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# Bayesianism, Analogy, and Hume's *Dialogues concerning Natural Religion*

SALLY FERGUSON

## Introduction

Analyses of the argument from design in Hume's *Dialogues concerning Natural Religion* have generally treated that argument as an example of reasoning by analogy.<sup>1</sup> In this paper I examine whether it is in accord with Hume's thinking about the argument to subsume the version of it given in the *Dialogues* under the model of probabilistic reasoning offered by Bayes's theorem. Wesley Salmon attempted this project in 1978.<sup>2</sup> In related projects, David Owen<sup>3</sup> as well as Philip Dawid and Donald Gillies<sup>4</sup> have more recently attempted to construct Bayesian analyses of Hume's argument concerning testimony in "Of Miracles."

I want to be careful at this stage to note exactly what I will claim. It is not that Bayesian reasoning sheds no light on the argument from design, or on arguments concerning testimony. All of the analyses mentioned above are beneficial in that they have been able to expose subtleties in these arguments that had previously gone unnoticed. Salmon's paper, in particular, contributes nicely to an understanding of just how the design argument may function in relation to contemporary scientific reasoning. In this paper I argue that, nonetheless, the attempt to apply Bayesian reasoning to the argument as presented in the *Dialogues* is not well supported as a reconstruction of Hume's own approach to the argument from design.

There are two stages to my treatment of the issue. I begin by considering how much Hume knew of Bayes's theorem, and what consequence that knowledge might have had on his treatment of the argument in the *Dialogues*. This discussion includes a consideration of exactly what has been claimed by other authors on this subject, including what some have argued concerning Hume's reasonings in "Of Miracles," section 10 of *An Enquiry concerning Human Understanding*. I conclude that, based on the historical data, there is little reason to think of Hume's approach to the argument from design as anything more than proto-Bayesian at best. I then argue further, through a close textual analysis of the *Dialogues*, that there are good reasons for not treating Hume's reasoning there as even proto-Bayesian. In the end, the benefits that have been claimed for that approach, in terms of exposing both the subtleties of the argument and of Hume's reasoning about it, can equally well be derived from a careful analysis of the argument under a model of analogical reasoning, without need of Bayes's theorem.

### Section One

Perhaps one might think that there is not much use for a consideration of the question whether Hume himself conceived of any of his arguments along specifically Bayesian lines. As Gower argues,<sup>5</sup> Hume's knowledge of mathematics in general was fairly limited, and Bayes's theorem was not well known even up until Hume's death. It is important, therefore, for me to establish that there have not only been those who thought that Bayesian reasoning illuminates the arguments Hume gave, but also his own thinking about those arguments. It is also important for me to establish that it is not obvious that knowledge of Bayes's theorem did not affect Hume's reasonings. Each of these points will be addressed in the following.

As to the first point, the claims of some authors on the subject are ambiguous. Dawid and Gillie, for example, make no statement to the effect that the probabilities involved in Bayes's theorem were in fact examined in "Of Miracles," nor do they attempt to produce any passages from Hume in support of that view. Thus it would be assumed that they see their attempt not as an attempt to provide an analysis that represents Hume's own approach to the argument, but rather simply as one that provides an illuminating method of analysis and support for an argument that Hume happened to give. Indeed, their conclusion, to the effect that a Bayesian analysis shows Hume's argument concerning miracles to be correct (with some important qualifications that they later discuss) suggests that a defense of the argument, rather than an analysis of Hume's own reasoning, is a central goal of their paper. But there are other passages (fairly long in what is a short paper) in which

they appear to be attempting to justify taking a Bayesian approach not simply because it makes good *philosophical* sense (i.e., because it illuminates the structure of the argument in important ways) but rather because it makes good *historical* sense (i.e., because there is reason to believe that this in fact is how Hume conceived of the argument). They mention, for example, the fact that Hume was personally acquainted with Richard Price, and that Price had used Bayes's theorem in an attempt to answer Hume's arguments concerning induction and miracles. Of course these discussions, taking place in Price's 1763 introduction and appendix to Bayes's essay and in the last of his 1767 *Four Dissertations*, are posterior to Hume's argument in "Of Miracles," published in 1748. But Dawid and Gillie make no mention of this fact. Thus it is unclear what Dawid and Gillies intend us to take away from their paper: the conclusion that Bayesian reasoning supports the argument, or the conclusion that Hume himself saw how Bayesian reasoning supports the argument.

A similar ambiguity appears in Salmon's piece, applying Bayesian reasoning to the argument in the *Dialogues*. Salmon argues generally that a Bayesian perspective provides an improved understanding of the subtleties of the argument from design. He argues further that the characters of the *Dialogues* appear to have an appreciation that the argument from design is subtler than it first appears. None of this goes very far, of course, toward establishing that Hume thought of the argument in Bayesian terms. I might well express an appreciation of the fact that a certain problem is difficult, and it might be the case that a specific approach to that problem would decrease its difficulty. That does not go very far toward establishing that I am anywhere near appreciating the value of that approach to that problem.

What might tend toward establishing that the characters in the *Dialogues* were on the road to Bayesianism would be some evidence that they examined the relevant probabilities that go into an application of Bayes's theorem. Now Salmon, unlike the authors who discuss "Of Miracles" in a Bayesian light, does appear to claim that this is the case:

My main thesis regarding Hume's *Dialogues Concerning Natural Religion* is that, although Hume must have been unaware of Bayes's theorem, his characters in the *Dialogues* (especially Philo) devote considerable attention to each of these three types of probabilities [i.e., the probabilities relevant in an application of Bayes's theorem to the argument from design] in their discussion of the hypothesis that a supremely intelligent, powerful, and benevolent deity created the universe. Although the argument in the *Dialogues* is not cast in formal terms, Hume showed a full appreciation of the three types of

considerations which must be brought to bear in order to evaluate the theistic causal hypothesis.<sup>6</sup>

Raynor, in his short piece called “Hume’s Knowledge of Bayes’s Theorem,”<sup>7</sup> insists that Salmon makes no claim as to the historical accuracy of applying a Bayesian analysis to Hume’s reasonings. But I think this quote from Salmon shows Raynor’s claim to be at least misleading. Although Salmon does make it clear that he believes, *contra* Raynor, that Hume had no knowledge of Bayes’s theorem *as Bayes’s theorem*, it is clear he believes him to have had an understanding of how the probabilities used in the full generalization of that theorem apply in this case, and thus that he is making a claim about the historical accuracy of applying Bayesian reasoning to Hume’s arguments. He is essentially arguing that Hume’s reasonings in the *Dialogues* are proto-Bayesian.

As to the second point from above, i.e., whether actual knowledge of Bayes’s theorem had any effect on Hume’s arguments in the *Dialogues*, Raynor counters Salmon with evidence that Hume was not only aware of Bayes’s theorem, but understood it to be of philosophical importance. As Raynor notes, Price sent Hume a copy of his own *Four Dissertations* in which the theorem is discussed and applied to Hume’s reasonings in “Of Miracles,” and Hume responded in a letter dated 18 March 1767:

I own to you that the light, in which you have put this Controversy, is new and plausible and ingenious, and perhaps solid. But I must have some more time to weigh it, before I can pronounce this Judgment with Satisfaction to myself. My present Occupations shall not deprive me of the Leizure requisite for that Purpose; as no Object can possibly have equal Importance.<sup>8</sup>

Raynor concludes that a closer examination of the role Bayesian reasonings played in Hume’s arguments is warranted on the basis of the discovery that Hume in fact was aware of the existence and philosophical relevance of Bayes’s theorem. But as Sobel remarks,<sup>9</sup> it is not likely the case that such knowledge could have had an effect on Hume’s reasonings in “Of Miracles”:

Why is it nearly certain that Hume did not have Bayes’ Theorem in mind? Because first, “Of Miracles” was published in 1748, whereas Thomas Bayes’ essay did not appear in print until 1763. Second, there is little evidence that Hume ever read Bayes’ essay . . . And third and most important, Bayes’ Theorem as we know it, complete with places for possible unequal prior probabilities, is not in evidence in Bayes’ essay . . . When Hume wrote “Of Miracles”, he had no knowledge of

Bayes' essay. He may never have had knowledge of it. . . . It is possible that *Bayes* had no knowledge of this theorem in its full generality.<sup>10</sup>

Sobel elaborates on this last point by saying that "in the problem Bayes deals with, prior probabilities are equal and thus can be ignored as indeed they are by Bayes: they do not have a place in his formulas or calculations."<sup>11</sup> He concludes that the same is true for Richard Price, and notes that this produces a certain irony, namely, that "we seem to have in his criticisms, objections to Hume's attention to prior probabilities, made by a mathematician who had no clear conception of the role of prior probabilities in Bayesian calculations!"<sup>12</sup> These last claims have an interesting relationship to our question. First, Sobel himself denies that Hume, at the writing of "Of Miracles," was aware of Bayes's theorem, even in the limited version that is given of it in Bayes's essay or that is discussed in Price's later criticisms of Hume. On the other hand it is clear that Sobel is nevertheless working from the position that Hume, in "Of Miracles," does examine the prior probabilities that would be relevant to an application of that theorem as we now conceive of it. Hume is thus, to Sobel, also best understood as a proto-Bayesian, but not because Bayes's theorem itself had any effect on him.

Now, for our purposes, we must ask whether Hume's knowledge of the theorem could have had an effect on his reasonings in the *Dialogues*. The *Dialogues concerning Natural Religion* were, of course, published posthumously in 1779. They were written in the period from 1749 to 1751, the same period as the *Natural History of Religion*, which was published in 1757. But revisions were made to them at least twice, once in or around 1761, and again in 1776, the year Hume died.<sup>13</sup> It is thus clear that it is at least possible that Hume's communications with Price had an effect on his final revisions of the *Dialogues*. Hume wrote to Price in 1767, and revised the *Dialogues* a final time in 1776, after having left them untouched during the period from 1761 to 1776.<sup>14</sup> Hume says in the letter to Price of 1767 that, to him, Bayes's way of reasoning about the issue concerning miracles is "new and plausible and ingenious." The implication of this statement is that Hume himself had not conceived of viewing the subject in those terms before that time, but that he gave that way of thinking about the argument some credit. Presumably the same would have been true for the subject of the argument from design, although we can't be sure that Hume ever made such a connection.

Earman argues,<sup>15</sup> in fact, that Hume's acquaintance with Price did lead him to make at least one revision to "Of Miracles." Earman cites a report<sup>16</sup> of a conversation between Hume and Price in which Hume admitted that Price had convinced him that, on some unspecified point, his reasonings were incorrect. Earman conjectures that this led Hume, in his 1768 revisions of the

*Enquiry*, to weaken the claim he made in prior editions that “no Testimony for any kind of miracle can ever possibly amount to a Probability, much less to a Proof,”<sup>17</sup> to the claim that “no testimony for any kind of miracle has ever amounted to a probability, much less to a proof.”<sup>18</sup> However, Earman himself admits that the extent to which Hume has qualified his claim thereby is unclear. The latter qualification does appear before the 1768 revisions, in a footnote. So the revision of 1768 involves moving a comment previously relegated to a footnote into the main text. Earman’s speculation is that Hume made this move in response to his discussions with Price. This, however, amounts to little more than speculation.

Our question, then, is whether we can similarly argue that the last revisions to the *Dialogues*, in 1776, indicate that Hume took into account any Bayesian reasonings that were not considered before. In this case, the answer appears to be no. The main categories of objection and the main lines of argument in the *Dialogues* were in place by 1751. The revisions that can reasonably be dated to 1776 all appear in part 12. Only two of these are substantial additions. One is a passage that indicates a problem with the argument from design that had not previously been brought out: that there is an irreducibly subjective component to the evaluation of all similarities that infects the argument and renders ultimate conclusions impossible (DNR, 268–70). The other is a passage concerning how revelation can make up for the failings of the argument from design to establish anything beyond the conclusion that “the universe probably bears some remote analogy to human intelligence” (DNR, 281–82). Neither of these revisions has any bearing on the issues at hand in this debate. Thus, if there is proto-Bayesian reasoning going on in the *Dialogues*, it is the result of Hume having anticipated Bayes and not of Hume having gotten wind of Bayes’s ideas via Price. It is to the question whether Hume’s reasoning is best thought of as proto-Bayesian that I now turn.

## Section Two

My argument in the rest of this paper is threefold. First, Salmon provides little in the way of textual support for the claim that the characters in the *Dialogues* in fact examine the relevant probabilities that would go into an application of Bayes’s theorem. Thus, there is little textual evidence that Hume’s reasonings in the *Dialogues* are indeed proto-Bayesian. On the other hand, there is abundant support for the claim that Hume viewed and treated the argument as an example of analogical reasoning. Second, I argue that what Salmon sees as the “considerable attention” devoted to the types of probabilities he cites can be explained just as well by a careful consideration of the argument as an example of an argument from analogy. Thus what looks

to be proto-Bayesian analysis is easily seen as careful analogical reasoning.<sup>14</sup> Third, I argue against Salmon that viewing the argument as a form of analogy restricts our analysis of it and prevents us from exposing many of the argument's subtleties, as recognized by the characters in the *Dialogues*. The same subtleties that Salmon draws out through his Bayesian analysis can be drawn out through a careful analogical analysis, without need of Bayes's theorem, especially when we "reverse-engineer" the discussion from the perspective of the standard criteria for evaluating arguments of that sort. Thus my conclusion is that the appeal to Bayesian reasoning in the case of Hume's *Dialogues* is both unjustified and unnecessary if our aim is to expose Hume's understanding of the argument.

The textual support Salmon provides for his claim that Hume's characters explicitly examine the relevant probabilities is painfully weak: he provides only one explicit quote, and several vague references to how points are made throughout the discussion. Let us begin by taking a brief look at the probabilities that need to be examined in order to apply Bayesian reasoning to the hypothesis that the universe is the result of intelligent design (where "A" designates any instance of coming-into-being, "B" any instance of the operation of intelligence, and "C" any instance that exhibits order or design):<sup>20</sup>

$P(A, B)$  = the probability that an instance of coming-into-being is an instance of the operation of intelligence.

$P(A, \bar{B})$  = the probability that an instance of coming-into-being is an instance of the operation of something other than intelligence.

$P(A \cdot B, C)$  = the probability that something produced by intelligence exhibits order or design.

$P(A \cdot \bar{B}, C)$  = the probability that something produced by the operation of something other than intelligence exhibits order or design.

$P(A \cdot C, B)$  = the probability that something that exhibits order and design is the product of the operation of intelligence.

These probabilities fit themselves into Bayes's theorem in the following way:

$$P(A \cdot C, B) = \frac{P(A, B) \times P(A \cdot B, C)}{P(A, B) \times P(A \cdot B, C) + P(A, \bar{B}) \times P(A \cdot \bar{B}, C)}$$

The one explicit quote that Salmon gives in defense of his claim that the characters examine the relevant probabilities is one he relates to  $P(A, B)$ —the probability that a thing that comes into being is caused by intelligent design. This probability can only be assessed relative to  $P(A, \bar{B})$ —the probability that a thing that comes into being is caused by some force or principle other than intelligent design. These are, from the perspective of Bayes's theorem, among the *prior* probabilities that must be examined before  $P(A \cdot C, B)$ —the probability that a thing that has come into being and exhibits order is the result of design—can begin to be assessed. This last is the target probability of the argument; it is this probability that, if high, will suggest the existence of an intelligent designer of the universe.

As Salmon notes, Philo discusses four possible sources of a thing's coming-into-being: mechanical forces, generative forces, instinctive forces, and intelligent design. This discussion, which Salmon refers to as the "springs and principles" discussion, occurs in parts 7 and 8 of the *Dialogues*. Salmon argues that Philo's discussion of these possible sources of a thing's coming-into-being is best understood as an attempt to assess these relevant prior probabilities. He concludes his discussion of this point by quoting Philo (his only direct citation in defense of this claim): "What peculiar privilege has this little agitation of the brain that we call thought, that we must thus make it the model of the whole universe?" (DNR 183). This Salmon says constitutes a rough assessment of the relevant prior probabilities, namely, an assessment to the effect that the prior probability that a thing that has come into being is the result of intelligent design is very low, and that the probability that it is the result of something other than intelligent design is very high. But this "assessment," made in part 2, comes long before the alternatives to intelligent design have even been discussed. As I said, Philo introduces those in parts 7 and 8. One is justified therefore, in being suspicious of the claim that Philo's statement in part 2 constitutes such an assessment. I would suggest that it is not at all clear that we should look at the "springs and principles" discussion as an example, however rough, of the calculus of prior probability. Moreover, as Burch suggests,<sup>21</sup> if this is taken to be an assessment of relative prior probabilities, it provides an assessment only in the trivial sense that it assesses the probability of intelligent design as less than 1. Philo does not provide even a rough numerical estimate of these prior probabilities; he simply lists that there is more than one possible source of coming-into-being. I will later suggest where I think Philo's discussion of the "springs and principles" fits in under an analogical analysis of the reasonings in the *Dialogues*.

At this point we are left with Salmon's claim that the argument is better viewed as an example of Bayesian reasoning, since this exposes subtleties in Hume's thought that an analogical model cannot reveal. But Salmon is unnecessarily restrictive in his view of analogical reasoning, insisting that there is not much to evaluating such arguments beyond the simple question whether the objects referred to in the analogy are sufficiently similar. As introductory logic texts typically frame the issue, the argument from analogy is a form of the general inductive argument.<sup>22</sup> Copi, for example, says that in such an argument:

The premises report a number of instances in which two attributes (or circumstances or phenomena) occur together. By analogy we may infer that a different particular instance of one attribute will also exhibit the other attribute. By inductive generalization we can infer that every instance of the one attribute will also be an instance of the other.<sup>23</sup>

It is easy enough to represent Hume's argument from design along the lines, for example, that Copi suggests, using his general schema for such arguments:

1.  $a$ 's and  $u$  all have the attributes  $p_1 \dots p_n$
2.  $a$ 's all have the attribute  $p_{n+1}$
3. Therefore,  $u$  probably has the attribute  $p_{n+1}$

Here " $u$ " stands for "universe," " $a$ " for any given artifact.  $p_1 \dots p_n$  are the properties  $a$  and  $u$  share (e.g., they exhibit order, economy, an adjustment of means to ends, etc.).  $p_{n+1}$  is the complex property an object has when its cause is intelligent design. Thus, the argument can be read:

1. Artifacts and the universe both exhibit order, economy, and adjustment of means to ends, etc.
2. Artifacts are caused by intelligent design
3. Therefore, the universe is probably caused by intelligent design.

As I say, the claim that analogies of this form are typically judged simply by the degree of similarity among the objects compared seems to be false. What follows, then, is a discussion of the factors that are generally seen to be important for evaluating such arguments,<sup>24</sup> and ways in which the characters in the *Dialogues* account for them. In the end I think we can account for any appearance of Bayesian reasoning and derive the same benefits in terms of exposing Hume's understanding of the argument's subtleties, by comparing

the characters' evaluation of the argument against these standard criteria for evaluating analogical reasoning.<sup>25</sup>

***The number of similar objects.*** The greater this number, the stronger the argument. This criterion is presumably what Cleanthes has in view in choosing to compare the universe to common artifacts, of which the examples are many.

Philo argues, however, (in part 2) that, although Cleanthes has shown a great number of instances of objects that resemble the universe and arise from design, this is not enough. Because the universe is so vast, we cannot know, but that taken as a whole the universe fails to resemble the products of design. Although the number of instances cited in the premises is very great, it is insufficient, given the proportion of that number to the whole to which the conclusion is applied. This demonstrates a subtlety in Hume's understanding of this particular criterion. Philo's apparent suggestion is that this criterion ought to be rejected in favor of another: one that maintains that it is not the mere number of similar objects that counts, but that it is important to attend to the proportion of the appropriate class on which the analogy is drawn.

This is where Philo's statement "What peculiar privilege has this little agitation of the brain called thought, that we must thus make it the model of the whole universe?" (DNR 183), on which Salmon hinges nearly his entire case that the *Dialogues* should be viewed under a Bayesian model, fits into our analysis. Something like a very rough estimate of the prior probabilities of a thing's coming-into-being as the result of intelligence versus some other cause is needed to evaluate the argument's performance relative to this criterion. Consider the reasoning behind this criterion. Generally, the larger the number of objects that can be shown to have these similarities, the greater the proportion of overall evidence that has been brought to bear on the argument. The greater the number of instances cited, the larger the proportion of the whole. Philo's argument here is that, although the number of instances is large, the proportion to the whole is relatively small, because the whole is so vast.<sup>26</sup>

***Number of similarities between the objects cited only in the premises and that cited in the premises and the conclusion.*** The more similarities the objects in the premises have to that in the conclusion, the stronger the argument. This is part of Philo's aim when he questions the degree of resemblance between the universe and machines. Taking resemblance to be a matter of shared properties,<sup>27</sup> the more properties things share, i.e., the more they resemble, then the stronger the argument. This is Philo's first objection to the design argument: that the universe, even that small corner we know about, is simply not similar enough to a machine to allow the analogy to proceed:

If we see a house, CLEANTHES, we conclude, with the greatest certainty, that it had an architect or builder; . . . But surely you will not affirm, that the universe bears such a resemblance to a house, that we can with the same certainty infer a similar cause, or that the analogy is here entire and perfect. (DNR 178)

Philo later goes on to argue that the similarity between the universe and machines is in fact no greater than it is for many other classes of object that arise from a principle other than design: "If the universe bears a greater likeness to animal bodies and to vegetables, than to the works of human art, it is more probable that its cause resembles the cause of the former than that of the latter" (DNR 217).

*The number of dissimilarities between the objects cited in only the premises and that cited in both the premises and the conclusion.* The greater this number, the weaker the argument. The just-cited quotations are also well understood as implying that the number of dissimilarities between products of human artifice is greater than Cleanthes implies. Philo's quote concerning the house analogy in fact concludes "The dissimilitude is so striking, that the utmost you can here pretend to is a guess, a conjecture, a presumption concerning a similar cause . . ." (DNR 178). This criterion is targeted when Philo emphasizes that things in their embryonic state differ from their mature forms: "By observation, we know somewhat of the œconomy, action, and nourishment of a finished animal; but we must transfer with great caution that observation to the growth of a foetus in the womb, and still more, to the formation of an animalcule in the loins of its male parent" (DNR 184). This is Philo's point when he argues that departure from the similarity of cases greatly weakens the analogy:

The exact similarity of the cases gives us a perfect assurance of a similar event; and a stronger evidence is never desired nor sought after. But wherever you depart, in the least, from the similarity of the cases, you diminish proportionably the evidence; and may at last bring it to a very weak *analogy*. (DNR 178)

Cleanthes likewise uses this criterion against Philo when he argues that the universe is like an animal: "though the world does, in many circumstances, resemble an animal body; yet is the analogy also defective in many circumstances, the most material: No organs of sense; no seat of thought or reason; no one precise origin of motion and action" (DNR 213).<sup>28</sup>

***The number of dissimilarities between items mentioned only in the premises.***

The greater this number, the stronger the argument. It is Cleanthes's aim to satisfy this criterion by drawing the analogy between the universe and a broad category of objects, i.e., all those that exhibit order, economy, an adjustment of means to ends, etc. He aims to show that many different kinds of object result from design, rendering the conclusion more probable that the universe itself likewise results from design. Philo claims, however, that this strategy relies on a *specific* resemblance between the kinds mentioned only in the premises and that mentioned in the conclusion, and that it will be impossible to establish such a resemblance in this case:

When two *species* of objects have always been observed to be conjoined together, I can *infer*, by custom, the existence of one whenever I see the existence of the other: . . . But how this argument can have place, where the objects, as in the present case, are single, individual, without parallel, or specific resemblance, may be difficult to explain. (DNR 185)

Hume argues similarly:

It is only when two *species* of objects are found to be constantly conjoined, that we can infer the one from the other; and were an effect presented, which was entirely singular, and could not be comprehended under any known *species*, I do not see, that we could form any conjecture or inference at all concerning its cause. (EHU 11.30; SBN 148)

If this claim is sound, then however many species of object are seen to result from design, we will always know that the universe is not of one of these kinds, because it is singular and unique. Some things must be said about this claim. First, it is not clear that it is true; i.e., that there are not other universes.<sup>29</sup> This doesn't much help Cleanthes, of course, since those other universes are beyond our experience. The argument given by Philo and Hume depends not so much on the claim that the universe *is* in fact unique, but rather on the claim that it is not of a kind with any of the other species of which we have experience.<sup>30</sup> But it is not clear that this claim has any basis, either. The position we are in is presumably one in which it is merely not known that the universe is of a kind with another known species, and not one in which it is known that it is not. In such a position, Cleanthes's overall *strategy* is sound. It bolsters any attempt at analogy to include as wide a variety of species among those mentioned only in the premises. This raises the

likelihood that if the universe is of a kind, specifically, with some other kind, it is of a kind with one of those mentioned.

This criterion also gives a clue as to what is going on in the “springs and principles” discussion to which Salmon refers us for a discussion of the prior probabilities ( $P(A, B)$  = the probability that an instance of coming-into-being is an instance of the operation of intelligence, and  $P(A, \bar{B})$  = the probability that an instance of coming-into-being is an instance of the operation of something other than intelligence.) As these probabilities vary, so varies our emphasis on this criterion. Where the species of the target object is unknown, and the number of species under which it may fall is high, we will require a larger dissimilarity between the kinds of objects mentioned only in the premises.<sup>31</sup>

**Strength of the conclusion relative to the premises.** This criterion is applied in several ways in the *Dialogues*, and also is mentioned in the *Enquiry* as well. It is one with which much of the discussion in the *Dialogues* is consumed. It leads to a positive conclusion with respect to God’s intelligence, but a negative (or at least inconclusive) one with respect to his power, wisdom, benevolence, and moral goodness.

Philo emphasizes this point at the outset of part 5, when he argues that Cleanthes’s analogy can be turned on its head, or pushed too far: “For as the cause ought only to be proportioned to the effect, and the effect, so far as it falls under our cognisance, is not infinite; what pretensions have we, upon your suppositions, to ascribe that attribute to the divine Being?” (DNR 206). Philo goes on to make analogous arguments concerning the properties of perfection and unity. Hume likewise allows Demea to use this fact as well when he points out that the closer the analogy is between the universe and a machine, then the more likely it is that God strongly resembles man. It then becomes less likely that God has the properties attributed to him by theology, e.g., omnipotence, omniscience, eternity, benevolence, and perfect moral goodness. Demea argues as follows:

[C]onsider what it is you assert, when you represent the Deity as similar to a human mind and understanding. What is the soul of man? A composition of various faculties, passions, sentiments, ideas; united, indeed, into one self or person, but still distinct from each other . . . How is this compatible with that perfect immutability and simplicity, which all true theists ascribe to the Deity? (DNR 196)

Philo targets this criterion late in the *Dialogues* when he has already granted that the universe indeed bears the marks of intelligent design:

But there is no view of human life, or of the condition of mankind, from which, without the greatest of violence, we can infer the moral attributes, or learn that infinite benevolence, conjoined with infinite power and infinite wisdom, which we must discover by the eyes of faith alone. (DNR 248)

Hume insists that the conclusion be proportional to the premises as well:

As the universe shows wisdom and goodness, we infer wisdom and goodness [in the creator]. As it shows a particular degree of these perfections, we infer a particular degree of them, precisely adapted to the effect which we examine. But farther attributes or farther degrees of the same attributes, we can never be authorized to infer or suppose, by any rules of just reasoning. (EHU 11.26; SBN 144-5)<sup>32</sup>

***Relevance of known similarities to inferred similarities.*** The sort of relevance appealed to in an argument from analogy is often one of causality or correlation. Analogical inference depends crucially, as Hume repeats on several occasions, on the maxim that like effects prove like causes, and like causes like effects.<sup>33</sup> The argument from design happens to be an instance of the form that makes explicit the causal or correlational connection between the properties in the first premise and that in the second premise and the conclusion. The way to criticize an argument from analogy on this point is to claim that this causal or correlational connection does not obtain. This cannot be directly done in this case, because the evidence we have in this case that the objects mentioned only in the premises do only result from design, is our experience. The best Hume can do is to maintain that this correlation is not known to hold in general. Thus the criticism that the extent of our experience is too limited, which we saw earlier, bears on two aspects of the argument. First, it argues that the resemblance might not hold universally. Second, it argues against the relevance of the properties.

We must note that this criterion of relevance, while it functions in this specific capacity, also functions in a general capacity with reference to a number of other criteria. So, for example, consider the criterion that insists that an increase in the number of similarities between the objects cited only in the premises and that cited in the premises and the conclusion increases the strength of the argument. This will only be true assuming that the similarities cited are relevant. Since it is possible to proliferate similarities ad infinitum (especially if we allow negative and disjunctive properties to count), a simple increase in the number of similarities proves nothing. We can apply

a like claim to the criteria involving dissimilarities. All of these criteria therefore function under the umbrella of a general criterion of relevance.<sup>34</sup>

From the above discussion, we see three things. First, “reverse-engineering” the discussion of the argument from the perspective of its criticisms is consistent with the claim that it is suitable to represent it in analogical form. Second, the minimal evidence of proto-Bayesian reasoning to which Salmon refers is easily explained by appeal to recognized criteria for evaluating analogies. Finally, the depth and subtlety that Salmon argues is only exposed through proto-Bayesian reasonings can be incorporated into an analogical account of the argument as well, once these more subtle criteria for evaluating such arguments are taken into account.

## NOTES

- 1 See, for example, J. C. A. Gaskin, *Hume's Philosophy of Religion* (London: MacMillan, 1978), 9ff; R. Hurlbutt, *Hume, Newton, and the Design Argument*, 2<sup>nd</sup> ed. (Lincoln: University of Nebraska Press, 1985), 95ff; T. Penelhum, *Hume* (New York: St. Martin's Press, 1975), 184ff; S. Tweyman, *Skepticism and Belief in Hume's Dialogues concerning Natural Religion* (Dordrecht: Martinus Nihjoff, 1986), 31ff.
- 2 W. Salmon, “Religion and Science: A New Look at Hume's Dialogues,” *Philosophical Studies* 33 (1978): 143–76.
- 3 D. Owen, “Hume vs. Price on Miracles and Prior Probabilities: Testimony and the Bayesian Calculation,” *Philosophical Quarterly* 37 (1987): 187–202.
- 4 P. Dawid, and D. Gillies, “A Bayesian Analysis of Hume's Argument Concerning Miracles,” *The Philosophical Quarterly* 39 (1989): 57–65.
- 5 B. Gower, “David Hume and the Probability of Miracles,” *Hume Studies* 16 (1990): 17–31, and “Hume On Probability,” *British Journal for the Philosophy of Science* 42 (1991): 1–19.
- 6 W. Salmon, “Religion and Science,” 148.
- 7 D. Raynor, “Hume's Knowledge of Bayes' Theorem,” *Philosophical Studies* 38 (1980): 105–6.
- 8 D. Hume, *New Letters of David Hume*, ed. R. Klibansky and E. C. Mossner (Oxford: Oxford University Press, 1954), 234.
- 9 J. H. Sobel, “On the Evidence of Testimony for Miracles: A Bayesian Interpretation of David Hume's Analysis,” *The Philosophical Quarterly* 37 (1987): 166–202.
- 10 Sobel, “A Bayesian Interpretation,” 167.

- 11 Sobel, "A Bayesian Interpretation," 169, n. 8.
- 12 Sobel, "A Bayesian Interpretation," 169, n. 8.
- 13 See K. Yandell, "Hume on Religious Belief," in *Hume: A Reevaluation*, ed. Donald Livingston and James King (New York: Fordham University Press, 1976), 121, n. 11; J. Noxon, "Hume's Agnosticism," in *Hume*, ed. V. C. Chappell, (Garden City: Doubleday, 1966), 363; and R. Wollheim, *Hume on Religion* (Cleveland: Meridian, 1963), 13.
- 14 On this point see Norman Kemp Smith's introduction to his edition of the *Dialogues concerning Natural Religion*, (Oxford: Clarendon Press, 1935), 111. Hereafter, references to this edition of Hume's *Dialogues* will be cited parenthetically in the text with the abbreviation "DNR" and page number(s).
- 15 John Earman, *Hume's Abject Failure: The Argument Against Miracles* (New York: Oxford University Press, 2000), sections 10 and 16.
- 16 R. Thomas, *Richard Price: Philosophy and Apostle of Liberty* (Humphrey Milford, 1924), 30.
- 17 D. Hume, *Philosophical Essays concerning Human Understanding* (London: A. Millar, 1748), 198-9.
- 18 D. Hume, *An Enquiry concerning Human Understanding*, ed. Tom L. Beauchamp, Oxford Philosophical Texts (Oxford: Oxford University Press, 2000), 96. Future references to this edition will cite the abbreviation "EHU" followed by section and paragraph number. Also found in Hume, *Enquiries concerning Human Understanding, and concerning the Principles of Morals*, ed. L. A. Selby-Bigge, 3<sup>rd</sup> ed., revised by P. H. Nidditch (Oxford: Oxford University Press, 1975), 127, cited as "SBN," with page number.
- 19 It has been suggested (by an anonymous referee for *Hume Studies*) that the reason for this may be that analogical reasoning is simply a type of (Bayesian) probabilistic reasoning. But this claim, even if true (and there are reasons for thinking it is, at least in the main) is off the point of the current discussion. That discussion is concerned with what we can deduce from the text about how Hume himself viewed the argument from design, and not with the perspective from which that argument is ultimately best viewed.
- 20 These are the probabilities that Salmon himself cites, and the hypothesis is the one he takes to be under scrutiny. Note that the presentation of these probabilities is non-standard. In this I am simply following Salmon's non-standard presentation. These probabilities would often be presented differently:
- $P(B/A)$  = the probability that something is the product of intelligence, given that it has come into being.
- $P(\bar{B}/A)$  = the probability that something is not the product of intelligence, given that it has come into being.
- $P(C/A \cdot B)$  = the probability that something will exhibit order and design, given that it has come into being and is the result of the operation of intelligence.

$P(C/A \cdot \bar{B})$  = the probability that something will exhibit order or design, given that it has come into being and is the result of the operation of something other than intelligence.

$P(B/A \cdot C)$  = the probability that something is the product of intelligence given that it has come into being and exhibits order or design.

The theorem is thus

$$P(B/A \cdot C) = \frac{P(B/A) \times P(C/A \cdot B)}{P(\bar{B}/A) \times P(C/A \cdot B) + P(B/A) \times P(C/A \cdot \bar{B})}$$

21 R. Burch, "Bayesianism and Analogy in Hume's Dialogues," *Hume Studies* 6 (1980): 35.

22 So for example see I. Copi, *Introduction to Logic*, 7<sup>th</sup> ed. (New York: MacMillan, 1986), 403ff. and P. Hurley, *A Concise Introduction to Logic*, 7<sup>th</sup> ed. (Belmont: Wadsworth, 2000), 485ff.

23 Copi, 432.

24 You will find a similar list in many introductory texts. See, e.g., Copi, 411–14, and Hurley, 486–9.

25 One might object that the use of such criteria is unsound, since many of these criteria have only been articulated in this century. I am arguing that Hume was sensitive to all of the criteria that we currently countenance as relevant to weighing the strength of an argument from analogy. See Stephen Barker, "Hume and the Logic of Design," *Hume Studies* 9 (1983): 1–29, for a discussion of an opposing view. Barker argues that Hume's understanding of the nature of analogical reasoning, although advanced beyond that of his predecessors and contemporaries, was by no means as sophisticated as I suggest.

26 I am indebted to an anonymous referee for *Hume Studies* for helping me to clarify these points.

27 I should note that I think it is fair to represent the idea of resemblance in Hume's writings generally as, at least in part, a matter of shared properties. For example, in the *Treatise*, Hume argues thusly: "For how can an impression represent a substance, otherwise than by resembling it? And how can an impression resemble a substance, since . . . it . . . has none of the peculiar qualities or characteristics of a substance?" Thus shared properties are at least a necessary, if not a sufficient condition for resemblance. See D. Hume, *A Treatise of Human Nature*, ed. David Fate Norton and Mary J. Norton, Oxford Philosophical Texts (Oxford: Oxford University Press, 2000), 153. Also in Hume, *A Treatise of Human Nature*, ed. L. A. Selby-Bigge, 2nd ed., revised by P. H. Nidditch (Oxford: Oxford University Press, 1978), 233. The editions of the *Treatise* are cited hereafter as "T" (with section and paragraph number) and "SBN" (with page number).

28 This last quotation in particular suggests that although Gaskin may be correct to argue that it is weaknesses in the similarities and not the presence of

dissimilarities on which Hume focuses in his critique of the argument, nevertheless he countenanced the presence of dissimilarities as an appropriate evaluative criterion for such reasonings. See Gaskin, *Hume's Philosophy of Religion*, 23.

29 Unless, as Gaskin suggests, it is appropriate to define "universe" as the totality of all that exists." See Gaskin, *Hume's Philosophy of Religion*, 21ff.

30 Thus Gaskin stresses that it is *known species* that are the issue here. See Gaskin, *Hume's Philosophy of Religion*, 22.

31 This is one of the criteria for which Barker insists Hume did not recognize the value. Barker does not blame Hume for what he perceives to be his failure in this respect, and notes that the criterion was first fully articulated by J. M. Keynes in Keynes, *A Treatise on Probability* (London: Macmillan, 1921). I differ with Barker on this claim, and, effectively, argue that Hume, while not a proto-Bayesian, is here something of a proto-Keynesian.

32 As Gaskin argues, the uniqueness of the universe plays a role in relation to Hume's claims concerning just how strong the conclusion should be relative to the premises in this argument. Hume states his position on this issue "Let the inferred cause be exactly proportioned (as it should be) to the known effect; and it is impossible that it can possess any qualities, from which new or different effects can be inferred" (EHU 109; SBN 145). Because the universe is not of any known species, its cause is one that is known only by way of its effects. In many cases of reasoning by analogy concerning causes, we can draw conclusions about the cause that go beyond the perceived effects. From Hume's example of the human footprint in the sand we can draw the conclusion that the agent that left the mark was human, because of the constant conjunction of that effect with that cause. But we can also draw many other conclusions, based on other constant conjunctions we have perceived of human agents with other effects. So we can conclude that the agent breathed air, had a heart, had an average body temperature of 98.6 degrees, etc. These conclusions are not required to produce the known effect, but they are justified because they are constantly conjoined with the sort of agent that is required to produce the known effect. Similar conclusions in the case of the author of the universe are not possible, because there are no other members of the class of universe-authors available to study. Thus, unless moral goodness and benevolence are required to produce the known effects of order, regularity, and purpose in the universe, the conclusion that the author of the universe possesses these characteristics will go beyond the evidence in the premises.

33 See DNR 204 and 210. See also T 1.3.15.6; SBN 173–4.

34 I am indebted to Torin Alter for a discussion of this point.