



## **Bayesianism and Analogy in Hume's *Dialogues***

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BAYESIANISM AND ANALOGY IN HUME'S DIALOGUES

Wesley Salmon has recently focussed attention on Hume's consideration of the argument from design for the existence of God in the Dialogues Concerning Natural Religion, by construing it according to a Bayesian account of inductive inferences to causal hypotheses.<sup>1</sup> Salmon argues that an interpretation of the argument from design, considered by Philo and Cleanthes in the Dialogues, as an appeal to analogy is not a correct interpretation of Hume's argumentation. I would like here to argue that Salmon's account is too far afield of Hume's actual pattern of arguing to be taken as an accurate account of the discussion in the Dialogues. I would also like to characterize Hume's account of causal arguments in the Dialogues more closely, and to show how it is connected with his notion of resemblance. In doing so, I shall defend the thesis that an appeal to analogy is after all the fundamental form of argument that is considered in the Dialogues.

## I.

Salmon argues that the discussion among the characters in the Dialogues, principally between Philo and Cleanthes, centers about the various probability terms entering into Bayes's Theorem in the form:

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

where in the context of the Dialogues, "A" stands for any event of coming-into-being, "B" stands for any event that is a product of intelligence, and "C" stands for any event that exhibits order or design.<sup>2</sup> The various probabilities that enter into Bayes's Theorem can, then, be characterized in the present context more thoroughly. For example, P(B/A&C) is the probability that an event of coming-into-being which displays order is the product of intelligence. This

probability, if high, would tend to support the argument from design, and, if low, would tend to undermine it.

In order to evaluate  $P(B/A\&C)$  by using Bayes's Theorem, we need to be in a position to find the following three probabilities:

$P(B/A)$ : This is the probability that any event of coming-into-being is a product of intelligence. If we know its value, it is easy to calculate  $P(\bar{B}/A)$ , the probability that any event of coming-into-being is not a produce of intelligence. For  $P(\bar{B}/A) = 1 - P(B/A)$ . Both these probabilities are called the prior probabilities of the problem.

$P(C/A\&B)$ : This is the probability - which Salmon typically calls one of the two likelihoods of the problem - that an event of coming-into-being which is a produce of intelligence does exhibit order or design.

$P(C/A\&\bar{B})$ : This is the probability - which Salmon calls the other likelihood of the problem - that an event of coming-into-being which is not a produce of intelligence exhibits order or design.

Now Salmon is not merely arguing - though he is also arguing - that Bayes's Theorem, with its constituent probabilities so understood, is relevant for evaluating the argument from design. He is arguing that Bayes's Theorem is relevant for interpreting Hume's thoughts about the argument from design. Salmon admits that "Hume must have been unaware of Bayes's Theorem."<sup>3</sup> But he claims that Bayes's Theorem is nevertheless relevant for interpreting Hume. He suggests a number of reasons for this. First, the argument considered by Philo and Cleanthes is weakened, he says, if it is

represented as a mere appeal to analogy.<sup>4</sup> Secondly, he says that the correct strategy for analyzing any causal hypothesis is Bayesian, and undoubtedly Philo and Cleanthes are debating about causal hypotheses.<sup>5</sup> Thirdly, Philo and Cleanthes show by the end of the second dialogue that they are aware the argument is more complex than a simple appeal to analogy.<sup>6</sup> Fourthly, with respect to the probabilities one needs to know in order to use Bayes's Theorem in the relevant way, Hume's characters and especially Philo "devote considerable attention to each of the three types of probabilities in their discussion."<sup>7</sup> Fifthly, Hume just does in fact recognize that the argument from design is "something deeper and more subtle than a simple appeal to analogy."<sup>8</sup>

We can greatly simplify the consideration of Salmon's reasons for attributing Bayesianism to Hume by recognizing that some of Salmon's reasons are dependent on others, and that some of his reasons are simply irrelevant to the issue of interpreting Hume. Thus, his fifth reason, to the effect that Hume just does recognize the excessive simplicity of an appeal to analogy, is not given independent support at all: it rests entirely on the previous four reasons and in particular on the fourth reason (the one to the effect that Philo and Cleanthes consider the Bayesian probabilities). The third reason - that Philo and Cleanthes are aware that the argument is more complex than a simple appeal to analogy - will be considered later in this paper. The first two reasons are, I submit, clearly irrelevant to the issue at hand. As for the first one, it may well be true, for all I shall argue here, that the design argument is weaker considered as an appeal to analogy than considered as an appeal to Bayes's Theorem. But, whether or not this is so, its being so would show nothing at all about whether Hume thought it weaker when so considered. A similar point is to be made for Salmon's second reason, that Bayesian analysis is the correct strategy for examining causal hypotheses. Even if this should be so,

this would do nothing to prove that Hume considered Bayesian analysis to be the correct way to probe causal claims. What it would require to show something about Hume's views on this and related matters is surely a close analysis of Hume's texts in the Dialogues and elsewhere. And this Salmon does not have.

Let us, then, turn to the text of the Dialogues with Salmon's fourth reason for finding Bayesianism therein kept firmly in mind. Does the discussion between Philo and Cleanthes actually contain a consideration - as Salmon maintains - of the three probabilities entering into Salmon's Bayesian analysis of the problem? Salmon vehemently maintains that it does: "Although the argument in the Dialogues is not cast in formal terms, Hume showed a full appreciation of the three types of consideration which must be brought to bear in order to evaluate the theistic causal hypothesis."<sup>9</sup> But Salmon's vehemence, as we shall see, seems to be little more than a cover for paucity of demonstration.

How about the prior probabilities  $P(B/A)$  and  $P(\bar{B}/A)$ , the probability that an event of coming-into-being is the product of intelligence, and the probability that such an event is not the product of intelligence? Salmon has a trace of an argument that these prior probabilities are given consideration by the characters in the Dialogues. As he correctly points out, Philo in the second, seventh, and eighth dialogues does discuss many of the 'springs and principles' by which a variety of events of coming-into-being transpire: animal and vegetable generation, instinctual activity, mechanical causation, and intelligent design. And Philo does say in the second dialogue: *What peculiar privilege has... thought, that we must make it the model of the whole universes?* (DNRI48)<sup>10</sup> But surely all that Philo is trying to do is to reject the thesis that the exhibition of design implies in every case a designer. To reject this thesis is not to provide any assessment of  $P(B/A)$ , except in the negative and trivial sense of showing that this value is not 1. But

where does Philo attempt to give any further numerical estimate? Where does he maintain even that  $P(B/A)$  is near zero or that  $P(\bar{B}/A)$  is near 1? The answer is, Nowhere. In fact there is in the Dialogues no consideration of Salmon's prior probabilities at all. That various forms of coming-into-being are adduced in the course of the discussion surely does nothing to show that there is any such consideration.

With respect to the remaining two types of probabilities - the likelihoods of the Bayesian problem - Salmon seems to have no argument at all. He simply claims that Philo does cite the appropriate evidence in his discussion of the various 'springs and principles' of coming-into-being: "In the course of the argument, Philo brings out these considerations quite explicitly."<sup>11</sup> But where? To be sure, Philo considers examples that might in their own right be usefully construed according to a Bayesian analysis. But where does Philo so construe them? Where does he provide any estimate - even a crude one - of the probabilities in question? So far as I can ascertain, the answer is, Nowhere.

Salmon's case, then, seems vastly trumped-up. But saying this does nothing to clarify what the crucial argument concerning causation is in the Dialogues. Salmon claims that, whatever it is, it is not an appeal to analogy. I say it is an appeal to analogy, and now I shall turn to showing this point in further detail.

## II.

What is an appeal to analogy in the sense in which I maintain that Philo and Cleanthes are considering such an appeal when they discuss the argument from design, and in the sense in which Salmon maintains that they are not? The typical analogy reasons from the fact that one particular is similar to another particular, to the claim that a given property possessed by the first particular is also possessed by the other (or that at least a similar property is possessed by the other). The strength of the analogical reasoning

crucially depends on the similarity between the two particulars, and perhaps also on the number of particulars we have experienced with the property in question. When the two particulars are quite similar, then the analogy is strong, and when they are more or less dissimilar, then the analogy is weak. But now this is certainly the sort of argument that Philo thinks he is considering:

*That a stone will fall, that fire will burn, that the earth has solidity, we have observed a thousand and a thousand times; and when any new instance of this nature is presented, we draw without hesitation the accustomed inference. 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 whenever you depart, in the least, from the similarity of the cases, you diminish proportionally the evidence; and may at last bring it to a very weak analogy, which is confessedly liable to error and uncertainty. (DNr144)*

This quote is from the second dialogue, but there is no reason to think that the nature of the fundamental form of argument being considered has changed later in the Dialogues. And there are at least four reasons for thinking that it has not changed. First, Philo simply defines the argument from experience as an analogy of the sort just described:

*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: And this I call an argument from experience. (DNr149)*

Secondly, in the fifth dialogue, Philo makes clear that he is still considering the same species of argument to be the basis for his discussion with Cleanthes:

*Like effects prove like causes. This is the experimental argument... Now it is certain, that the liker the effects are, which are seen, and the liker the causes, which are inferred, the stronger is the argument. Every departure on either side diminishes the probability, and renders the experiment less conclusive. (DNr165)*

Thirdly, in the sixth dialogue, the basic principle at the core of the discussion is still said to be *that where several known circumstances are observed to be similar, the unknown will also be found similar.* (DNR170) A fourth source of support for the claim that Hume considers the argument from design to be basically an appeal to analogy is that throughout the Dialogues, whenever 'the experimental argument' is being considered, the crucial point of debate is whether or not the universe as a whole is or is not similar (and, if it is, to what degree it is similar) to the various kinds of effects that are found among the particular parts of the universe with which we are familiar. Thus, in the seventh dialogue Philo reasons this way:

*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, and its origin ought rather to be ascribed to generation or vegetation than to reason or design.* (DNR176)

Indeed, Philo's whole case against the argument from design depends on the fact that basically the argument, as he conceives it, is an appeal to analogy. His main point is that we have no strong evidence about the origin of the universe, and that in the absence of such evidence, the best we can do is to reason by a weak analogy; moreover, that the particular weak analogy to which the design argument appeals is no better than a variety of other weak analogies:

*I have still asserted, that we have no data to establish any system of cosmogony. Our experience, so imperfect in itself, and so limited both in extent and duration, can afford us no probable conjecture concerning the whole of things. But if we must needs fix on some hypothesis, by what rule, pray, ought we to determine our choice? Is there any other rule than the greater similarity of the objects compared? And does not a plant or an animal, which springs from vegetation or generation, bear a stronger resemblance to the world, than does any artificial machine, which arises from reason and design? (DNR177)<sup>12</sup>*

## III

Let us then characterize more closely the appeal to analogy, as Hume considers it in the Dialogues. This might seem impossible to do, since in different passages in the Dialogues Hume might seem to embrace somewhat different fundamental principles of argument by analogy. One reason for the difficulty in this regard is that Hume uses both an absolute or *tout-court* notion of resemblance and also a relative or comparative notion of resemblance. According to the absolute notion, two objects either resemble each other or they do not; their resemblance is not a matter of degree.<sup>13</sup> According to the comparative notion, two objects resemble each other to a given degree, rather than merely resembling each other or not resembling each other; in the comparative sense of "resemble," it might happen, for example, that a resembles b but does so to a lesser degree than c resembles d.<sup>14</sup> Let us use "R" to designate the absolute notion of resemblance, in such a way that "R(x,y)" says that x and y resemble each other, *tout-court*. Let us use "r" to designate the comparative notion of resemblance, in such a way that "r(x,y)" designates the degree to which x and y resemble. Then we can let

$$r(x,y) > r(w,z)$$

say that x and y resemble each other to a greater degree than do w and z. Finally, let us use the letter "c" to designate a cause-locating function, so that "c(x)" designates the cause of x.

It can, perhaps, seem, then, that there are various ways of encoding the basic principle of 'the experimental argument.' For example, it can perhaps seem that the dictum *like effects prove like causes* should be represented as

$$R(\underline{x}, \underline{y}) \implies R(c(\underline{x}), c(\underline{y})).$$

It can also seem, perhaps, that the dictum *the liker the effects...the stronger is the argument* should be rendered as

$$[r(\underline{x}, \underline{y}) > r(\underline{x}, \underline{z})] \implies [r(c(\underline{x}), c(\underline{y})) > r(c(\underline{x}), c(\underline{z}))].$$

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The possibilities for interpreting the basic principle of appeals to analogy do not end here. Hume also employs a notion of probability (though not a Bayesian one).<sup>15</sup> It can, then, perhaps seem that the basic principle should be rendered as

$$[r(\underline{x}, \underline{y}) > r(\underline{x}, \underline{z})] \Rightarrow [P[R(c(\underline{x}), c(\underline{y}))] > P[R(c(\underline{x}), c(\underline{z}))]],$$

where "P(A)" is understood to denote the probability of A. No doubt there are many further suggestions for formulating the basic form of argument under discussion in the Dialogues. What, then, actually is this form of argument, and how are Hume's two notions of resemblance connected with each other in it?

Despite the initial plausibility of the above suggestions, I do not think that any of them is the correct principle for interpreting Hume. They all involve entailments, or in other words valid deductive inferences. But Hume is clearly aware that it is not deduction he is dealing with, but rather induction.<sup>16</sup> Accordingly, we must find an inductive argument of some sort that Philo and Cleanthes are appealing to. I submit that the following is the basic form of argument in question:

(A1)  $R(\underline{x}, \underline{y})$

(A2)  $R(c(\underline{x}), \underline{z})$

Therefore,  $\underline{z} = c(\underline{y})$ .

The premises A1 and A2 here are to be construed not as entailing the conclusion " $\underline{z} = c(\underline{y})$ " but rather as providing inductive support for it.

With this basic form of inductive argument in mind, we can go on to interpret Hume's claim that *the liker the effects are, which are seen, and the liker the causes, which are inferred, the stronger is the argument.* (DNR165) This means that the greater the resemblances referred to in both A1 and A2, the stronger is the inductive support that these premises give to the conclusion " $\underline{z} = c(\underline{y})$ ." The notion of "probability" used by Hume is, I submit, simply this notion of the strength of inductive support that premises give to

conclusions in inductive arguments. This idea of probability could be more accurately characterized in a set of formal principles about the basic form of argument. One such principle would explicate how the strength of inductive support obtaining in a new instance of the argument depends on the number of previous instances of the arguments that have been successful. Another, surely, would be that if we had two arguments

$$\begin{aligned} R(\underline{x}_1, \underline{y}_1) \\ R(c(\underline{x}_1), \underline{z}_1) \\ \text{Therefore, } \underline{z}_1 = c(\underline{y}_1), \end{aligned}$$

and

$$\begin{aligned} R(\underline{x}_2, \underline{y}_2) \\ R(c(\underline{x}_2), \underline{z}_2) \\ \text{Therefore, } \underline{z}_2 = c(\underline{y}_2); \end{aligned}$$

and if it were true both that

$$r(\underline{x}_1, \underline{y}_1) > r(\underline{x}_2, \underline{y}_2),$$

and that

$$r(c(\underline{x}_1), \underline{z}_1) > r(c(\underline{x}_2), \underline{z}_2);$$

then the strength of the support for " $\underline{z}_1 = c(\underline{y}_1)$ " would be greater than the strength of the support for " $\underline{z}_2 = c(\underline{y}_2)$ ."

The argument from design can be represented as an instance of this general form of inductive analogy, as follows. Let "u" stand for the universe and "g" stand for God. Then the argument from design becomes:

$$\begin{aligned} (B1) \quad R(\underline{x}, \underline{u}) \\ (B2) \quad R(c(\underline{x}), \underline{g}) \end{aligned}$$

$$\text{Therefore, } \underline{g} = c(\underline{u}),$$

where in this argument "x" is understood to refer to an entity that displays order and design, and where this order and design are the basis for maintaining the premise B1. Representing the 'experimental argument for theism' in this way has not only the advantage of bringing out the inductive character of the form of argument underlying it, but also the advantage of clarifying how degrees of resemblance are used to assign degrees of strength to arguments which are

instances of this form. Furthermore, construing the design argument in this way also has the advantage of bringing out that the conclusion of the argument is a causal judgment, a judgment that one item is the cause of another. Since the argument from design as Philo and Cleanthes consider it in the Dialogues is an argument that concludes to the cause of the universe, this encapsulation of the fundamental form of the argument accords with the actual argumentation of Hume's work.

In another respect too this construal of the argument accords with the discussion in the Dialogues. This respect has to do with the detailed structure of the discussion in the Dialogues, a structure which Salmon completely misrepresents when he gives his third argument for a Bayesian interpretation of the Dialogues. Salmon says: "The strength of a simple argument by analogy depends crucially upon the degree of similarity between the entities with respect to which the analogy is drawn. But...watches are...dissimilar to universes. Philo is quick to point this out with devastating force.... By the end of the second dialogue...both Philo and Cleanthes are fully aware that the argument is more complex."<sup>17</sup> Now I am not quite sure whether the form of argument I am attributing to Philo and Cleanthes in the Dialogues is a "simple argument by analogy" in Salmon's sense, but an argument by analogy it certainly is (perhaps not a simple one). And appealing to this argument does make plainer the general drift of the details of the discussion between Philo and Cleanthes. For, what they are arguing about is simply the various resemblances in question in the premises B1 and B2 of various instances of the general form of which the argument from design is also an instance.

Philo and Cleanthes spend a great deal of time discussing various choices of x and the merits of these choices. In the second dialogue Philo argues that, given our minute and partial knowledge of the universe as a whole, we could never be in a position to argue for premise B1. And if we

could, Philo maintains in the fifth, sixth, and seventh dialogues, the atheist still has available many choices of order-displaying  $x$  (e.g. an animal) and choices of  $z$  (e.g. cosmic sexual reproduction) such that an atheistic argument

(C1)  $R(x, u)$

(C2)  $R(c(x), z)$

Therefore,  $z = c(u)$

is inductively much stronger than any theistic argument of the same general form, because the resemblances in C1 and C2 are much closer than any of those in B1 and B2. I submit, then, that the details and complexities of the discussion between Philo and Cleanthes can and should be seen in light of the form of argument in question. They do not, despite what Salmon contends, signal the employment of some form of argument that is not an appeal to analogy at all.

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1. Wesley C. Salmon, "Religion and Science: A New Look at Hume's Dialogues," Philosophical Studies 33 (1978), 143-176.
2. Salmon, pp. 146-52.
3. Salmon, p. 148.
4. Salmon, p. 145.
5. Salmon, p. 145.
6. Salmon, p. 145.
7. Salmon, p. 148.
8. Salmon, p. 148.
9. Salmon, p. 148.
10. David Hume, Dialogues Concerning Natural Religion, ed. Norman Kemp Smith (Indianapolis: Bobbs-Merrill, 1947), p. 148. When Hume says here, ... *why select so minute, so weak, so bounded a principle as the reason and design of animals is found to be upon this planet?* it might be thought that he is suggesting that

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P(B/A) is very low. Perhaps this is what Salmon directs his attention to. But Hume's point in this passage is not to estimate P(B/A). Rather it is to say that the analogy between one part of nature and the whole of it, or between one part of nature and another part of it, is such a weak analogy that it cannot correctly underpin an inference from the part to the whole, or from one part to another part.

11. Salmon, p. 151.

12. The same point is repeated at the end of the seventh dialogue.

13. (DNR165) The dictum *Like effects prove like causes* seems to employ the absolute notion of resemblance.

14. (DNR165) The dictum ... *the liker the effects...and the liker the causes...the stronger is the argument* seems to employ the comparative notion of resemblance.

15. (DNR176)

16. Moreover, if any of the suggestions were correct, then we would have a kind of logical relation between causes and effects, and it is doubtful that Hume would admit any logical relationship of the sort to exist.

17. Salmon, p. 145.