every* circumstance involving sufficiently improbable specified complexity:

In every instance where the complexity-specification criterion attributes design and where the underlying causal story is known, it turns out design actually is present; therefore design actually is present whenever the complexity-specification criterion attributes design. The conclusion of this argument is a straightforward inductive generalization. It has the same logical status as concluding that all ravens are black given that all ravens observed to date have been found to be black (ID 142).

Just as our prior experience with ravens supports the conclusion that all ravens are black, so too, on Dembski’s view, does our prior experience with inferring design from irreducible specified complexity support the conclusion that design *always* explains such complexity wherever it appears.

Dembski’s argument, then, for the design inference is a straightforward inductive generalization with the following structure:

1. Every *observed instance* of specified complexity is explained by the acts of some intelligent agent who brought it about.
2. Therefore, every *instance* of specified complexity is explained by the acts of some intelligent agency who brought it about.

Unfortunately, this induction paints much too broad a picture of our experience with specified complexity. Whenever we have been in a position to confirm the actual cause of an observed instance of specified complexity, the cause has been the behavior of *some human being*. As is readily evident, each of the scientific examples cited by Dembski (e.g., forensic science, detection of insurance fraud, etc.) involves human agency – and only human agency. At the very most, our prior experience with specified complexity and design inferences justifies the following generalization:

1. Every observed instance of specified complexity is explained by the acts of some *human being* who brought it about.
2. Therefore, every instance of specified complexity is explained by the acts of some *human being* who brought it about.

But even this more modest induction turns out to be straightforwardly problematic. As framed, it would justify attributing every instance of specified complexity to the behavior of some human being – including those instances that Dembski and Behe believe can be explained only by divine intelligence. Thus, for example, this induction would justify inferring from the existence of cells with cilia that some class of human beings deliberately brought it about that those cells have cilia. While we are becoming increasingly able to modify genetic material to bring about such events, it is clear that we could not be responsible for the original appearance of such cells because, as even creationists would agree, we lacked the relevant expertise when such cells came into existence.

As it turns out, our experience in confirming the origins of specified complexity, then, extends no further than this:

1. Every observed instance of specified complexity that *could be explained by the acts of some human being* who brought it about has, in fact, been explained by the acts of some human being who brought it about.

2. Therefore, every instance of specified complexity that could be explained by the acts of some human being who brought it about *is* explained by the acts of some human being who brought it about.

As this argument makes clear, our experience justifies the design inference only when confronted with an instance of specified complexity that could, given human limitations, have been brought about by a human being and justifies no stronger conclusion than that some human being brought that instance about.

This, however, is only the beginning of the problem for the argument from biochemical complexity. It is important to realize that what explains why Premise 1 is true in large measure is that we already know that intelligent human beings exist and bring specified complexity into existence. After all, *we* are the ones who build the very mousetraps that can be rendered non-functional simply by removing one piece. And the same, of course, is true of just about any reasonably complex artifact that we can think of. Remove a part from, say, a picture tube, and it is quite likely that the picture tube will cease to function.

As a statistical matter, the causes of the vast majority of instances of specified complexity are obvious to us because we are in a position to directly observe human beings manufacturing them. The cases where there is some mystery about whether a particular instance of complexity is brought about by design represent a very small percentage of the total observed instances. Indeed, it is not implausible to suppose that the class of mysterious cases is so small relative to the total number of observations as to be statistically insignificant. As an empirical matter, we know that human beings are deliberately bringing about such complexity because, well, we do it all the time.

This background knowledge, of course, helps to explain why the design inference is reliable in the various contexts that Dembski describes. Although Dembski claims that the court was justified in making the design inference in the Caputo case immediately once they had succeeded in “ruling out regularity, and then ruling out chance” (ID 19), we saw above that the court also knew that there was at least one intelligent agent who had motive and ability to ensure the Democrats got the preferred ballot position 40 out of 41 times. These facts enabled the court to attribute a value to the design hypothesis that was clearly much higher than the chance hypothesis – and hence made it possible to justifiably conclude that Caputo had cheated somehow.

It is precisely because we have such background knowledge that the design inference has proved reliable in every instance in which the cause of highly improbable complexity was known. As a general matter, design inferences in insurance fraud cases, in forensic cases, and in cases of possible falsification of scientific data are employed against a background in which we already know (1) that there exists an intelligent agent who has, (2) the ability to bring about the relevant instance of specified complexity and (3) a motive to do so – though we may not know the exact identity of the person. But this background information operates to dramatically raise the probability of a design explanation relative to the probability of a chance explanation and hence allows us confidently to reject the chance hypothesis.

Indeed, the design inference is unjustified without this background information. If, as I stated above, one cannot be epistemically justified in preferring one hypothesis to another on probabilistic grounds when one has information about the probability of only one hypothesis, the design inference, as Dembski formalizes it, is justified only when we have sufficient background information to justify us in thinking that the probability of the design hypothesis is greater than 1 in 10^{150} . In the Caputo case, we have such background information: the fact that Caputo is a Democrat with access to the ballot position selection mechanism justifies us in thinking that the probability that he deliberately brought about the ballot position of the Democrats is extremely high – and hence much greater than 1 in 10^{150} . Without any such knowledge, however, we are not justified in assigning any particular probability value to the design hypothesis.

The problem, then, with trying to infer God's existence from specified biochemical complexity is that, without help from other arguments or evidence for and against God's existence, we do not have any information that would justify us in assigning any particular probability to the hypothesis that God exists and brought about the relevant complexity. What we lack in particular is some independent reason to think that there exists an intelligent agent with the appropriate abilities and motivations – which is, of course, exactly what the argument from specified biochemical complexity is trying to show.

The claim here is not that we must already be justified in thinking that God exists in order to reliably infer design; rather, it is that we need sufficient information to justify assigning some value greater than 1 in 10^{150} to the probability that God exists. Though the design argument is typically employed in *human* contexts in which we are justified in assigning a probability of 1 to the hypothesis that there exists

an intelligent agent with the appropriate motivations and abilities, this is not necessary. All that is needed is sufficient information to justify assigning a probability to the design hypothesis that is higher than the one we can assign to the chance hypothesis.

It is true, of course, that the epistemic force of the design inference tracks the magnitude of the difference between the two probability assignments: other things being equal, the bigger the difference between the two numbers, the stronger the epistemic force of the design inference. But as long as we can justifiably assign a bigger number to the probability of the design hypothesis than the one we assign to the chance hypothesis, the occurrence of irreducible specified complexity provides an epistemically respectable reason to prefer the design hypothesis to the chance hypothesis. Since the occurrence of irreducible specified complexity alone, however, cannot justify assigning any particular probability to the hypothesis that God exists, the argument from biochemical complexity needs help from other arguments for God's existence. Like Schlesinger's version of the fine-tuning argument, then, the argument from biochemical complexity cannot stand alone as an argument for God's existence.

4. The problem exemplified

4.1. A thought experiment

In the last three sections, I argued that the various versions of the design inference cannot ground a stand-alone argument for God's existence because they need help from other arguments for God's existence. To see at a deeper level why this is so, it would be helpful to consider a thought experiment. Suppose that you are a space traveler and that, during your travels, you pass close enough to a planet to notice a surprising arrangement of rocks. They are intricately arranged into the shape of the following phrase "Ken was here." The immediate temptation, of course, is to make a design inference. In particular, you will undoubtedly consider drawing the conclusion that some personal, intelligent agent had visited this planet and deliberately arranged the rocks to form these words; in fact, you might very well be tempted to think the agent's name was Ken.

But notice that how much epistemic force the inference has will depend on your proximity in space to a portion of the universe where you have strong grounds for supposing that intelligent life exists. If,

for example, you are very close to Earth, then the force of the design inference will be fairly strong – though you will undoubtedly have many questions about who could have done this. Similarly, if the location of the stones is near another planet with clearly sufficient resources to support intelligent life, then the force of the inference will also be fairly strong – though not quite as strong as it would be were you close to Earth; after all, knowing that there is a nearby planet that *can* support life is not the same as knowing that there is a nearby planet that *does* support life.

The force of the inference, however, continues to diminish the further you are from planets you know are capable of supporting life. There are two situations to be distinguished here: (1) you are a substantial distance from the last place you know to be capable of supporting life and you know that there is nothing within that distance (in any direction) that is capable of supporting life; and (2) you are a substantial distance from the last place you know to be capable of supporting life but *do not know* whether there is anything else within that distance (in any direction) capable of supporting life. It should be clear that whatever epistemic (or probative or evidentiary) force the design inference has in either of these contexts, its force in (2) exceeds that in (1). As an epistemic matter, you are justified in having more confidence in the design inference if you are in situation (2) than you would be in situation (1) – though it is clear that the force of the inference in both situations is considerably weaker than it would be if you knew yourself to be near a planet capable of supporting life.

What this discussion suggests, then, is this: the epistemic force of the design inference in these situations depends on our having *additional* empirical information about the universe – information that is independent of the observation of complexity in the rock arrangement. To the extent that the epistemic force of the design inference, as we just saw, varies directly with our distance from a planet we know to be capable of supporting life, it seems reasonable to surmise that, assuming that such force can be quantified, it would approach (but never reach) zero as we approach (but never reach) an infinite distance from a planet we know to be capable of supporting life. But this suggests that the empirical information about our proximity to a planet capable of supporting life is playing an indispensable role in justifying the inference.

This should not be taken to deny that the design hypothesis in *this* context gets independent support from the relevant observation of apparent design. And this is as it should be: design inferences are sup-

posed to provide support that is independent of and in addition to the probability assessment made possible by whatever other reliable information one has at one's disposal. To deny that the design hypothesis gets some support from the new observation would entail the implausibly skeptical claim that design inferences are incapable of contributing evidentiary value (or epistemic force) to design hypotheses – a *reductio*, I think, of any claim that entails it.

Nor should this be taken to deny that how much independent support the design hypothesis gets will depend on the level of observed specified complexity.²² Clearly, the design inference will have greater epistemic force if the observation involves rocks arranged in the form of a complete Shakespearean sonnet than if the observation involves rocks arranged in the form of the phrase “Ken was here.” Part of what makes design strategies epistemically relevant is that, so to speak, the occurrence of random specified complexity in any universe is presumptively improbable – and the higher the level of observed complexity, the higher the improbability of the hypothesis that it can be explained in terms that do not make reference to intelligent agency.

Even so, the fact that the epistemic force of design inferences depends on our having additional information about the relevant design hypothesis tells us something very important about design inferences in general. Notice that, no matter where we are in *this* universe, the design inference from the observation of the rocks in the form of “Ken was here” will have *some* epistemic force – though this force will vary according to our physical proximity to locations that are known to be able to support physical life. We can be confident that the probability of *any* hypothesis positing the existence of some intelligent *material* being in this universe will be very high, other things being equal, because we *know* that this universe contains at least one form of such life – namely, us. Thus, in this universe and hence against the epistemic backdrop of these known probabilities, any design inference from observed complexity will have some significant, if not fully determinable, epistemic force.

But the epistemic situation is radically different if we have no other information about the world that would bear on the probability of the relevant design hypothesis. Suppose, for example, that someone in this logically possible world has invented a machine capable of transporting us to other logically possible worlds.²³ Suppose that this machine transports us to a different logically possible universe where we observe the rock formation. Suppose, further, that we know (1) that we are in a different world and (2) that this observation is all we have to go on in

determining whether there is any other intelligent life in that universe than us. In this world, it is simply not clear how much epistemic support, if any, the observation could provide for a design hypothesis. In our world, it is clear that the further you get from a location where you know there either is or could be intelligent life, the less epistemic force the design inference has. But this suggests, at the very least, that we are not in a position to determine how much epistemic force, if any, a design inference has in a world where we have no other information whatsoever about the probability of intelligent life.

The problem with respect to theistic design arguments is that we are in exactly the same epistemic position with respect to God's existence in *this* world that we would be in with respect to the existence of intelligent life in another logically possible world where we lack relevant background information. If we concede for the sake of argument that the other arguments for and against the existence of God have no epistemic force,²⁴ then we have no reliable information about the probability that there exists a being that instantiates all the perfections and that exists, at least in part, outside of time and space. The existence of intelligent agents like us in this universe, by itself, does not tell us anything about the probability that there exists a being that has properties that are utterly unlike those instantiated by any known material beings. That, in part, is why theists and atheists resort to other strategies of argument.

By now, this sort of epistemic difficulty should be familiar. We saw, for example, that Schlesinger's distinction between suspiciously improbable and benignly improbable lotteries, which underlies his version of the fine-tuning argument, presupposes the existence of intelligent cheaters who are usually responsible for bringing about events that have the structure of a suspiciously improbable lottery. Likewise, we have seen that the argument from irreducible specified complexity relies on an inference strategy that has been shown to be reliable only in contexts where we already know that there exist intelligent agents capable of bringing about the right sort of result.

4.2. Are there design inferences not subject to these application-conditions?

It is tempting to think that one can produce an example of a successful design inference that does not presuppose that we have other information regarding the existence of the right sort of intelligent agents by changing last section's thought experiment in just one respect.

Suppose that we observe what appears to be a 1957 Chevy, complete in every respect all the way down to the logo and markings on the instrument panel. It seems that, no matter where we are in this universe, we are justified in inferring that the object's presence at this surprising location is explained by the acts of some intelligent agency. Indeed, it seems that we would be justified in inferring intelligent agency even if we knew (or believed) we were in some other logically possible universe. If so, then this would be an example of a design inference that is justifiably made in a context in which we have no independent reasons for thinking that the right sort of intelligent agency exists.

Strictly speaking, however, what explains our confidence in the design hypothesis is not really a matter of our detecting an instance of irreducible complexity. What should jump out at us here, more than anything else, is the exact similarity of the object to 57 Chevys in our world. The object resembles a 57 Chevy in every respect: it has the same instrument panel with the same markings; to our surprise, the speedometer is even marked off in miles per hour. It seems indisputable that this object, despite its highly improbable location, is an *automobile* – something we know is made by intelligent designers. Otherwise put, it seems clear that we are justified on the strength of its resemblance to other automobiles in characterizing the object as an *artifact*.

But to the extent that our reasoning depends explicitly on the observed similarity with artifacts in our world, it is not plausibly characterized as a design inference as I have described it. Instead, the structure of this reasoning is more plausibly characterized as being an argument from analogy:

1. The observed object resembles in every perceivable respect a 1957 Chevy.
2. What causes every 1957 Chevy is that it was made by an intelligent agent.
3. Like effects have like causes.
4. Therefore, what caused the observed object is that it was made by an intelligent agent.

The resemblance to the version of the design argument criticized by Hume is conspicuous. As was true of that argument, the complexity of the observed object plays at most an indirect role in inferring that it has an intelligent maker: it is the similarity of the object in this respect to known artifacts that does the epistemic work here.

In this connection, it is worth noting that we would likely be nearly as confident about the design inference if what we observed on the planet was instead an exact replica of the grill, or even a rear bumper, of a 1957 Chevy. Despite the fact that the object does not instantiate any obvious instance of irreducible specified complexity, we would probably be extremely confident in thinking that a design hypothesis explains its presence precisely because of its exact similarity to objects we know to have been the products of intelligent design. And, as long as we are justified in thinking that we are in *this* material universe, it seems clear that we would be justified in drawing exactly that conclusion.

It is hard to say whether we would be justified in inferring an intelligent maker if we knew or believed ourselves to be in some other logically possible world without any other information than what we can observe around us. For my part, while a quick gut check indicates that I would probably, as a psychological matter, be very tempted to draw the conclusion that some intelligent agency accounts for the object's presence, I must confess that I have absolutely no idea whether that inference would be justified: whether and to what extent the claim that two logically possible worlds are similar in one respect justifies concluding that they are similar in some other respect is an issue that is well beyond my expertise (and the scope of this paper). One way or another, though, the important point for our purposes is that these examples are not plausibly characterized as involving design inferences as I have defined the notion.²⁵

To my knowledge, proponents of design inferences have yet to produce even one uncontroversial example of a successful design inference that is not subject to exactly the same application-conditions; the success of the design inference in each of the paradigm instances offered by proponents relies implicitly on our having independent evidence of the right kind of intelligent agency. Consider another example that William Dembski offers in support of design inferences:

A standard trick of statistics professors with an introductory statistics class is to divide the class in two, having students in one half of the class each flip a coin 100 times, writing down the sequence of heads and tails on a slip of paper and having students in the other half each generate purely with their minds a "random looking" string of coin tosses that mimics the tossing of a coin 100 times, also writing down the sequence of heads and tails on a slip of paper. When the students hand in their lists of sequences, the professor must sort them into two piles, those generated by flip-

ping a fair coin and those concocted in the students' heads. To the amazement of the students, the statistics professor is typically able to sort the papers with 100% accuracy (ID 135).

As Dembski explains, the reason for the professor's accuracy is that she simply looks for a repetition of six or seven heads or tails in a row to distinguish those sequences that are genuine from those that are fabricated. The professor knows that people generally alternate between heads and tails too frequently when they are trying to fabricate random sequences of coin-flip outcomes. Thus, she can infer design in sequences of outcomes that alternate too frequently between heads and tails.

But notice, again, that this empirical background information is absolutely crucial in warranting the design inference. After all, the probability of any one of these sequences is exactly the same as any other – namely 1 in 2^{100} ; thus, from a purely mathematical point of view, each of the genuine sequences is as astronomically improbable as each of the fabricated sequences. What makes it possible for the professor to assign a higher probability of design to the fabricated sequences is that she *knows* that half of the students are trying to fool her – information that, in each instance, goes towards determining the prior probabilities of a design hypothesis *in any given case*. In the absence of this kind of information, however, the epistemic force of the design inference drops catastrophically.

Similar things, of course, can be said about the arrangement of the rocks in the form of “Ken was here.” In the absence of any background information about the relevant probabilities, every arrangement of those rocks within that particular region of ground is as astronomically improbable as the arrangement in the form of “Ken was here.” How much epistemic force the design inference has depends on what *other* information we have at our disposal. If we are close to Earth, say, the probabilities of intelligent design go way up, making the design inference all the more forceful. If we are not close to a planet that we know can support life, our confidence in the design inference diminishes accordingly.

The thought experiment and supporting discussion, then, seem to confirm the general point. We can confidently make design inferences only against a backdrop in which we can confidently assign a comparatively high probability to the hypothesis that the right sort of intelligent agent exists. Thus, the application of design inferences presupposes that we have some independent evidence that the right

sort of agent exists; in particular, it presupposes we have sufficient information to infer that the probability the relevant phenomenon is explained by the acts of an intelligent agent is n , where n is greater than the probability it is explained by chance.

4.3. *Miracles as stand-alone empirical evidence for the existence of God*

It would be wrong to conclude from the last two sections that empirical considerations can never stand alone (i.e., independently of other arguments for the existence of God)²⁶ as epistemically respectable reasons to believe that God exists. Suppose, for example, that it is clear on the basis of everything we know about the relevant sciences that Laz A. has been dead for several hours. Assume, in particular, that rigor mortis has set in; Laz's body temperature has been significantly below 98.6° for several hours; no brain, heart, or lung activity has been detected in several hours; and so on. On this set of assumptions, Laz is, as far as our best technology can tell, as dead as a man can be. Suppose further that another man – a stranger who identifies himself as J.C. – enters the room and, upon seeing Laz's passionately grieving friends and loved ones, says "I am moved by your great love for this man and will raise him from the dead." If J.C. performs some physical gesture intended to resurrect Laz that immediately succeeds in doing so, it is reasonable to think we have an epistemically respectable reason for thinking that J.C. either has supernatural powers or is acting as a medium for something that has such powers (i.e., powers or abilities that are not subject to the nomological laws that constrain what ordinary humans can do). In either case, this gets us one step towards an inference that God or some superior sort of God-like being exists.

Another inference is possible here. On the strength of the observation that Laz's resurrection is logically inconsistent with the fundamental laws that we have, as an empirical matter, identified as governing/describing the behavior of organic entities, one might be tempted to infer instead that we have misidentified or misstated the relevant fundamental laws. Indeed, it is not entirely uncommon in the history of science that scientists have responded to recalcitrant empirical observations by replacing one set of propositions making up the fundamentals of one scientific theory with another set; as a historical matter, scientists have sometimes discovered evidence that calls the very fundamentals of a theory into question. While it is perhaps

a little surprising that one isolated observation might be so powerful as to call the fundamentals of biological theory into question, such a response is not implausible in this case: assuming that we are certain that Laz was dead, Laz's resurrection alone is sufficient to justify skepticism with respect to the existing theory.

Given the role that J.C. plays in this event, though, it seems far more reasonable to, at the very least, entertain the conclusion that the explanation for Laz's resurrection is that someone with supernatural or divine power brought it about. J.C. responded to the sufferings of Laz's grieving friends and loved ones with (1) a statement that he would resurrect Laz; and (2) a gesture intended to resurrect Laz that was immediately followed by Laz's resurrection. It is the connection of an event that is inconsistent with fundamental biological laws with J.C.'s stated purposes that makes it epistemically reasonable to think that some being with divine or supernatural power is responsible for Laz's resurrection.

Though the occurrence of these sorts of events – which are not unreasonably characterized as “miracles” – can thus provide stand-alone empirical evidence for the claim that some being has divine or supernatural powers, it is important to note that the relevant inferential strategy is very different from the one that grounds the design arguments we have considered. In contrast to those arguments, this one is grounded in information about the probabilities of *all* of the relevant hypotheses. Insofar as Laz's resurrection is inconsistent with the fundamentals of the prevailing biological theories, no causal process could explain his resurrection consistently with these laws – including those that we characterize as “random” or “chance” because we cannot predict the consequences.²⁷ If, as seems reasonable, we can rule out genuinely indeterministic quantum events as being irrelevant in explaining Laz's resurrection, then we can conclude that the relevant chance hypothesis is 0.²⁸ If, as also seems reasonable, J.C.'s stated intention to resurrect Laz together with a gesture that apparently succeeds in resurrecting Laz²⁹ justifies assigning some (possibly small) non-zero probability to the relevant design hypothesis, then Laz's resurrection provides a stand-alone empirical reason to think that God exists.

There is, of course, evidence of design in this occurrence, but it functions differently than the way in which such evidence functions in design arguments. J.C.'s statements are obviously direct evidence of design: they are evidence of his beliefs, intentions, and objectives. But J.C.'s existence and intelligence are not in question; what *is* in question is what sort of powers we can justifiably attribute to him: his state-

ments, together with the apparent success of his gesture in resurrecting Laz, give us reason to think that he has supernatural powers. The evidence of design does not enable us to infer anyone's existence; rather, it enables us to infer some sort of causal connection, albeit one not subject to ordinary laws, between J.C.'s behavior and Laz's resurrection. And the presence of this connection, together with the fact that this event is inconsistent with the relevant fundamentals of biological theory, allows us to draw the conclusion that J.C. has supernatural powers or is acting as a medium for someone else who has such powers.³⁰

Nevertheless, these sorts of events can provide empirical evidence of the existence of something with supernatural powers. To take an interesting example that Dembski considers in passing, suppose that "microscopic examination revealed that every cell was inscribed with the phrase 'Made by Yahweh.'" ³¹ While Dembski immediately concludes, reasonably enough, that "[d]esign always remains a live option in biology," ³² it is important to realize that whether we should infer that Yahweh exists depends on more than just the fact that the inscription appears to convey a startling piece of information. If the phrase really is an inscription of some kind that cannot be explained in terms of some set of genes, then what we have here is a case that is similar to the last case. The appearance of this inscription in every living cell appears inconsistent with certain fundamentals of molecular biology that tell us that the traits of living organisms are determined by their genetic characteristics. The probability, then, that the inscription occurs by chance, given that it appears in every living cell, appears to be 0. In the absence of any other plausible explanation (such as some form of necessity), it is reasonable to infer design: something has to explain such an occurrence; and if we can rule out everything but design, then it is reasonable to infer design.

The analysis, however, is different if the appearance of the phrase can be explained in terms of certain genetic traits. If it could be explained in terms of genetic traits, the likely explanation is that this particular trait contributes something important to the survivability of every living organism; accordingly, the probability of the chance hypothesis might be very low, but it would nevertheless, in contrast to the last interpretation of the example, be non-zero. While this would, of course, be very surprising and would perhaps produce a strong psychological tendency to think that Yahweh exists and is responsible for this remarkable fact, such an inference, if the analysis in this paper is correct, would not be justified. On this interpretation, the "Made

by Yahweh” example has the same structure as the other design arguments and is vulnerable to exactly the same objections: as was true of “Ken was here” on a distant planet, the occurrence of what appears to be a meaningful phrase, by itself, does not provide any information about the probability of the design hypothesis. Although there would undoubtedly be a strong psychological temptation to make the inference on the basis of the occurrence of the phrase alone, such an inference is problematic.

5. What design inferences are designed to tell us

As it turns out, the examples discussed by Dembski point us in the direction of an interesting observation about design inferences: design inferences are typically used to enable us to distinguish what is *done* from what *merely happens*. In the statistics example, we are not attempting to infer the *existence* of intelligent agents; we already know that the right kinds of agent exist. Rather, we are trying to determine whether the best explanation for the occurrence of a particular sequence of heads and tails is that some intelligent agent fabricated the sequence. Likewise, in the Caputo case, we are not attempting to infer Caputo’s existence; we already know he exists. Rather, we are trying to determine whether a particular sequence of ballot position assignments was deliberately brought about by Caputo.

There is, of course, nothing unusual about this: in their prototypical use, design inferences are used to identify intelligent behavior – and not to show the existence of the right kind of intelligent agents. When an insurance company uses the design inference to identify insurance fraud, the company already knows that a particular intelligent agent exists – and one who has the right sort of abilities and motivations; the issue is whether *that* agent deliberately brought about some result. When a forensic scientist conducts DNA testing in order to place a defendant at the scene of a crime, the scientist already knows that a particular intelligent agent exists – and one who, again, has the right sorts of abilities and motivations to bring about the result; the issue is whether the particular result was the design of that particular agent. All of the standard uses of design inferences occur in contexts where we already know the right sort of agent exists.

I know of only one instance in which the design inference is widely accepted as being a reliable means of establishing the existence of some sort of intelligent being that we do not already have strong inde-

verse, it is clear that such information, *by itself*, justifies us in thinking that the probability of intelligent life elsewhere in the universe is vastly higher than 1 in 2^{1126} , which is the probability that this particular meaningful sequence of 1s and 0s is a purely random occurrence.

It is true, of course, that we do not know exactly how much higher that probability is, but that does not cast doubt on the reliability or force of the inference here. What is minimally needed to justify a design inference is sufficient background information to make it possible for us to assign a probability to the design hypothesis that is greater than the probability we can justifiably assign to the chance hypothesis. (1) and (2), above, do exactly that: given that we know that intelligent life exists and, *a fortiori*, that the universe is hospitable to intelligent life, we can justifiably assert that the probability that intelligent life explains the sequence above is vastly higher than 1 in 2^{1126} and hence conclude that the design hypothesis is vastly more probable than the chance hypothesis – which, I think, is sufficient to warrant accepting the design hypothesis.³⁵ Even in this context, the application of the design inference turns on the fact that we know the right sort of intelligent beings exist.

Still it is important to realize that this is an exceptional use of a design inference. Design inferences are usually employed to distinguish events that can be attributed to the behavior of intelligent beings already *known* to exist from events that are the result of chance.³⁶ But even when they are used to detect the existence of intelligent beings, as in the SETI example, they implicitly rely on information about the prior probabilities that the right kind of intelligent being exist; our existence, by itself, justifies us in thinking that the prior probability of extraterrestrial life is considerably higher than 1 in 2^{1126} . The distinct observation of specified complexity for which the probability of the chance hypothesis is 1 in 2^{1126} , together with this background information, is what justifies the acceptance of the design hypothesis.

Accordingly, design arguments for the existence of God must ride piggy-back atop the other arguments for the existence of God. As was true in the other cases, we must have some independent reason for thinking that there exists an intelligent agent with the right sort of abilities and motivation to bring about the relevant occurrence of complexity. Without such a reason, design arguments provide little, if any, reason to think that God exists.

This should not, however, be taken to imply that design arguments can do no epistemic work whatsoever. Such arguments *can* legitimately function to buttress the other arguments for God's existence – to the

extent that the reasoning in such arguments is not logically fallacious and hence has some epistemic force. For example, if one believes, as theists presumably do, that the arguments against God's existence fail and that at least some of the arguments for God's existence provide reason to believe that God exists, then the design inference provides some additional reason to believe that God exists. Accordingly, insofar as the goal of the design arguments is merely to reinforce the faith of believers who already believe they have good reason to think that God exists, the design arguments succeed.

Indeed, insofar as we are otherwise justified in thinking that God exists, design inferences can provide reliable information about how to make sense of the world and about what God wants for the world. In that set of epistemic circumstances, for example, the occurrence of fine-tuned properties would provide a very good reason to think that God (whose existence has already been independently verified) deliberately structured the world to support life. Likewise, what Dembski, Behe, and others identify as irreducible complexity in the world would provide a very good reason to think that God, so to speak, values intelligent life and, for this reason, helped evolution along. And this sort of information about God's behavior would enable us to come to understand quite a bit about what God wants from us.

What design arguments will not do, however, is function as a stand-alone rebuttal to atheism or agnosticism. Insofar as one believes that the other arguments for and against God's existence lack epistemic force, the design arguments provide little, if any, reason to believe that God exists. Similarly, insofar as one believes that the arguments against God's existence provide some reason to think that God does not exist while the arguments for God's existence lack epistemic force, the design arguments provide no reason to reject the hypothesis that God does not exist. The design arguments, by themselves, will not justify belief that God exists. To the extent that design arguments are intended to provide a stand-alone reason that will convert agnostics or atheists, they fail.³⁷

Notes

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1. Undecided voters are, other things being equal, more likely to vote for the first person on a ballot; thus, getting the top line in a ballot affords the candidate with an advantage.
2. Though the court declined to convict Caputo, it was primarily because the court needed more than (1) through (4) to satisfy a criminal burden of proof, which requires proof beyond a reasonable doubt; in particular, it needed a causal story as to how Caputo could have brought this about.
3. David Hume, *Dialogues Concerning Natural Religion* (edited with an introduction by Norman Kemp Smith), New York: Social Sciences Publishers, 1948, p. 143.
4. In contrast to the argument from analogy, William Paley's famous watchmaker argument explicitly identifies a sort of irreducible functional complexity as a reliable indicator of design: "[S]uppose I found a watch upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think ... that, for anything I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for [a] stone [that happened to be lying on the ground]? ... For this reason, and for no other; viz., that, if the different parts had been differently shaped from what they are, if a different size from what they are, or placed after any other manner, or in any order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it." Though frequently interpreted as an argument from analogy (see Louis P. Pojman, *Philosophy of Religion* (Mayfield Publishing Company, 2001), 32; and Ed. L. Miller, *God and Reason: An Invitation to Philosophical Theology*, 2nd Edition (Prentice Hall, 1995), 72), Paley's argument is a clear precursor to the mathematically more sophisticated contemporary versions.
5. Robin Collins, "A Scientific Argument for the Existence of God," in Michael J. Murray (ed.), *Reason for the Hope Within* (Grand Rapids, MI: William B. Eerdmans Publishing Co., 1999), 47–75, 49–50. Hereinafter referred to as SAG.
6. Collins's argument presupposes that this is the only actually extant material universe. If the hypothesis that every nomologically possible material universe actually exists in some superspace is true, then the probability that a fine-tuned universe exist is 1.
7. It is worth noting that, strictly speaking, this version of the fine-tuning argument provides a very weak reason to think God exists. To see why, let O be the observation that John Doe wins a 7,000,000-to-1 lottery. Let H1 be the hypothesis that an omnipotent, omniscient God wanted John Doe to win the lottery and intervened for the purpose of ensuring that John's numbers are drawn. Let H2 be the hypothesis that the lottery numbers are randomly selected. Notice that under H1, the probability that John wins the lottery is 1; for it is not possible for an omnipotent, omniscient God who intervenes to ensure John's numbers are drawn to make a mistake in those circumstances. Notice further that under H2, the probability that John wins the lottery is very small; for, as

I described the example, the odds are 1 in 7,000,000. Thus, O is considerably more probable under H1 than it is under H2. Accordingly, it follows from PC that we have reason for preferring H1 over H2.

It is true, of course, that PC provides some reason to prefer H1 over H2; after all, if O is *all* you know about the world, then the fact that O is more probable under H1 than under H2 gives you some epistemic reason to prefer H1 over H2. However, it should be readily evident that such a reason is easily defeated by other observations in the world: the fact that we know that winning numbers are sometimes selected by random mechanisms is sufficient to defeat H1, which theists would readily concede. As Collins formulates the argument, the occurrence of fine-tuning provides a pretty easily defeated reason to prefer the design hypothesis. For more detailed discussion of this point, see Kenneth Einar Himma, "Prior Probabilities and Confirmation Theory: A Problem with the Fine-Tuning Argument," *International Journal for Philosophy of Religion*, Vol. 51, no.4 (June 2002), 175–194.

8. George N. Schlesinger, *New Perspectives on Old-time Religion* (Oxford: Clarendon Press, 1988), 124–148.
9. There is a second major problem: it is not even clear that the event has the right structure. Assuming that it makes sense to think of the creation of the universe as involving some sort of lottery-like selection event, it lacks one of the elements that justify suspicion in the other examples. In the other examples, each selection results in something of independent value, like a preferred ballot position or a cash prize. The selection of one fine-tuned property, however, does not result in something of independent value. It is valuable only because it leaves open the possibility of winning something that is of independent value – namely, a universe hospitable to life; as will be recalled, had any one of these properties been significantly different, carbon-based life at least would not be possible. In this respect, the selection event resembles a lottery game that proceeds by selecting several numbers that must all be matched in order to win a cash prize. This latter event is not, as is readily evident, the kind of improbable event that naturally leads us to suspect that someone was cheating.
10. William A. Dembski, *Intelligent Design: The Bridge Between Science and Theology* (Downers Grove, IL: InterVarsity Press, 1999), 147. Hereinafter ID.
11. Michael J. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Touchstone Books, 1996), 204. Hereinafter DBB.
12. I believe that H. Allen Orr was the first to make this argument. See H. Allen Orr, "Darwin v. Intelligent Design (Again)," *Boston Review* (December 1996/January 1997), 28–31. I am grateful to an anonymous reviewer for the citation.
13. As Behe concedes "evolution might be far chancier than we thought, but still possible" (DBB 40).
14. Dembski defines "specified complexity" as follows: "Whenever we infer design, we must establish three things: *contingency*, *complexity* and *specification*. Contingency ensures that the object in question is not the result of an automatic and therefore unintelligent process that had no choice in its production. Complexity ensures that the object is not so simple that it can readily be explained by chance. Finally, specification ensures that the object exhibits the type of pattern characteristic of intelligence" (ID 128). Irreducible biochemical complex-

- ity is one type of specified complexity – as is the complex specified information that Stephen C. Meyer believes is contained in DNA. See, e.g., Stephen C. Meyer, “Evidence for Design in Physics and Biology: From the Origin of the Universe to the Origin of Life,” in Behe, Dembski, and Meyer (eds.), *Science and Evidence for Design in the Universe* (San Francisco: Ignatius Press, 2002).
15. See William Dembski, *The Design Inference* (Cambridge: Cambridge University Press, 1998), Sections 2.2 and 6.5. Hereinafter DI.
 16. Unless, of course, the probability of that hypothesis is 1. Even if one hypothesis has probability 0, we cannot conclude that another is *more probable* unless we have some reason to think its probability is greater than 0.
 17. One might be tempted to think that this is true only if we have information about the probability of the hypothesis that is being rejected. Thus, on this line of analysis, if we know that A has a non-zero probability and we have no information about the probability of B, we could be justified in rejecting B on the strength of such information, but we could never be justified in rejecting A on the strength of such information. It seems to me, however, that only agnosticism about B is epistemically justified at this point. Should we achieve information about B that bears on its probability down the line, we would have to assess it relative to that of A. Though I will continue to assume as much in expressing the relevant epistemic principle, it is important to note that nothing turns on this assumption.
 18. Indeed, the mere fact that an event is highly improbable does not, by itself, justify an inference of design. After all, we can easily bring about the occurrence of chance events with a probability of less than 1 in 10^{150} . Suppose, for example, we program a computer to randomly select a 151-digit number. No matter which number it selects, the probability of its selecting that number will be 1 in 10^{151} , which is less than 1 in 10^{150} . There are, of course, many numbers that Dembski believes might warrant an inference of design (e.g., the first 151 places of a decimal expansion of pi), but it is clear that we would not be warranted in inferring design in every case. Since highly improbable events (i.e., those with probabilities of less than 1 in 10^{150}) happen all the time, we need some explanation as to why the occurrence of highly improbable specified complexity, *as a general rule*, justifies an inference of design.
 19. While Chapter 6 of *The Design Inference* is devoted to giving a mathematically rigorous justification for the design inferences in such cases, it focuses primarily on showing that chance is almost always a highly improbable explanation of specified complexity – something that I think most people would concede. Dembski typically does no more than gesture at giving an argument for the claim that the probability of design is almost always higher than 1 in 10^{150} , which is absolutely crucial to justifying the design inference.

Dembski, for example, asks us to consider Swinburne’s example of the mad kidnapper who allows a machine that simultaneously shuffles 10 decks of cards to decide whether he will kill the victim *S*: if the first card from each shuffled deck is an ace of hearts, he will let *S* go; otherwise, he will kill *S*. On Dembski’s view, *S* should conclude, after examining that no one has tampered with the machine, that the design hypothesis is the most likely explanation when the first draw comes up all aces of hearts: “Even though *S* distrusts the kidnapper’s claim that E happened by chance, *S* does not want to be hasty. After all,

- highly improbable events happen by chance all the time. What if *S* is not the only victim ever kidnapped by the madman? Suppose that prior to *S* being kidnapped, the madman kidnapped billions and billions of other hapless victims, placing them all inside identical cardshuffling machines, and that in each case the cardshuffling machine failed to deliver ten aces of hearts, thereby exploding and killing the victims. . . . *S* is a human being. Throughout recorded history, the number of humans has not exceeded a trillion, that is 10^{12} . Even if every one of these human beings was kidnapped by mad kidnappers, placed inside exploding cardshuffling machines, and subjected to the same cardshuffling experiment as *S*, even with this many kidnapping victims, it would still be highly unlikely to survive” (DI 186–7). It is clear that this passage, which is representative of his efforts in Chapter 6, tells us nothing about the probability of the design hypothesis; its point is to show that, even if there we assume that there are a trillion kidnappings, the probability of any favorable outcome being explained by chance is extremely low.
20. See Dembski, *The Design Inference*, Chapter 1, for a discussion of these examples.
 21. Dembski, *No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence* (Rowman & Littlefield, 2002), 5.
 22. Michael Behe makes the point as follows: “A few years ago it was reported that an image of Elvis was formed by mold growing on the refrigerator of a lady from Tennessee. Again, the resemblance could be seen, but it was slight. Suppose, however, that the resemblance was actually very good. Suppose that the image was made up not only of black mold. Suppose that there was also *Serratia marcescens* – a bacterium that grows in red sheets. And suppose there were colonies of the yeast *Saccharmyces cerevisiae*, which are shiny white. And there was also *Psuedomonas aeruginosa*, which is green, and *Chromobacterium violaceum*, which is purple, and *Staphylococcus aureus*, which is yellow . . . In fact, suppose the bacteria and mold on the refrigerator formed an image of Elvis that was well nigh identical to one of those velvet posters of him that you see in variety stores. Can we then conclude that the image was designed? Yes we can – with the same confidence that we conclude that the dimestore posters were designed” (DBB 198–199). Of course, part of what contributes to our confidence here is that we already know there exist human beings capable of doing similar sorts of things (some people, e.g., can paint detailed pictures on very small surfaces).
 23. There are a couple of other ways to set up this thought experiment if the reader has doubts about whether it is coherent. First, one could assume that the truth of the hypothesis that all possible material universes exist in some actually extant superspace and then assume that we have been transported across this superspace to another material universe. Alternatively, one could assume that we are traveling in this one and mistakenly come to believe that we are in some other logically possible world and have no other information about the probability of intelligent life in this universe (apart, of course, from knowing we exist).
 24. This assumption is harmless since, again, proponents of design arguments do not want to rely on the other arguments for God’s existence.

25. At the very least, they are not *principally* design inferences. If it is true that the observation of some sort of complexity plays some role in even this second inference (the grill, after all, is fairly intricate), the similarity to other objects nonetheless bears most of the weight. By itself, the observation of complexity does comparatively little to raise the probability of the design hypothesis; it is the similarity to other artifacts that, I think, raises the probability to such an extent that we are justified in accepting the design hypothesis.
26. Of course, ordinary and uncontroversial background knowledge about the world is assumed here.
27. Computers that are programmed, for example, to randomly select a set of numbers operate by means of nomological processes. To say that an event is random is not to deny that it has a cause; it is rather to assert that the causal processes that produced it were, as the matter is sometimes put, blind.
28. One might, of course, doubt that we can rule out such events as irrelevant, but the point here is not to show that these sorts of arguments work. Rather, the point is to show that the inferential strategy is different from the one that grounds the design argument.
29. Because there is such evidence, this is not an instance of the *post hoc ergo propter hoc* fallacy.
30. Which of these possibilities will presumably be worked out on the basis of further evidence – such as, for example, what J.C. has to say about what happened.
31. William Dembski, “Reinstating Design within Science,” *Rhetoric and Public Affairs*, vol. 1, number 4 (Winter 1998), 506. Since Dembski says very little about the particulars of this very intriguing example or its analysis, I will try to flesh it out in a bit more detail here.
32. *id.*
33. See *ID*, Chapter 5, for Dembski’s discussion of this sequence.
34. We are, for example, sending out radio transmissions in the hope that some extraterrestrial intelligent life receives it.
35. As will be recalled, we cannot be justified in rejecting one hypothesis on the strength of its probability unless we know there is an alternative hypothesis with a higher probability.
36. There is, of course, another epistemically legitimate use. Design inferences enable us to tell when a being we already know to exist is capable of intelligent behavior.
37. Insofar as one believes that the arguments for God’s existence provide some reason to think that God exists, the design arguments would seem to provide additional reasons – even if one thinks that the arguments against God’s existence provide more reason to think that God does not exist. As long as one believes that she is justified in assigning some non-zero probability to God’s existence based on some argument for God’s existence, the design argument can add to that. Thus, I suppose that the design argument can be used to tip the scales in favor of theism for an agnostic who believes that the epistemic force of the arguments against God’s existence is exactly counterbalanced by the epistemic force of the arguments for God’s existence.