

Defense of David Hume's Attenuated Deism & More-

Revisiting Philo's Criticisms of the Design Argument in

Hume's *Dialogues Concerning Natural Religion*

Introduction: The Demise of the Design Argument & Natural Theology?

The Design Argument (hereafter abbreviated as DA) is a traditional argument for the existence of God. It argues from the order & purposiveness of nature, & parts of nature, to the existence of a very powerful & very intelligent Designer. In this paper, I do not claim that this Designer is necessarily morally perfect, omniscient or omnipotent. I do not deny these claims but intend to confine the scope of inquiry in order to focus on the question whether the “marks of design” exhibited by nature demands an explanation by an Intelligence beyond nature. This will also avoid the complications generated by the difficult problem of evil or the concepts of omni-attributes. Although David Hume has offered many incisive criticisms of DA in his *Dialogues Concerning Natural Religion* (DNR)¹ through the mouth of Philo, I argue in an earlier paper that Hume is in fact at least an attenuated deist. For many people, this position is hard to accept because they would think that this position is inconsistent with Hume’s “devastating” & “decisive” criticisms of DA.

For example, James Noxon claims that Hume’s “[a]bsolute decisive refutations” of DA (Noxon 1973, 25) had led to the “annihilation of an entire discipline [natural religion] which engaged some of the best minds of the time” (Noxon 1973, 26). Noxon thinks that in the DNR, “Hume deployed his mature philosophical & literary talents with brilliant effect against the DA, the keystone of 18th-century theology,” which “collapsed under the strain of his skeptical probing. The critical, analytical side of Hume’s intellect was fully realized in this graceful, witty, dramatic work of philosophical art” (Noxon 1973, 26). Similarly, Aiken regards “the *Dialogues* as the death-knell of religious belief among the philosophically enlightened.” He believes that “Hume & Kant have shown, once & for all, how tenuous is the intellectual basis of our belief in a Transcendent Cause of the nature.” As a result, he predicted that natural theology was gone “once & for ever” (Aiken 1948, xvii). However, Aiken’s prediction in 1948 was proven wrong as we have witnessed the renewal of natural theology among professional philosophers in recent decades.²

Norman Kemp Smith is correct to point out that the DNR was “the first work in our literature to subject DA to a passionless & searching criticism.” He also claims that “Hume’s destructive criticism of the argument ... was final & complete,” & “Hume’s indictment of them is now but seldom challenged” (Kemp Smith 1947, 30). In 1965, the book *Hume, Newton and the Design Argument* by Robert Hurlbutt was published. In this book, he writes: “Indeed, at the hands of David Hume, natural theology meets a

¹ In this paper, all texts of DNR are quoted from this version: Hume, David. 1963. *Dialogues Concerning Natural Religion*. In Richard Wollheim, ed., *Hume on Religion* (London: Collins), pp. 99-204.

² For example, see the *Blackwell Companion to Natural Theology* & many others.

somewhat violent, although well mannered and reticently executed, death" (Hurlbuttt 1965, 168); "this sort of natural theology and its prime argument, the DA, has met its logical end" (Hurlbuttt 1965, 190-191). He also writes, "None seeks to refute Hume's analysis of the design argument" (Hurlbuttt 1965, 190). I am not sure whether Kemp Smith & Hurlbuttt's claims were entirely correct about the fifties to the sixties in the last century, but definitely from the end of the sixties, Hume's criticisms of the DA have started to be challenged. In 1968, Richard Swinburne published the first influential paper which tried to rebut Hume's criticisms of the DA (reprinted in Swinburne 1973). It was followed by the important works of Pearl (1970) & Pike (1970). Other philosophers also pointed out the inconclusiveness of many Humean criticisms, e.g., Ferre, Davies, Ewing. While I agree that DNR certainly deserves high praise, I think Aiken & Noxon are mistaken about the logical conclusiveness of Hume's criticisms of the DA, & their assessment of the demise of natural theology is gravely exaggerated. As a matter fact, Humean criticisms of DA are now vigorously contended. & the DA is alive & well. Perhaps this would not be surprising to Hurlbuttt since he also writes, "Despite such buffetings, however, the DA has exhibited in the past the tenacity of a hardy perennial, suffering obscurity only to rose in full power again" (Hurlbuttt 1965, 189). Hurlbuttt seems to be prophetic here but Hurlbuttt attributes the tenacity of the DA mainly to its intuitive-emotional force and not to its logical force. So it remains to be seen how cogent is each of Hume's criticisms, logically speaking. In this paper, I will argue that all of Philo's criticisms of the DA are in fact far from decisive. The apparent victory of Philo is largely due to Cleanthes' failure to formulate better rules of analogical or scientific reasoning. Many criticisms of Philo are based on Hume's faulty philosophy of empiricism, & others can be overcome in light of contemporary scientific developments.

The Analogies Suggested by Cleanthes' Design Argument

Different Formulations of Design Argument

There are different formulations of DA. This is Cleanthes' first and longest formulation of DA: "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. All these various machines, and even their most minute parts, are adjusted to each other with an accuracy, which ravishes into admiration all men, who have ever contemplated them. *The curious adapting of means to ends, throughout all nature, resembles exactly, though it much exceeds, the productions of human contrivance...* 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" (DNR, 115-116; italics mine).

The second formulation by Cleanthes is more succinct: "The order and arrangement of nature, the curious adjustment of final causes, the plain use and intention of every part and organ; all these bespeak in the clearest language an intelligent cause" (DNR, 137). These DAs are not identical but also not incompatible. They appeal to several kinds of empirical data, and suggest different kinds of analogies of the universe with "productions of human contrivance" (this is the key concept in Cleanthes's first formulation). These analogies may then be used to support an analogical inference to the existence of a Cosmic Designer. Let me explore in some detail the nature of these analogies below. I will also elaborate and update these

analogies.

The Universe as a Complex Highly Ordered System

Cleanthes talks about the “order and arrangement of nature,” and the design argument which appeals to data about order can be called DA qua order. Cleanthes compares the world to “one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions.” This is referring to the complex hierarchical structure of the world, which is impressive order indeed. This may suggest intelligence through an analogy with the Russian dolls, which consist of a larger doll containing a smaller doll of exactly the same shape inside, which contains yet another smaller doll of exactly the same shape inside, and so on. In fact, Cleanthes’s description of the world is significantly similar to another description informed by contemporary sciences more than two centuries later: “the worldview justified by the evidence provided in the major sciences was one of a single, indivisible whole of reality, ordered by a principle of organization, which specifies itself in and as a scale of overlapping, interdependent, and dialectically related forms. Each major phase of this scale is itself a whole of the same kind, itself differentiated into a similar series of forms; and all together they constitute one continuous scale ranging from the physical and chemical, to the biological, and thence to the mental and intellectual. This last presents the whole as a conceptual totality that itself is a science” (Harris 1996, ix).

For modern scientists, the most astounding feature of natural order is that it seems to be governed by universal and invariable natural laws. Swinburne is a notable contemporary defender of this DA qua order, or regularity argument. He draws our attention to the fact of a temporal order which is all-pervasive in our world. "The orderliness of nature is a matter of the vast uniformity in the powers and liabilities throughout endless time and space, and also in the paucity of kinds of components of bodies" (Swinburne 1979, 140). Or "the orderliness of the universe... is its conformity to simple, formulable, scientific laws" (Swinburne 1979, 136). It seems to me that the premises can be divided into three: a) structural order- our world is simple in structure, consisting only of a few basic kinds of fundamental building blocks; b) temporal order: this structure is stable over time, governed by the same set of natural laws; c) the mathematical nature of these natural laws. I think we should also add the fourth point: d) creativity: following these natural laws, the cosmic process has generated many levels of reality in the cosmic hierarchy, e.g., quantum level, material level, life and consciousness.

It should be noted that order *as such* may not be strong data for DA, but complex and highly ordered systems (HOSs) are. The universe may consist of only one big iron sphere and it has order in some sense, but this hardly invites the postulation of a Designer. For a HOS, there may be millions of parts which constitute the system, but all parts can be divided into a few kinds of basic building blocks, thus manifesting some kind of structural intelligibility rather than sheer chaos. Moreover, these building blocks can interact or even combine together, but again the combination processes are not chaotic- they are governed by definite rules. The English language is a highly ordered system (HOS), and its basic building blocks are the 26 alphabets, which can be combined into different words. There are also more or less rigid rules governing the combination of these words, e.g., the English grammar. Similarly, the Hong Kong coin system is a highly ordered system, and its basic building blocks are the ten cents coins, the

twenty cents coins, the fifty cents coins and the one dollar coins. Of course the combinations of these coins follow strictly arithmetical rules to give different sums of money. Other HOSs may include musical scales, traffic systems, cities, the game of lego, etc. A HOS in itself may not reach the level of a complex specified purposive system (CSPS) (this concept will be explained further below), but a HOS can be the infrastructure for the creation of CSPSs, e.g., by using the English language system, human beings can produce works of genius like the plays of Shakespeare.

Of course, all these HOSs, such as languages, coin systems, musical scales, traffic systems, cities, libraries, and the game of lego, are all products of human contrivance. So understanding the universe as a HOS is a way to mount the analogical DA. That our universe turns out to be a HOS is by no means a guaranteed fact. Our universe might consist of amorphous energy/matter which is constantly changing with no stable building blocks, and the changes may be more or less random, not governed by any laws. Perhaps this kind of universe would be more like chaos than a system. Even given a universe constituted by well-demarcated particles, all the particles might have different sizes, shapes and weights, like the stones on the mountain side. There may also be no laws governing these particles. In all these and infinitely many possible worlds, no HOS would exist, and science in those worlds would not be possible. So the existence of our universe as a HOS open to scientific investigation should not be taken for granted.

The Universe as a Complex Specified Purposive System

In some complex systems, their structure suggests a purpose as the governing principle of that structure, such as a biological organism- “the plain use and intention of every part and organ” is to keep the organisms survive. Of course, products of human contrivance like clocks or computers also have this kind of structure. The DA qua purpose may refer to these two important features mentioned in Cleanthes’ first formulation of DA:

- **“curious adapting of means to end” (CAME);**
- **mutual adjustment of parts with accuracy (MAPA):** rephrasing “parts adjusting to each other with an accuracy” in the first formulation.

The categories of final causes, purpose and intention clearly have more affinity with mind than matter, and hence complex specified purposive systems (CSPSs) would provide stronger data for DA.³ Let me first explain this concept. By “system” I mean a collection of closely interacting parts which maintain some degree of regular form or behaviour. A system is complex if it consists of many parts. The more parts it has, the more complex it is. A system is also more complex if it exhibits a more intricate structure, such as the existence of hierarchical levels of organization. A system is specified if the arrangements of its many parts are highly specific. In fact they have to be arranged in highly specific ways before the system can achieve some purpose, which seems to characterize the system as a whole. The parts can be seen to have various well-defined functions which interact, cooperate or are integrated to make the realization of its overall purpose possible. If a *slight* deviation from the existing organization of the parts would result in the system’s loss of its purpose, then the system can be said to be *highly* specified. Both complexity

³ Obviously this concept is inspired by the important work of William Dembski (see Dembski 1998, 2002). My ideas in this paper owe a lot to him, but the elaboration, and any fault contained here, is completely mine.

and specificity are matters of degree.

It can be readily seen that a watch or a computer is a CSPA: it has many parts like gears, and the parts have different functions but they have to fit together in highly specific ways before the watch can realize its purpose of telling the time *accurately*, or for the computer to serve as a highly efficient data processing machine. A novel is also a CSPA: it has many different chapters which contain descriptions of various incidents, conversations, etc., and different parts of the novel have to fit together in highly specific ways before it can tell a coherent and meaningful story. It is not hard to see that typical products of human contrivance like scientific theories, symphonies, books, various kinds of machine, buildings like houses and museums, and complex organizations of big companies are all CSPAs.

However, sometimes we only have a complex specified system (CSS) but the purpose which characterizes or integrates the system as a whole may not be apparent or discernible by us. For example, the Stonehenge has many parts (many big stones) and they have somewhat regular shapes (specified), but the puzzling feature about them is that we cannot yet understand the overall purpose of the Stonehenge, and how this purpose can reveal the principle of organization of all those stones. So it can be said to be a complex specified system (CSS) without being known to be a complex specified purposive system (CSPA) yet. But the purpose may be discovered in the future. For example, we may have good reasons to believe some ancient symbols to be really linguistic expressions but we cannot understand their meaning. But their meaning may be suddenly unraveled one day due to the availability of new information. So a mere CSS may turn out to be a CSPA as well.

Being a CSPA seems to be a very strong indicator of being a product of intelligence, unless there is a good alternative explanation. However, being a CSS is already a good indicator of being a product of intelligence as illustrated by the movie *Contact*. In this movie Jodie Foster is a scientist who has tried to establish contact with ET intelligence but with no success for a long time. But one day she received a digital signal composed of a very long series of zeros and ones- this signal was of course very complex. Moreover, it turned out to have a very specific structure: the zeros were like punctuation marks which separated the ones which represented the series of prime numbers. This was evidence enough for the existence of the ET intelligence, which did come to have contact with her later. This signal is a CSS but the purpose of this signal is not very clear- so it is not yet a CSPA. (We may guess that its purpose is exactly to indicate the existence of intelligence somewhere in the universe for other intelligent beings elsewhere, but this purpose cannot be “read” from the structure of that message. For the watch, the purpose is kind of built into its structure.)⁴ It should be clear that the features of the universe as mentioned by Cleanthes look like those of a CSPA. The infinite number of levels of its hierarchical structure, and its numerous parts evince the complexity of the universe. Together with the universe’s MAPA (with accuracy, i.e., specificity) and CAME (with curious adjustment of final causes, i.e. purpose),

⁴ In general, many purposive systems are also complex and specified but there are also some purposive systems which may not possess a high degree of complexity and specificity. For example, a thermometer is created for a purpose, i.e., to measure temperatures, but its structure is much less complex or specific than other CSPAs like computers.

it can be rightly classified as a CSPA. So the analogy of the universe with “a product of human contrivance” seems to be quite strong, if Cleanthes’ characterization is correct.

But there is a problem here. Traditional DA qua purpose mainly uses biological design as data, and the analogy of organisms, which are parts of the universe, with products of human contrivance concerning being CSAs is indeed quite strong. Suppose this is successful in inferring the designer of those organisms. Questions can still be raised whether the designer of those organisms is identical to the Designer of the whole universe. Natural theologians like Paley seem never to raise this question and they assume that if there is a designer of the organisms, then it is also the Designer of the whole universe. For example, Newton infers from “Eyes, Ears, Brain” directly to “a powerful ever-living Agent” (Newton 1989, 156), without considering the possibility that this “ever-living Agent” can be any being other than God.⁵ Moreover, if we just look at the natural laws and the large-scale structure of the universe, it is also not clear what the purpose of all these is. So the analogy of the universe as a whole with CSAs is not as well-established as the analogy of organisms with products of human contrivance concerning being CSAs. There is a gap in the argument here.

However, recent developments in modern cosmology provide new data of fine-tuning which may fill up this gap. These data suggest the existence of ingenious cosmic design in addition to biological design. We find that the exact forms of our orderly universe as HOS and the emergence of life and embodied persons can't be separated; in fact the latter depends on the former. (Here I just assume that the theory of evolution can completely and satisfactorily explain the origin of the first cell as well as the subsequent evolution of all diverse life forms.) For the emergence of life and embodied persons to be even possible, a lot of “accidents” have to happen. For example, there has to be a “very close balance between the competing effects of explosive expansion and gravitation contraction which would have corresponded to the incredible degree of accuracy represented by a deviation in their ratio from unity by only one part in 10^{60} ” (Polkinghorne 1988, 22). If expansion rate is a little higher, the world would have flown apart. If this is a little lower, it would have collapsed earlier. In either case, life would be impossible. Another example: “Cosmologists have calculated that the actual density of matter in the universe as measured against the critical density of matter (the exact amount necessary for the perfect balance- in expansion between confetti and crunch) cannot have differed by more than one part in 10^{15} and still lead to a complex, life-friendly universe” (Wiker and Witt 2006, 153). What is more striking is that the constants of the basic laws of physics have to be fine-tuned as well. For example, if the nuclear strong force is a little bit weaker, all elements heavier than hydrogen would not be stable. If the nuclear strong force is a little bit stronger, all hydrogen would become heavier elements. If the electromagnetic force is a little bit weaker, atoms will not be formed at all. If the electromagnetic force is a little bit stronger, no covalent bonds would be possible, and all bio-molecules would not exist. For the details, see Barrow and Tipler (1986, chapters 4-7); Lewis and Barnes (2016).

⁵ This assumption may be natural or even reasonable in their time, as the only kind of superhuman intelligence credible to them is Divine Intelligence. But in our post-Darwin space age, some people may believe that organisms on earth are created by some very wise and powerful ET intelligent beings, which evolved on some distant planets long time ago.

There are numerous such kinds of “coincidences”- this inspires Paul Davies, a theoretical physicist, to remark: "It is hard to resist the impression of something- some influence capable of transcending space-time and the confinements of relativistic causality- possessing an overview of the entire cosmos at the instant of its creation, and manipulating all the causally disconnected parts to go bang with almost exactly the same vigor at the same time, and yet not so exactly coordinated as to preclude the small scale, slight irregularities that eventually found the galaxies, and us" (Davies 1982, 95). The force of the argument depends on the fact that if there is no further explanation, the balance of the universe is very improbable- it's very delicate, and many causally unconnected factors contribute to it. A slight change of the constants would make life impossible. The degree of precision needed, in some case of fine-tuning, is equivalent to that required to hit a target an inch wide on the other side of universe, twenty thousand million light years away! Also there's the problem of accounting for the apparent coordination or mutual adjustment of separate factors, e.g., different physical constants. These are also CAME and MAPA at the abstract level. Hence it suggests an intelligent purpose because from our experience, intelligence can achieve a *purpose* (e.g., the emergence of life and embodied persons) by fulfilling stringent conditions and coordinating diverse parts, e.g. perfect fitting of the components of a watch.

So a Supreme Mind can provide a good explanation for this "accidental universe" which, against all odds, tends to the eventual emergence of life and embodied persons. This looks very like a purposive adaptation imposed by Intelligence on the universe. For this we can find many analogies in our lives, e.g. a gardener tinkering with the growth of plants to make some pattern. A close analogy can be provided by the human-created mini-ecosystem in a big greenhouse containing many life forms. To make this life-sustaining, the scientists have to monitor numerous conditions like the temperature, the humidity, the oxygen content of the air inside, and many more. Every condition has to be just right; otherwise the “ecosystem” will break down. The common point is that intelligence can select one specific meaningful combination out of infinite possible sets to achieve a purpose: emergence of life and embodied persons in this case. The existence of all-pervasive natural order together with the fine-tuning of this order to prepare for the emergence of life and embodied rational consciousness reveal the universe as a whole to be a CSPA. The highly *specific* conditions for this to happen are already laid down in the deep structure of the universe (i.e., its natural laws) from the very beginning (including the initial conditions of the Big Bang or so). So after all, the universe as a whole is not only a HOS, but also a CSPA. The analogy is completed.

Two Forms of the Design Argument

To sum up, there are two major forms of DA: the DA qua order argues from the natural order (natural laws) to the existence of the Cosmic Orderer, & the DA qua purpose argues from the ingenious purposive structures in biological organisms to the existence of the Cosmic Designer. For example, Newton accepts the DA qua purpose: “Uniformity in the Bodies of Animals... Eyes, Ears, Brain... other organs of Sense & Motion; & the Instinct of ... Insects, can be the effect of nothing else than the Wisdom & Skill of a powerful ever-living Agent” (Newton 1989, 156). The argument from fine-tuning would be a contemporary version of DA qua purpose. Robert Boyle, another pioneer of modern science, accepts the

DA qua order, & believes that it is God who set up the laws of nature: “in the beginning, he [God] so guided the various motions of the parts of it as to contrive them into the world he designed they should compose; & established those *rules of motion*, & that *order* amongst things corporeal, which we call the laws of nature” (Boyle 1989, 111; italics mine). It is best to see all these versions of DA as complementary which constitute together a cumulative argument for design.

An Overview of Humean Objections to the Design Argument

Hume has proposed numerous objections and rhetorics against the DA through Philo's mouth. I think that they can be classified into 3 main types:

- I) Defective Argument Objections: the DA is suffering from logical or other kinds of defect.
- II) Epistemic Uncertainty Objections: the data-base of the DA is too small to justify any confidence in any conclusion about the Intelligent Designer.
- III) Alternative Explanation Objections: there are alternative explanations of the marks of design in the universe which are either superior to or as good as the design hypothesis.

Defective Argument Objections

- a) Uniqueness Objection: causal analogy is inapplicable to the universe as a whole since it is unique and no one has had experience of the origin of worlds.
- b) Weak Analogy Objection: the analogy between natural order and artefacts is not close enough to make theism a good explanation of the former.
- c) Regress Objection: even if the theistic hypothesis can explain the order in the world, its status as a satisfactory explanation is challenged by the fact that the divine mind which it postulates would itself be as much in need of explanation (being another case of order) as the order in the world. This would generate a vicious regress.

Epistemic Uncertainty Objections

- a) Infinitely Many Principles Objection: logically speaking, there are an infinitely number of springs & principles which can explain marks of design in the universe. Since the design hypothesis is only one of them, we can never be sure that this is the correct explanation.
- b) Part to Whole Objection: it is not legitimate to argue from knowledge of the tiny part of world we have to the nature of the whole world. For example, we cannot draw any conclusion about the growth of the whole body merely from knowledge of the growth of a hair.
- c) Present to Past Objection: similarly, we cannot infer from our present knowledge of the world to how it originated long time ago.

Alternative Explanation Objections

- a) Polytheism & Defective Deities Objection: even if we need to appeal to intelligence to explain the marks of design in the universe, the explanation may appeal to a team of gods or various kinds of defective deities. So the DA may reach a conclusion of polytheism rather than theism.
- b) More Like An Organism Objection/Generation Objection: since the universe is more like an organism than a machine, it is more reasonable to conclude that the universe was originated from a Cosmic Organism instead of a Cosmic Mind by analogical reasoning. It is better or equally good to explain the universe by generation rather than intelligence.
- c) Immanent Order Objection: the marks of design in the universe can be better or equally explained by a principle of immanent order inside the universe than by an external Intelligence.
- d) Epicureanism/Chance Objection: the marks of design in the universe can be equally explained by appeal to chance processes. This can be called an Epicurean hypothesis.
- e) Egregious Partiality Objection: the DA is selecting intelligence as key to cosmos, but this is a kind of special pleading & partiality towards our own species. We may ask: "What peculiar privilege has this little agitation of the brain which we call thought that we must thus make it the model of the whole universe?" (Due to space limitations, I will not deal with this objection in this paper.)

I will try to reply to these criticisms one by one below.

Critical Evaluation of the Defective Argument Objections

Critical Evaluation of the Uniqueness Objection

Hume: Causal Inference Requires Experience of Constant Conjunction

The most common objection to DA is perhaps this uniqueness objection: Causal analogy is inapplicable to the universe as a whole since it is unique and no one has had experience of the origin of worlds. As Hume says: "It is only when two *species* of objects are found to be constantly conjoined, that we can infer the one from the other; & were an effect presented, which was entirely singular, & could not be comprehended under any known *species*, I do not see, that we could form any ... inference at all concerning its cause... Deity, a cause no less singular & unparalleled... both the effect & cause must bear a similarity & resemblance to other effects & causes, which we ... have found, in many instances, to be conjoined with each other" (OPP, 245).⁶

So both the effect (the world) & cause (God) involved in the DA need to belong to some known *species*. In the above passage, the uniqueness of God is emphasized. In a similar passage in the *Dialogues*, Philo emphasizes that the universe is unique: "when the objects, as in the present case, are single, individual, without parallel, or specific resemblance," this causal inference is impossible. We need to have

⁶ OPP refers to: Hume, David. 1963. "Of a Particular Providence & of a Future State." In Richard Wollheim, ed., *Hume on Religion* (London: Collins), pp. 230-245.

“experience of the origin of worlds” (DNR, 123). Philo asks, “Have worlds ever been formed under your eye?” (DNR, 125) So the gist of the uniqueness objection is that since causal inferences from A to B depend on experiences of constant conjunction of As & Bs, it is inapplicable to the universe, a unique member in the class A.

This is a standard objection which appears time and time again in discussions of the DA, and it is not uncommonly regarded as unanswerable. However, I will argue that this objection, at least in an unqualified form, is basically fallacious.⁷

The Inapplicability of the Uniqueness Objection to Some Forms of Design Argument

The first point to note is that the uniqueness objection, even if cogent, is only applicable to some forms of DA & not to other forms. The DA qua order does argue from the whole universe, but the DA qua purpose mainly argues from parts of the world, e.g., organisms or the solar system, to a designer of these particular things. Then it can argue that since the ordered parts of nature appear to work with one another, it's reasonable to postulate one Supreme Designer of the whole universe. For example, Cleanthes' DA sometimes appeals to *cases* like the eye & Paley has elaborated its strong & detailed analogy to a telescope or camera. Philo also appeals to *multiple cases* of biological design. So the uniqueness objection is in fact not applicable to these versions of DA.

Uniqueness is Relative to Description

However, the above way of reply is not open to Swinburne's version of the DA which argues from the natural order of the whole universe. But as Swinburne sharply points out, the uniqueness objection “becomes hopelessly confused by ignoring the fact that uniqueness is relative to description. Nothing describable is unique under all descriptions (the universe is, like the solar system, a number of material bodies distributed in empty spaces), & everything describable is unique under some description” (Swinburne 1973, 146). Since “uniqueness” can mean so many things, the objector needs to explain what is meant by saying that “the universe is unique”. Does it say that none of the properties of the universe can be applied to any other object? As it stands, this suggestion is false. For example, the universe has mass. So do many other objects. On the other hand, every physical object is unique in some sense. For example, most watches differ in size, color and at least serial number. If the serial numbers are deliberately made the same, they are still unique in having their own locations. So if we find a watch on a beach, we can also say that this watch is unique in some sense and hence we can't infer that it is designed. But this does not seem reasonable. So only uniqueness in the relevant aspect can bar an argument from analogy.

⁷ John Mackie, a Humean, has provided a classification of Hume's objections to DA. But interestingly, the uniqueness objection is silently dropped in Mackie's discussion (Mackie 1982, 136-137).

One can argue that the world or universe must be unique because it is all there is, but it seems to beg the question against those who believe in the existence of God, angels, or even parallel universes. So the definition of the universe as the total of all there is won't do, because it begs the question against theism as well as multiverse theories in science. Even if the universe is unique under certain description, it does not imply it cannot be subject to causal reasoning under another description. For example, "the designation 'My father' is (when used by me) logically confined to one person. But this does not mean that I cannot make any sort of induction about my father... For he is also describable in terms that are not logically unique: he is male, English" (Sturch 1972, 353).⁸

A far as DA is concerned, we only need to claim that our universe belongs to the class of HOS or CSPS, which does have more than one member. Because "the world has characteristics in common with other existents that are not worlds... the observed nature of the world is such as would quite likely be the choice of an intelligently design- External Cause" (Sturch 1972, 353). In fact since Cleanthes does not adopt an extreme form of negative theology, he does not need to deny that God does belong to some species. As Pike points out, "Cleanthes readily accepts... God is a member of the class of intelligent beings... God is *like* human artisans in that He is intelligent" (Pike 1970, 137). The inference can be built on experiences of constant conjunctions then, because "though no other universes are known to us, plenty of designed & undesigned things are" (Sturch 1972, 354). Once we clarify various meanings of "world" & different kinds of uniqueness, one can see that the uniqueness objection has no force.

Counter-examples to the Uniqueness Objection

Actually we find that science tries to explain the whole universe despite its "uniqueness". Similarly, biologist tries to explain the origin of human race despite its "uniqueness". On the other hand, puzzling features of quantum physics have forced some scientists to postulate many worlds. This hypothesis needs not to be true but it challenges the notion that our universe *has to be* the unique world. As Swinburne says, "cosmologists are reaching very well-tested scientific conclusions about the universe as a whole, as are physical anthropologists about the origins of our human race, even though it is the only human race of which we have knowledge" (Swinburne 1973, 145-146). Bird elaborates on the Big Bang cosmology: "We cannot estimate the likelihood of an event like the Big Bang in the way we might estimate the likelihood of a hurricane... But that does not prevent us from hypothesizing about it versus the alternative hypothesis of a steady-state universe. *Nor does its uniqueness preclude us finding evidence in favour of its occurrence*- such as background heat radiation across space, the relative abundances of hydrogen, Olbers' paradox, & Hubble's law... Insofar as a Big Bang theory can successfully explain these things, we may be in a position to know what happened when the world was born" (Bird 1998, 87; italics mine). So this case clearly refutes the uniqueness objection to DA, & Bird also explains the reason: we can use inference to the best explanation (IBE) instead & do not need to be restricted by Humean inductivism.

⁸ Unique? It "is trivially true of every object. The universe also ... falls under many species ... being large, possessing many parts... 'the fattest man presently on Canal street' can be satisfied by one & only one entity & surely one can discover from experience how he originated" (Pearl 1970, 275).

Although Elliott Sober is no friend of natural theology, he makes a similar point: “consider the suggestion ... that the mass extinction that occurred at the end of the Cretaceous period was caused by a large meteorite crashing to earth & sending up a giant dust cloud. Although there is plenty of room to disagree about whether this is plausible... it is quite irrelevant that we have never witnessed meteorite strikes producing mass extinctions ‘in other worlds.’ Inference to the best explanation is different from an inductive sampling argument” (Sober 1993, 35-36).

Critical Evaluation of the Weak Analogy Objection

The Exchange between Cleanthes and Philo

In Philo’s first reply to Cleanthes, he claims that Cleanthes’ DA suffers from the weak analogy objection- this claim is based on his proposed rules about analogical argument (paragraph 2.7), and he further elaborates these rules later in paragraph 2.17. (I will critically evaluate these principles in the next section.) Then Philo objects: “But surely you will not affirm, that the universe bears such a resemblance to a house.” Instead the “dissimilitude is so striking” that one cannot say that “the analogy is here entire and perfect.” So in the end the DA is only “a guess” (DNR, 117). I find this criticism less than clear because Philo does not really spell out what kind of disanalogy he is mainly talking about.

Anyway, here Philo seems to be interpreting Cleanthes as comparing the universe to a house, but this is odd because Cleanthes did not compare the universe with a house before, but with the entire class of “productions of human contrivance” abstractly conceived instead of a specific product. As explained above, Cleanthes’ main point is that the universe as a great machine, on the one side, and productions of human contrivance, on the other side, share a common feature, i.e., the ingenious feature of curious adaptation of means to end (CAME). (I think we may also add MAPA here.) *Concerning this comparison*, he claims that the two sides “resemble exactly”!

If Philo is talking about the *external appearances*, then of course Cleanthes would agree with Philo that the universe is very different from a house. So Cleanthes could accuse Philo of attacking a straw man here. If Philo wants to vindicate his weak analogy objection, he should try to show that the universe and an abstractly conceived product of human contrivance are greatly disanalogous concerning the crucial feature of adaptation of means to end. Philo has not done so. In fact we have seen earlier that the analogy of the universe to a HOS & to a CSPA seems defensible.

Critique of Philo’s Rules of Analogical Argument

Philo objects that Cleanthes’s analogy is not “entire and perfect” (DNR, 117). But the requirement that any analogy be entire and perfect is simply too demanding. It is not even possible for the inference concerning most familiar objects like houses, which Philo endorses. Almost all houses differ somewhat in size, color and design. All differ at least in terms of location and their environments. Philo’s weak analogy objection seems to be grounded on supremely demanding methodological requirement: “Unless the cases be exactly similar, they repose no perfect confidence in applying their past observation to any particular

phenomenon. Every alteration of circumstances occasions a doubt concerning the event; and it requires new experiments to prove certainly, that new circumstances are of no moment or importance. A change in bulk, situation, arrangement, age, disposition of the air, or surrounding bodies; any of these particulars may be attended with the most unexpected consequences” (DNR, 120).

It is simply impossible to observe this rule: in every two cases compared, there is likely to be an infinite number of dissimilarities. Nothing is exactly identical to another thing in all respects. Otherwise they would be the same thing. If what Philo says is correct, it is not clear we can have confidence in *any* analogical argument even for very familiar objects. To sum up, Philo’s rules of analogical argument are unrealistic and impossible to meet, not even by himself. So it seems that Philo’s Weak Analogy Objection fails to threaten Cleanthes’s analogical DA. His claim of dissimilitude seems to depend on some misunderstanding of Cleanthes’s central analogy, and in any case he fails to explain the details about the alleged dissimilitude, not to mention providing *empirical* evidence to support his claim. Nor has he produced *empirical* criticisms of the analogies suggested by Cleanthes. Surprisingly, his major criticisms seem to be based instead on allegedly true *theoretical* principles of analogical reasoning, which are simply unrealistic, and which are not followed consistently by Philo himself.

Upgrading the Mere Analogical Argument to the Analogical-Inductive Argument

We have already pointed out that when we search for the analogies between the universe and products of intelligence, we cannot focus on superficial features like sizes and appearances in view of the extreme diversity of products of human contrivance. When we further note that paradigm products of intelligence do not only include physical objects like houses, cities, watches, but mental objects like poems, novels, and scientific theories, we have to conclude that the common feature of all of these objects cannot be a physical characteristic but have to be an abstract property like being a CSPA or HOS. In fact Philo understands this point very well. He once compares the “mental world, or universe of ideas,” to the “material world, or universe of objects.” Then he emphasizes that “In an *abstract* view, they are *entirely alike*” (DNR, 134; italics mine). When we compare the universe with the products of intelligent design, we should adopt a similar approach. For example, although products of human contrivance have a lot of differences, we can focus on their common feature of curious adapting of means to end (CAME). Then we can equally say, “In an abstract view, they are entirely alike”- concerning CAME.

That is why J. S. Mill deems the DA an inductive argument rather than merely an analogical argument. “The circumstances in which it is alleged that the world resembles the works of man are not circumstances taken at random, but are particular instances of a circumstance which experience shows to have a *real connection* with an intelligent origin, the fact of *conspiring to an end*. The argument therefore is not one of mere analogy. As mere analogy it has its weight, but it is more than analogy... It is an inductive argument” (Mill 2009, 163; italics mine).

I think the real rather than contingent connection here can be demonstrated by inductive investigation: we can collect a wide variety of things which we know to be typical products of intelligence (see many

examples above),⁹ and we almost invariably discover them to have features like complexity, CAME and MAPA, i.e., they are CSPSs. Furthermore, we can almost vary all characteristics of objects like shapes and colors but as long as they remain to be CSPSs, they are almost invariably the products of intelligent design. This corresponds to Mill's method of agreement and method of difference, which are used to help identify causal connection. This also means that the connection between being a CSPS and being a product of intelligent design is supported by uniform experiences (or experiences of constant conjunction), and is not likely to be a mere contingent connection. So this step does not only depend on analogies but also on some kind of inductive investigation. The database for this investigation should be as broad as possible. Of course I cannot provide detailed discussions for each of the examples we have mentioned. I can only assume that this step of inductive investigation would support a real connection between being a CSPS and being a product of intelligent design. I also think this is a plausible assumption.

If so, we may justifiably believe that being a CSPS is a characteristic mark or good indicator of intelligence. This principle is supported by inductive evidence as explained above. Therefore, if the universe as a whole or its parts are like CSPSs (and this may be established by analogies), then we may rationally recognize the universe as a whole or its many parts to be products of intelligence.¹⁰ The foundation for this *analogical* inference is not any single instance of analogy, but a principle *inductively* abstracted from the plethora of empirical data we have. This kind of DA can be called an *analogical-inductive argument*. Mill's point that the DA "is more than analogy- it is an inductive argument" seems to be justified. Pearl is also correct to point out that "Hume's criticisms in Part II would seem to indicate his failure to realize that the argument from design is essentially inductive and not analogical in Mill's sense" (Pearl 1970, 276).

Critical Evaluation of the Regress Objection

Philo's regress argument or objection is one of the most popular objections to DA which common people also know about. It can be represented by a question: "If God made the world, then who made God?" But this argument in fact can take different forms. The point is that even if order can be explained by a designer, the designer has still to be explained, *ad infinitum*. There is another understanding of this regress objection: the ideas in divine mind & their order also need to be explained.

Who Explains the Existence of God?

Philo suggests that since the proponents of DA insist on finding the cause of this world in God, then by the same principle it seems that the DA is "obliged to mount higher, in order to find the cause of this

⁹ Sometimes intelligent beings can produce some orderly effects that do not require a high degree of intelligence, e.g., putting three stones in a straight line. They are produced by intelligent beings but not *typical* products of intelligence.

¹⁰ However, if something is not a CSPS, it does not mean that it is NOT a product of intelligence. Suppose we notice three stones on a beach which fall into the shape of an equilateral triangle. It may well have been formed by chance alone, but it is conceivable that someone did arrange those stones into that shape. But this won't affect the DA, which just needs some reliable indicator of intelligent design. It does not require any principle like "if X is not a CSPS, then X is not a product of intelligence." Anyway, this kind of asymmetry is not unusual. Consider a murder case. If a person has solid alibi, it is a reliable indicator that he or she is not the murderer. But if a person has no alibi, it does not mean that he or she is the murderer.

cause” (DNR, 134). But of course, we need to posit the cause of this cause of this cause, & so on. This kind of regress objection seems to suggest that if we use God to explain the universe, then unless we can also find some explanation for God, then the original God-explanation would be illegitimate.

But the principle behind this objection seems to be false. In fact Cleanthes has a good reply: “Even in common life, if I assign a cause for any event; is it any objection, Philo, that I cannot assign the cause of that cause, & answer every new question, which may incessantly be started?” (DNR, 136). Similarly, scientists may move from phenomena to “refined principles”, but these principles are “still ... inexplicable” (DNR, 137). But we would not reject all these explanations just because of this. For example, Newton uses gravity to explain motions, but he confesses: “hitherto I have not been able to discover the cause of those properties of gravity from phenomena... to us it is enough that gravity does really exist, & act according to the laws which we have explained, & abundantly serves to account for all the motions of the celestial bodies, & of our sea” (Newton 1989b, 152). This seems to violate Philo’s maxim, but it does not mean that we need to deny the legitimacy of using gravity to explain various phenomena! Instead it is that maxim which needs to be rejected. As long as gravity does a good explanatory job, we have good reason to believe in its existence, & it doesn’t matter whether we further know the cause of gravity or not!

In fact Hume himself recognizes that even in science we do need to assume some provisionally ultimate causal explanation. “In the *Inquiry*, speaking of the search for principles of greater generality in natural philosophy, he says: ‘But as to the causes of these general causes, we should in vain attempt their discovery... the most perfect philosophy of the natural kind staves off our ignorance a little longer...’ Hume does not think that causal explanations in natural philosophy are defective, or that we ought not to search for them... But then why should he object to explanations in theology for this very reason?” (Pearl 1970, 280)

The second point made by Cleanthes is: “The order & arrangement of nature, the curious adjustment of final causes, the plain use & intention of every part & organ; all these bespeak in the clearest language an intelligent cause” (DNR, 137). This is saying that we have good reasons based on *empirical data* to infer to an intelligent cause. If the inference is a good one, whether there is a further explanation of this cause would not invalidate the inference.

Frederick Ferre replies, "But the empirical question remains: both being possible (i.e. order inherent in matter or mind), what is our actual experience? And this would appear to be the proper issue for debate. If the Rationalist model of 'explanation' is imported into discussion, wherein an explanation is faulty if it does not follow, deductively, from ultimate explanatory principles and if it thus permits the explanatory quest to go on and on- if this is what lies behind Hume's criticisms here, then the wrong logic is being used" (Ferre 1967, 164). "As long as an actual uniformity in experience underlies the explanation and as long as this uniformity helps to bring the sheer multiplicity of things to some kind of intelligible relation, the Empiricist is content. Taking one step rather than none, if adequately justified by the evidence, is not futile but the only way that knowledge may be expected to advance" (Ferre 1967, 164-165).

Ferre's answer is in line with Cleanthes's methodology, which looks at an inference one step at a time to see whether it is supported by valid reasons. If everyone follows Philo in being "contented to sit down with the same answer" & not to go further (DNR, 137), then even inquiries in common life (like asking for the explanation of the disappearance of money in your purse) would not be possible- the sceptic may say that if you postulate a thief to explain this, you also need to explain the existence of this thief & his actions, & so on *ad infinitum*. *A fortiori*, scientific research into the unobservable causes or the deep structure of the world would be impossible. These examples suggest that even if we do not accept a full-blown Principle of Sufficient Reason, a certain Presumption of Intelligibility is necessary. Philo's regress objection is unsound because an infinite regress would not be generated if Cleanthes does not require every cause to be further explained (& he does not). We just require as much intelligibility as possible, guided by experiences & good reasons. This seems to reflect the existing practice of common people as well as scientists.¹¹

No Particular Cause for Particular Effect? Philo's Revisionist Move

In response to Cleanthes's reply, Philo admits that "Naturalists indeed very justly explain particular effects by more general causes though these general causes themselves should remain in the end totally inexplicable" (DNR, 137); "but they never surely thought it satisfactory to explain a particular effect by a particular cause, which was no more to be accounted for than the effect itself. An ideal system, arranged of itself, without a precedent design, is not a whit more explicable than a material one, which attains order in a like manner; nor is there any more difficulty in the latter supposition than in the former" (DNR, 137).

Note that Philo here is in fact conceding the truth of Cleanthes's reply, & he acknowledges that his original regress objection does not work. However, he wants to beef up his objection by proposing a revised principle. This principle may be derived from Newton's Way of Analysis: "Compounds to Ingredients... Motions to the Forces... from Effects to their Causes, & from particular Causes to more general ones, till the Argument ends in the most general" (Newton 1989a, 157-158). So now Philo further insists that the DA is arguing from one particular (universe) to another (God), but a priori both could be ultimately inexplicable brute facts. So why not stop at the world order? No other knowledge can be yielded by taking this further step. So this move is illegitimate.

But we need to point out that this principle is not really explained or justified by Philo: he just asserts it. Furthermore, Philo's new revisionist principle can be challenged by many counter-examples. As Leon Pearl says: "it is not apparent why Hume should object to explanations in which a particular effect is explained by a particular cause, where the cause itself cannot be accounted for. We consider many such explanations to be perfectly proper. The flashing of a ghost image in Tom's mind is a perfectly good explanation for his sudden burst of fear despite the fact that no one is likely to give an account as to why the cause should have occurred" (Pearl 1970, 281). Many more counterexamples can be adduced from

¹¹ Swinburne has directly responded to the question about the proper stopping point. He argues that we should stop at the simplest explanation which can explain all our data, & his entire project tries to vindicate the view that God is such an appropriate stopping point.

modern science. For example, the Big Bang Explanation involves many particular events & causes: “We cannot estimate the likelihood of an event like the Big Bang in the way we might estimate the likelihood of a hurricane... But that does not prevent us from hypothesizing about it versus the alternative hypothesis of a steady-state universe. Nor does its uniqueness preclude us finding evidence in favour of its occurrence- such as background heat radiation across space, the relative abundances of hydrogen, Olbers’ paradox, & Hubble’s law... Insofar as a Big Bang theory can successfully explain these things, we may be in a position to know what happened when the world was born” (Bird 1998, 87).

In fact a full scientific explanation, according to Hempel’s deductive nomological model, always requires initial conditions, which are particular events, in addition to general laws. It is not possible to derive particular effects *merely* from general laws. The conclusion is that this revisionist principle is not plausible.

God is a General Cause

We can also point out that God is not merely a particular cause. When we argue from the world to God, we reach a *general* Cause which should give everything a purpose. Hence we can observe further whether this purpose is evinced anywhere. Is every feature and development of this order explainable with respect to God’s intelligent purpose? If not, the hypothesis is disconfirmed. If yes, it is significantly confirmed. The DA in fact leads us to expect the emergence of consciousness, & the form of human experiences (especially aesthetic, moral & religious experiences), the intelligibility of the universe & some form of fine-tuning, etc. These are further consequences drawn from the design hypothesis. For example, the DA qua order just explains the regularity, which does not need to be beautiful. So the amazing beauty of the natural order is another surprising fact which needs to be explained- this can be comfortably accommodated into the design hypothesis, but by no means expected from the naturalistic hypothesis.

(The elaboration of all these would require another paper.) Pearl also agrees that “In the design hypothesis we do not *merely* have a particular effect being explained by a particular cause. The explanatory value of a world designer is that it is taken to be an instance of the general proposition that all objects that exhibit order are the products of design” (Pearl 1970, 281).

What Explains the Ideal World in God’s Mind?

But another kind of **regress objection** puts the emphasis on the mental world in the Divine Mind, which is supposed to provide the explanation of the universe’s design, but we can similarly raise the question about the explanation of this “mental world.” This would then generate a vicious regress. Philo asserts, “That a mental world, or universe of ideas, requires a cause as much, as does a material world, or universe of objects; & if similar in its arrangement must require a similar cause... In an abstract view, they are entirely alike” (DNR, 134). We also cannot tell “any material difference ... between these two kinds of worlds” by experience. So if the cause of the material world is traced to the ideal world of God, “Have we not the same reason to trace that ideal world into another ideal world, or new intelligent principle? But if we stop, & go no farther; why go so far? Why not stop at the material world? How can we satisfy ourselves without going on *in infinitum*?” (DNR, 135)

First, we may wonder why even an infinite regress of Designers of their ideal worlds really matters. In fact Hume leaves open whether the ideas in the world designer's mind 'contains the principle of its order within itself'. "Whether the ideas arranged themselves into an orderly system in his mind, or he acquired the plan of the world from some other mind, in either case the DA established what it intended to do, namely that the world is the product of design" (Pearl 1970, 279).

Second, the key issue is not how the ideas fall into place (whatever it means); it is how the understanding of these ideas & their intrinsic connections, coupled with the causal powers of a person, help to account for the formation of complex functional systems. We cannot understand how the parts of matter can have this capacity for understanding; nor can we understand how they can act on the world guided by the future goals they want to achieve. All these processes can happen in a mind & with a mind- we know this as fact from our own experiences. So there is a big difference. The DA is guided & demanded by our experience of the constant conjunction of HOS/CSPS & intelligence- CAME & MAPA are indeed more intrinsically connected to mind than matter.

Hume's Bundle Theory of Mind Is Implausible

Philo's objection seems to presuppose his bundle theory of mind- mind as a collection of ideas or impressions which are intrinsically disparate existents. So to explain the appearance of "an ideal system," we need to explain how these ideas "arranged of itself, without a precedent design, into a coherent system." But the problem is that the entire picture is misguided & not true to our experiences of ourselves. Hume seems to think that the universe of material objects & the universe of mental ideas are exactly parallel but this is problematic. First, the parts of the matter are in space & we have a clear idea of their distinct existence. Because from our past experiences, we understand how it is difficult, on the basis of their basic powers alone, for them to form automatically into a watch or house, not to mention a computer. (Philo's reformulation of DA contains such data.) However, mental ideas are not in any space & before they are perceived by a mind, it is difficult to understand how they can exist independently as something unpossessed by any mind or subject. In fact Hume's theory of impressions faces a lot of difficulties.¹² For example, an autonomous language of bare sense contents actually does not exist, nor is the prospect bright for constructing one. There is no good evidence to show that sensory qualities are apprehended as atomic simples. Even simple observations are theory-laden. As Harris points out, "perception essentially involves an activity of interpretation & judgment, an activity of ordering objects & placing them in a coherent context elaborated in the course of experience" (Harris 1965, 427), & the activity of relating the particulars in a perception is given immediately & simultaneously with the act of perception, & not something performed afterwards. So by its very nature perception cannot be a collection of discrete impressions; otherwise they would not be contained in that perception. Of course, further mental processing may lead to "progressive assimilation of wholes," but none of them "individually is analyzable into separate elements" without remainder (Harris 1965, 428).

Apart from perceptions, a mind can also attain a rational insight, say, into a logical relation or a solution to a problem. "At this stage a body of systematized & co-ordinated experience must already have been

¹² It is notoriously difficult for Hume's theory to provide an account of personal identity, & this is something Hume admits.

evolved, the bearing of which upon the presented problem must be directly apprehended to effect an immediate solution. Insight is precisely this direct grasp of the inter-connection of relevant factors” (Harris 1965, 433). It would be difficult to account for musical composition according to Hume’s model- somehow discrete musical notes which can exist independently just fall into place to form a beautiful symphony? But where on earth can this happen but a mind? An insight which leads to the creation of a symphony is like a “lightning-like momentary illumination of complex-content.” A genius like Mozart even claims to have the “ability to ‘hear’ the entire course & structure of a musical composition ‘all at once’, ‘so that I can survey it like a fine picture or a beautiful statue- at a glance’” (Harris 1965, 434). In many areas of thinking, psychologists “reported the momentary & instantaneous operation in their thinking of whole trains of reasoning & systems of knowledge” (Harris 1965, 434). So the “operation in thought of entire organized systems” is the distinguishing mark of insight. In general, “thinking consisted essentially in the construction of completion of wholes... The stimulus is apprehended as a complex relational fact... & the subject ... strives to complete the structure of the presented data” (Harris 1965, 435).

Coming back to the question about design, it is false to say that distinct ideas in themselves can produce a house. It is the mental plan grasped by our mind, which is a whole consisting of the interweaving of different ideas playing different roles in the plan, that accounts for the final outcome of the house. Of course, this plan needs to be understood by the architect who also has the ability to turn the plan into reality. We understand the whole process, which does seem to be the basic power of the mind. Matter lacks this basic power as far as we know. This is the difference. As Pearl points out, “designing for Hume turns out to be an activity by which the order among the ideas (the plan) is duplicated among material bodies. The assumption does not seem to me to be true... it makes no sense to say that the idea or plan of a machine is itself an orderly organization of ideas. I really do not know what could possibly be meant by speaking of a man’s ideas as orderly or disorderly other than that his ideas objectively signify some state of affairs which would be orderly or disorderly” (Pearl 1970, 279). Hume’s doctrine of distinct impressions generates the problem how those impressions can be connected together. But our experience of intelligence shows that we can conceive of the machine in a single idea about a Whole which consists of internally connected parts mutually adjusted to fulfill a purpose.

Of course, there are complicated problems of philosophy of mind here which cannot be thoroughly discussed, but at least we can say that Hume’s objection has presupposed a controversial picture of mind which is contrary to common experience & prima facie implausible. Philo’s model of Divine Mind is like this: “the different ideas, which compose the reason of the Supreme Being, fall into order, of themselves, & by their own nature.” This is odd. It seems to assume those ideas can first exist distinctly in a separate space from the Divine Mind, & then they come together. This model suggests that the Divine Reason is nothing more than the collection of those different ideas. As explained above, this model is not even plausible for human minds. Moreover, a rational mind is an active principle, a capacity or basic power. In the above picture, the distinct ideas seem to possess all the active power, & the rational mind itself is rendered passive. An intelligent mind cannot be just a collection of atomistic ideas separated from one another, seeking some external force to bind them together. Hume’s picture of the ideal world is not

realistic.

Some readers may complain that my picture of the mind is “mysterious” & Hume often says the power of mind itself is inexplicable. However, we need to distinguish two questions:

- Whether the existence of the Mind with its basic power can be further explained? May or may not- but the answer does not matter here; it does not affect the validity of DA.
- Given the existence of the Mind, whether its power to generate CSPS & the like can be understood? The answer is yes: by the intrinsic nature of the Mind, about which we have first hand experiences.

We do have “grounds from experience for believing that order is more likely to belong originally to mind than matter. Hume is confusing the originality of a plan with its being uncaused... whenever we observe order in matter originate from a nonorderly state, as in the case of human productions, the order is in all cases imposed from without” (Pearl 1970, 280). So Philo seems to confuse different questions.

Critical Evaluation of the Epistemic Uncertainty Objections

Critical Evaluation of the Infinitely Many Principles Objection

Philo says, “Thought ... intelligence, such as we discover in men & other animals, is no more than one of the springs & principles of the universe, as well as heat or cold, attraction or repulsion, & a 100 others, which fall under daily observation” (DNR, 120-121). In fact the situation is even worse: “Nature, we find, even from our limited experiences, possesses an *infinite* number of springs & principles, which incessantly discover themselves on every change of her position & situation. And what new & unknown principles would actuate her in so new & unknown a situation as that of the formation of a universe, we cannot, without the utmost temerity, pretend to determine” (DNR, 122; italics mine).

Philo queries: “A *very small part* of this great system, during a *very short time*, is very imperfectly discovered to us; & do we thence pronounce decisively concerning the *origin of the whole*?” (DNR, 122; italics mine) So “why select so minute, so weak, so bounded a principle as the reason & design of animals is found to be upon this planet? What peculiar privilege has this little agitation of the brain which we call *thought*, that we must thus make it the model of the whole universe? Our partiality in our own favour does indeed present it on all occasions; but sound philosophy ought carefully to guard against so natural an illusion” (DNR, 121).

These passages seem to contain several objections to the design argument. Here I will focus on the **Infinitely Many Principles Objection**: the design argument is using thought or intelligence as *the* model of the whole universe, but intelligence is only one possible principle out of numerous, or even infinitely many, principles. It suggests this choice is probably incorrect, or at least highly uncertain. So intelligence should not be made the model of the Whole.

The Distinction between a Specific Objection to the Design Argument & a General Skeptical Objection

When we evaluate Philo's objections, we may ask this question: are these Humean objections *specific* objections to DA, or are they based on *general* skeptical arguments, which apply to DA *as well as* a wide spectrum of human cognitive enquiries, modern science in particular? If Philo's objections to DA rely mainly on the latter, then whether this would result in an "overkill"? A recent commentator on this debate, Robert Fogelin, has also raised this question. He points out, correctly I think, that "Deciding whether Hume is able to supply Philo with arguments sufficient to undermine Cleanthes' natural theology without undermining the natural sciences as well is ... fundamental to evaluating the *Dialogues*" (Fogelin 2017, 118). Fogelin thinks that Philo should focus on criticisms of the DA which shows that it does "not provide adequate *empirical* grounds for the existence of a religiously significant deity" (Fogelin 2017, 112), & should not "employ general Pyrrhonian" arguments against the DA which "raise the specter of a general skepticism of the kind that deeply troubled him in the *Treatise*" (Fogelin 2017, 118), because this would "undercut both the beliefs essential to daily life & the methods of the natural sciences" (Fogelin 2017, 112). I totally agree with Fogelin's suggested constraint on a good objection to the DA here.

I will argue below that Philo's Infinitely Many Principles Objection would violate this constraint.¹³ Before further discussions of the Infinitely Many Principles Objection, let us first summarize the epistemological challenges faced by modern science- these are already well-worn grounds in contemporary philosophy of science.

The Underdetermination of Theory by Data

Science is supposed to be based on our sense experiences, but these foundational data are far from indubitable. Not to mention the sceptical arguments like the dreaming hypothesis, deception by Cartesian demon, brain-in-a-vat, etc., now it is widely agreed that all observations in common life & science are theory-laden, & not free of interpretations. But let this point pass & let us agree that these data are secure enough to be used to adjudicate our scientific theories, which mostly consist of natural laws with universal scope of application, especially in physics. Unfortunately there remain a lot of almost intractable problems.

The problem of curve fitting is faced by scientists in the laboratory everyday. Suppose we have done an experiment successfully, & got five numerical data- they are plotted as five points on a graph. We then need to derive the curve which stands for the theory. Suppose that we can plot a straight line passing through all five points, but the problem is there is an infinitely number of curves which can equally pass through all five points, e.g., they can satisfy the criterion of empirical adequacy equally well. How can we be sure that the straight line represents the truth in nature? Let us consider another example of a series of integers. Suppose we have this sequence: 2, 4, 6, 8, ... So the first term is 2; second term is 4; third term is 6 & so on. It seems obvious that the general term, $T(n)$, should be $2n$. But just a little mathematical

¹³ In fact, this problem of overkill has already been emphasized by Cleanthes in Part I of the *Dialogues*. He objects to a critic of Copernicanism who has "nothing *particular* to object to the arguments of Copernicus & Galileo for the motions of the earth," but only "withhold[s] his assent, on that *general* principle, That these subjects were too ... remote to be explained by the narrow & fallacious reason of mankind" (DNR, 108; italics mine).

sophistication would make us realize this is by no means the only answer. In fact,

$T(n) = 2n + f(n)(n-1)(n-2)(n-3)(n-4)$, where $f(n)$ is *any arbitrary function* of n !

The general import of the mathematical examples above is that: **“There are always an infinite number of hypotheses or laws which fit a finite set of data.”** This is an illustration of the general problem of under-determination of theory by data.

The problem illustrated above concerning the general term of an integer sequence also plaques the efforts to find a general theory to explain our empirical data. Nicholas Maxwell, a philosopher of science, is trying to criticize the Principle of Empiricism, which says: “In science, *only* observation & experiment may decide upon the *acceptance or rejection* of scientific statements, including laws & theories” (Maxwell 1998, 21). Clearly this is very similar to the kind of principle accepted by Philo & Cleanthes. Maxwell thinks that this principle would only lead to “scientific sterility”: “In physics, any theory, T , however well established empirically, will apply to a vast range of phenomena never observed, most of which indeed, will never occur at all. It is thus easy to concoct endlessly many rivals to T which agree precisely with T as far as all observed phenomena are concerned but disagree with T , in arbitrary ways, for different specific unobserved phenomena. There will always be infinitely many such grossly *ad hoc* rivals to T ... If empirical considerations alone govern choice of theory in science, on what grounds are these infinitely many rivals to accepted theories rejected, independently of, or even against empirical considerations?” (Maxwell 1998, 3)

This problem can be elaborated a bit. For a theory T we believe on the basis of empirical evidence, we can always construct aberrant versions of T as “rival theories which agree precisely with the given theory for all available evidence but which disagree for some as yet unobserved phenomena” (Maxwell 1998, 51):

- 1) T_1 “agrees with T for all observed phenomena, disagreeing only for phenomena within some as yet unobserved space-time region”;
- 2) T_2 “agrees with T for all observed *kinds* of phenomena... but disagrees for some *kind* of phenomena never observed”;
- 3) T_3 “agrees with T for all observed *kinds* of phenomena but disagrees for particular kind of phenomenon observed many times *except for some irrelevant, bizarre detail*”;
- 4) All actual theories, however empirically successful, have their problems. Suppose the predictions of T are accurate for phenomena A , more or less accurate for phenomena B , not forthcoming for phenomena C , but apparently incorrect for phenomena D . Then let T_4 be: identical to T in A ; identical to T not exactly but within some limits of error in B ; just the summary of the observed phenomena in C & D . Obviously, T_4 not only can explain all the same evidence, but in fact is also more empirically successful than T !¹⁴

According to the Principle of Empiricism, T_1 , T_2 , & T_3 are as justified & acceptable as T , & T_4 should be preferred to T ! But the fact is that “these aberrant rivals ... would never be taken seriously for a moment in scientific practice” (Maxwell 1998, 51).

¹⁴ I have simplified Maxwell’s discussions here a bit.

In fact the problem is even more serious, because “physical theories ... contain an infinite wealth of counterfactual predictions- predictions about states of affairs that could, but do not exist.” This power of counterfactual prediction is important for us because when we exclude some options for our actions, we often have these counterfactual predictions in mind, such as “if I were to do X, I would have been killed.” So “even if a physical theory could be precisely verified for all actual phenomena throughout the entire history of the universe, we would still be infinitely far away from verifying the theory itself... Our universe is but one of an infinity of *possible universes*” (Maxwell 1998, 49).

Maxwell points out the basic problems: “all the observational & experimental evidence that we can ever possess in support of any physical theory must always be highly restricted & atypical, verifying almost an almost vanishingly small, non-random sample of the predictive content of the theory,” namely, “phenomena that have occurred on earth during the past 300 years or so” (Maxwell 1998, 47). Interestingly, this description is very similar to Philo’s description of the problems associated with choosing intelligence as the model of the universe!

We may point out that by using instruments such as telescopes, we can transcend our limitations by observing distant stars & galaxies. Moreover, because light may take many years to travel from those stars to us, what we observe is actually what happened long ago! “But this is only the case if our present optical theories that we use to interpret these observations are more or less *true* when applied to distant places in the past” (Maxwell 1998, 48). But the reasons for all those optical theories are based on local evidence! Maxwell concludes, “The prospects of verifying a physical theory *empirically* seem utterly hopeless” (Maxwell 1998, 50).

Of course, in inferring from the observed to the unobserved & from the regularity in the past to the regularity in the future, we are facing the problem of induction, which has been forcefully pointed out by Hume himself. The question is: How do we know the future is going to resemble the past? It seems to me Maxwell is correct to say that “in recent times...the consensus is, in my view correctly, that none of the widely known attempts at solving the problem [of induction] succeeds” (Maxwell 1998, 1). Moreover, there exist new ways to formulate this problem, & one creative way to do that is Nelson Goodman’s famous & gruesome paradox of *grue*. Let us define “*grue*” in this way:

X is *grue* iff X is observed to be green before T (some time in the future), & is blue after T.

Let O be the statement that “all emeralds ever observed are green.”

Let H1 be the hypothesis that “all emeralds are green.”

Let H2 be the statement that “all emeralds are *grue*.”

The paradox is that O seems to support H1 as much as H2, but they would have different predictions after T. T can be any time in the future & the same paradox would hold. So there are also an infinite number of inductive inferences we can make on the basis of existing observational evidence, & they all look equally good. Of course, many philosophers of science argue that the predicate “green” is projectible, but the predicate “*grue*” is not, but so far we do not have any consensus about the criteria to distinguish the projectible predicates from the unprojectible predicates.

Some philosophers have put the hope on the possibility of conclusive falsification in science, even if conclusive verification seems impossible. However, the Duhem-Quine thesis of holism tells us that if we do an experiment to falsify a theory, it is not any single theory which is facing the test, but a system of several or more theories (Duhem 1999). So even if we have a clearly negative result from the “crucial” experiment, this datum still under-determines our theory choice because we cannot be sure which one of the group of theories is in fact falsified, & which are not. In many cases, we are not really sure whether the problems are due to some theories which we have implicitly assumed but are not aware of, or some auxiliary hypothesis which have been made unwittingly (Quine 1999b).

Some other scholars have tried to develop a rigorous inductive logic or confirmation. I cannot go into this big issue here, but can only say that this effort has not met with great success either. So the upshot is: *Nothing* in science, especially concerning the general natural laws, can be proved. Abstractly talking, there are always an infinite number of ways to explain the necessarily finite set of observational or experimental data we have, some or many of them we may have never thought of. There is also no logical algorithm or procedure to decide which of these infinite possibilities is true or even the most probable.

Infinitely Many Principles Objection & Scepticism about Modern Science

Armed with this understanding of modern science, let us return to Philo’s claim that there are infinitely many principles which can explain the universe, which seems true, logically speaking. However, is this really a specific objection to DA, or a general skeptical objection? It seems to be the latter. As we have seen, similar problems also inflict our scientific theories due to the underdetermination of theories by empirical data, which seems to be a logically necessary feature of our theories. So the *mere* existence of infinite possibilities, if damaging to DA, would also be damaging to our sciences & all forms of rational inquiry. Consider this query: “A very small part of this great system, during a very short time, is very imperfectly discovered to us; & do we thence pronounce decisively concerning the origin of the whole?” (DNR, 122) This is in fact also an argument against cosmology, the Big Bang Theory in particular! So Philo is again offering arguments against modern science on the basis of general skeptical ideas. This falls foul of Cleanthes’ objection & Fogelin’s constraint.

In fact in view of this problem, we need to abandon the principle of empiricism, & reconsider the method of science. There is no consensus on this point, but the more widely accepted suggestion is that science actually uses the *inference to the best explanation* (IBE) to arrive at theories deemed most probable to be true, or most worthy of rational acceptance (cf. Lipton). We still need to carefully investigate the empirical data (while still guided by theories), & the best explanation needs to explain satisfactorily all the empirical data (Criterion of Empirical Adequacy or Empirical Success). Then we need to consider different initially plausible theories which can explain those data. The theories may be suggested by analogical arguments or based on empirical regularities, but they may also mainly be derived from creative imagination. (So they may be but not necessarily be based on experiences of constant conjunction as Hume or Philo emphasizes.) Then we can compare these theories or test them in various ways to see whether they satisfy theoretical (a priori in the broad sense) criteria like simplicity, coherence, explanatory power, fit with background knowledge or theories, fruitfulness; whether they may be able to

generate predictions of or at least lead us to expect some phenomena, & so on. In the end, we will take the best explanatory theory which satisfies the above criteria as probably true.

Supporters of the model of IBE usually contend that IBE is what is actually used in both ordinary life, e.g., detective cases, & scientific investigation. In face of the Infinitely Many Principles Objection, those who adopt the IBE will say that those initially plausible theories which can satisfy both the Criterion of Empirical Adequacy & various theoretical criteria will usually not amount to infinite. Then we can select the best one out of them. This procedure also seems to be applicable to the debate about DA. Even if intelligence is just one of infinitely many possible principles, we can still investigate whether the design hypothesis is at least plausible as shown by its capacity to explain a wide variety of data, & then whether there is any other hypothesis which can do a better job. If the design hypothesis can pass these tests, then we can deem it worthy of rational acceptance.

Critical Evaluation of the Part to Whole Objection

Philo raises this **no moving from parts to whole objection** to DA: “I will not allow any one part to form a rule for another part, if the latter be very remote from the former” (DNR, 121). In particular he is targeting intelligence- the “active cause, by which some particular parts of nature, we find, produce alterations on other parts. But can a conclusion, with any propriety, be transferred from parts to the whole? Does not the great disproportion bar all comparison & inference?” (DNR, 121) Despite logical uncertainty, in practice the answers to both questions are clearly yes. We can surely infer in this way- otherwise science is impossible because we are all the time moving from the patterns observed in parts of the universe to universal natural laws which govern the whole universe!

Inference from Part to Whole in Science

In Newton’s *Rules of Reasoning in Philosophy*, Rule III says that the basic Presupposition is that the “analogy of Nature ... is wont to be simple & always consonant to itself.” So this kind of inference follows: “because we perceive extension in all that are sensible, therefore we ascribe it universally to all others also... all bodies are impenetrable... movable, & endowed with certain powers (... inertia) of persevering in their motion, or in their rest... The extension, hardness, impenetrability, mobility, & inertia of *the whole*, result from the extension, hardness, impenetrability, mobility, & inertia of *the parts*; & hence we conclude the least particles of all bodies to be also all extended, & hard & impenetrable, & movable, & endowed with their proper inertia. And this is the foundation of all philosophy” (Newton 1989b, 147; italics mine). So Newton is very explicit about an inference from the parts to the whole. In doing so, we are also moving from one part (our experiments) to “another part ... very remote” from us (such as distant galaxies).

Moreover, when he talks about “the least particles of all bodies,” he may be referring to those invisible particles which are supposed to constitute the material bodies. If so, Newton is also inferring from the observable realm to the unobservable! These really bold moves seem to violate all of Philo’s rules of inductive reasoning! They seem to go far beyond what is necessary to explain our experiments, going to

very remote areas indeed. Moreover, inference about the unobservable (A) cannot be justified by experiences of constant conjunction of As & Bs simply because As are never experienced. Newton is also talking all the time about OUR experiments- isn't it showing partiality to our own species? Perhaps Newton is also suffering from some kind of natural illusion?!

So Philo's argument is a general objection to the scientific enterprise & not to DA specifically. Our social surveys & statistical analysis also depend on the assumption of moving from parts to the whole. Of course we need extreme caution & safeguards like random sampling, but to "bar" all such inferences would be disastrous. Modern Humeans need to rephrase the argument to explain what is specifically wrong with DA or other natural theological arguments. General skeptical arguments would result in an overkill. One analogy provided by Philo is quite interesting: "From observing the growth of a hair, can we learn anything concerning the generation of a man?" (DNR, 121) This example may be quite powerful in Hume's time, but now we know that we can indeed derive the DNA of a man from his hair, & hence we can know a lot about "the generation of" that man! Once again Philo's a priori epistemic pessimism is contradicted by actual scientific progress based on some contingent feature of the universe.

William Sessions' Defense of Philo

Sessions tries to defend Philo by saying that "Philo is not criticizing *all* inferences from parts to whole, only an inference 'so wide'" (Sessions 2002, 68). This seems to me an ad hoc move to save Philo's extravagant criticism which leads to an overkill. How wide exactly would be too wide? Philo or Sessions need to explain what kind of disproportion he has in mind? Sheer size or what? They also need to shoulder the burden of proof by explaining clearly what features of dissimilarity exactly debar the inference to an Intelligent Designer, & why. If part to whole reasoning is not entirely prohibited, then which kind of part to whole reasoning is allowed? Perhaps common statistical inferences about earthly populations are permissible. Perhaps filling in the gaps of perception is okay too (such as by seeing the front side of the cup, we infer the existence of its backside). But in deriving general natural laws from our limited experiences, we are indeed traversing a wide gap, in fact an infinite gap! So is this too wide? Would Philo object to this? Philo is averse to extrapolation from our "small corner" to remote areas. If so, how can we infer that because gravitational forces are operating in this small globe, it will also operate on the entire solar system, our galaxy & even very distant galaxies billions of light years away? We can see that Philo is using a lot of rhetorical questions often with words having unclear, vague or ambiguous meaning. If these terms cannot be made more specific, it would be difficult to evaluate whether this or that objection amounts to a convincing argument or not.

In fact the limitations or uncertainty of inference from a part to the whole does not only reside in remoteness. Things may differ very radically even in nearby places. For example, even on earth, perhaps there is a small spot on earth (e.g. Bermuda Triangle) where the laws of gravity are different (G is different, say), or even some kind of anti-gravity dominates? This may well be true for all our data which support the law of gravity.

Moreover, if we allow for the part to whole reasoning in modern science & place some trust in

contemporary scientific findings, then they would provide data for the design hypothesis which go far beyond our “small corner.” Indeed, as Swinburne has stressed, the order of the universe seems to be all-pervasive. So the DA qua order actually uses data about the whole and not only the parts. Also, the anthropic principle seems to suggest purposive adaptations of the most basic physical laws of our world. Tennant has also drawn together features of various levels of our world which suggest purposiveness. So as more data come in, it seems false to say that the DA just argues on the basis of meagre knowledge about severely limited areas of our world. Instead, a comprehensive teleological interpretation of the world in its various aspects seems quite possible.

Critical Evaluation of the Present to Past Objection

Reasoning from the Present to the Origin

Sometimes Philo seems to be talking about “remote” in the temporal sense, & he is extremely averse to extrapolation from the present back to the remote past, especially concerning the origin of world. We have already seen that this kind of prohibition or epistemic abstinence is contradicted by contemporary scientific research on the origin questions. In any case, if there are striking data for design available in the present, it is legitimate to investigate what happened in the remote past to make sense of those data. As Frederick Ferre says: "However many unknown forces may be at work in the production of a phenomenon characterized by the marks of design, the regress of intermediary causes must eventually lead back to some cause adequate... Any other theory is gratuitous, a mere appeal to blank ignorance when some guidance from experience is in fact available" (Ferre 1967, 159).

Moreover, for the contemporary DA, the data alleged to show marks of design are not confined to the present (e.g. observation of organisms.) Instead, the data include data from almost all phases of the cosmic evolution and evolution of life, e.g., the Big Bang, cooking of elements, emergence of the first cell. Cf. Hugh Montefiore, *The Probability of God*; John M. Robson, *Origin & Evolution of the Universe: Evidence for Design?* (Robson 1987)

Critical Evaluation of the Alternative Explanation Objections

Critical Evaluation of the Polytheism & Defective Deities Objection

Hume against Philo?

In the design of human artefacts, we can often find examples of a corporate design- the job being done by a team of designers. So by analogy, there can be a committee of gods rather than a God who are responsible for bringing about the order. That is why Philo challenges Cleanthes to rule out “several deities combine in contriving & framing a world” (DNR, 141). On the basis of analogy. Philo claims to “find a numerous society of deities as explicable as one universal deity, who possesses, within himself, the powers & perfections of the whole society. All these systems ... of Scepticism, Polytheism, & Theism, you must allow, on your principles, to be on a like footing... You may thence learn the fallacy of your

principles” (DNR, 148).

However, clearly this hypothesis of polytheism is much more complicated, & according to the widely accepted Occam’s razor: “When postulating entities, postulate as few as possible... If there were more than one deity responsible for the order of the universe, we should expect to see characteristic marks of the handiwork of different deities in different parts of the universe” (Swinburne 1973, 147), but of course we don’t. So polytheism would lead to a barrage of irresolvable questions: are these gods identical? Why do they collaborate? Are they responsible for different parts of the world? As suggested above, modern science seems to discover one all-pervasive order instead of several distinct orders. Hence there’s no positive reason for postulating more than one god. In the absence of a reason, by Occam’s razor, surely monotheism is preferable to polytheism.

Interestingly, when discussing the issue about the unity of Deity, Hume himself appeals to unitary order twice in NHR, & Philo himself also proposes this point once in DNR. See the texts below:

- Hume: “several independent beings ... might conspire in the contrivance ... of one regular plan; yet is this a merely arbitrary supposition... neither to be supported by probability nor necessity. All things in the universe are evidently of a piece. Every thing is adjusted to every thing. *One design prevails throughout the whole. And this uniformity leads the mind to acknowledge one author;* because the conception of different authors ... serves only to give perplexity to the imagination, without bestowing any satisfaction on the understanding... to ascribe any single effect to the combination of several causes, is not surely a natural & obvious supposition“ (NHR, 37; italics mine).
- Hume later (near the end) affirms this point again: “*The uniform maxims ... which prevail throughout the whole frame of the universe, naturally, if not necessarily, lead us to conceive this intelligence as single & undivided,* where the prejudices of education oppose not so reasonable a theory” (NHR, 96; italics mine).
- While not explicitly comparing polytheism & monotheism, Hume does sometimes emphasize the unity of God when he talks about the DA: “Were men led into the apprehension of invisible, intelligent power by a contemplation of the works of nature, they could never possibly entertain any conception but of *one single* being, who bestowed existence & order on this vast machine, & adjusted all its parts, according to *one regular plan*” (NHR, 37; italics mine)
- What is even more surprising is that Philo also puts an emphasis on the unity of nature later in the *Dialogues* (11.14): “consider ... the perfect uniformity & agreement of the parts of the universe, we shall not discover in it any marks of the combat of a malevolent with a benevolent being” (DNR, 186). Philo invokes this point to attack the Manichean system which postulates two separate gods over Nature. But of course the same point can be used to argue against polytheism, as Hume does at least twice in NHR.

So it is Hume himself who has eloquently replied to Philo's objection from polytheism. It is strange that he does not put at least this reply in Cleanthes' mouth; nor does he let Philo elaborate this point earlier! Philo does mention the possibility of invoking Occam's razor, but only to argue that this does not invalidate his objection from polytheism. This seems to be different from his position in Part X. My solution to this "inconsistency" is that Philo is *playing* the dramatic role of a philosophical sceptic from Parts II to VIII in order to bring out forcefully different opinions about the DA, especially those criticisms mostly neglected by the theists in his time. However, not every objection is in fact adopted by Philo or Hume himself. In fact, while Philo the philosophical sceptic seems sympathetic towards polytheism in DNR, Hume himself has poured scorn on the superstitions of the polytheists & morally condemned the ethical implications of polytheism (e.g., the obnoxious acts of Jupiter) in NHR .

As Gaskin points out, "Hume in his own person does not advocate polytheism" (Gaskin 1978, 18). In fact, in NHR Hume has defended DA many times & also the unity of God, as pointed out above. He may think monotheism tends to intolerance, but rationally speaking, he unmistakably thinks that monotheism (merely as a philosophy & not tainted by popular religions) is superior to polytheism, & he often faults the vulgar for failing to consider the works of nature, & then coming to a belief in the Creator.¹⁵ Moreover, it is an understatement to say that "Hume does not advocate polytheism." The truth is Hume detests & despises polytheism, & in numerous passages in NHR he pours scorn on the cruelties of the god Jupiter & the stupidities of the superstitions. In the end, Gaskin's conclusion is that Philo is "damaging DA" because "it gives polytheism a rational possibility (Gaskin 1978, 18). But I think this objection is as damaging to DA as the infinite possibilities of fitting the curve is damaging our scientific inferences.

From the Uniformity of Design Plan to the Unity of Deity

William Paley also emphasizes "the *uniformity* of plan observable in the universe" in order to defend the unity of the Deity: "The universe itself is a system; each part either depending upon other parts, or being connected with other parts by some common law of motion... other points of agreement amongst them, which may be considered as marks of the identity of their origin, & of their intelligent author" (Paley 2006, 234). He also elaborates on this theme: "the same attracting influence, acting according to the same rule, reaches to the fixed stars... The light from a fixed star affects our eyes in the same manner, is refracted & reflected according to the same laws, as the light of a candle... The heat of the sun, in kind, differs nothing from the heat of a coal fire... We never get amongst such original, or totally different, modes of existence, as to indicate, that we are come into the province of a different Creator" (Paley 2006, 234). He also mentions the similarity of large terrestrial animals, among other things; the point is that the same design suggests the "same Creator" (Paley 2006, 235).¹⁶

¹⁵ Hume talks about the vulgar in the following way: "Ignorant of astronomy & the anatomy of plants & animals, & ... the admirable adjustment of final causes; they remain still unacquainted with a first & supreme creator, & with that infinitely perfect spirit, who alone, by his almighty will, bestowed order on the whole frame of nature. Such a magnificent idea is too big for their narrow conceptions, which can neither observe the beauty of the work, nor comprehend the grandeur of its author" (NHR, 42).

¹⁶ John Stuart Mill also supports a similar argument. He says, "every event depends on antecedents; & at the same time that to bring it about many antecedents must concur, perhaps all the antecedents in Nature, insomuch that a slight difference in any one of them might have prevented the phenomenon... the conviction follows that no one event, certainly no one kind of events,

I think Paley's elaboration of the details may help to show the plausibility of his argument, but of course the above argument, as it stands, appealing only to empirical considerations, is not strictly speaking a logically tight argument. As Nelson Pike, a commentator sympathetic with DA, points out: "However, I cannot see that this line of thought is really effective. The presence of a unified & integrated plan cannot be taken as evidence for a one-creator, as opposed to a multiple-creator, hypothesis. The parts of an automobile engine function according to a single plan. But in the usual case, an automobile engine is not designed & produced by a single planner" (Pike 1970, 165-166).

Pike's criticism is correct if applied to Paley's & Hume's defense in NHR which appeal only to empirical considerations, & avoid invoking an a priori principle like the principle of simplicity. But if we combine both, as Swinburne does, the argument seems to be largely successful. So Pike is correct to point out that the unitary order itself cannot guarantee monotheism, but it is the Principle of Simplicity *together with* unitary order which favor monotheism.

Philo's Revisionist Move

In fact Philo knows about the principle of simplicity but he contends that this does not really help Cleanthes here: "To multiply causes, without necessity, is indeed contrary to true philosophy; but this principle applies not to the present case" (DNR, 141). The explanation is as follows:

- "Were one deity antecedently proved by your theory, who were possessed of every attribute, requisite to the production of the universe; it would be needless, I own (though not absurd) to suppose any other deity existent. But while it is a question, Whether all these attributes are united in one subject, or dispersed among several independent beings: by what phenomena in nature can we pretend to decide the controversy?" (DNR, 141).

I find Philo's elaboration of this objection quite unconvincing. As Swinburne points out, Hume claims that "it is an open question whether there is a god with sufficient power to put the whole universe in order. The principle, however, still applies whether or not we have prior information that a being of sufficient power exists" (Swinburne 1973, 147). Similarly, Gaskin also notes Philo's claim that "it is an open question whether all the attributes of deity are united in one subject" (Gaskin 1978, 17). While Gaskin almost always tries hard to counter Swinburne's every criticism of Hume, this time Gaskin agrees with Swinburne that Philo's reply "is not an entirely satisfactory answer. An open question between two alternatives is exactly the sort of situation where it is appropriate to close on the simpler alternative (in this case monotheism) by an appeal to Occam's Razor" (Gaskin 1978, 17).

Swinburne has suggested a reason why Philo refuses to apply the Ockham's razor to the debate between polytheism & theism: "Hume however thought (in my view wrongly) that the vastness of the Universe &

can be absolutely preordained, or governed by any Being but one who holds in his hand the reins of all Nature & not of some department only" (Mill 2009, 143). He concludes, "Monotheism ... is the only Theism which can claim for itself any footing on scientific ground. Every other theory ... is either inconsistent either with the carrying on of that government through a continual series of natural antecedents according to natural laws, or with the interdependence of each of these series upon all the rest which are the two most general results of science" (Mill 2009, 143).

the great power which in consequence we would need to attribute to the deity excused him from this counter-objection” (Swinburne 1972, 202). This may be the case but I think the more important reason is that Philo thinks that he & Cleanthes have agreed that the DA should be based on empirical considerations *alone*, & the liker the better principle is to be adopted, & hence Cleanthes needs to demonstrate the superiority of theism over polytheism by empirical considerations *alone*. That is why he challenges Cleanthes to tell him “*by what phenomena in nature* can we pretend to decide the controversy?” (DNR, 141, italics mine). He assumes that Cleanthes cannot appeal to any a priori principle, & hence he has good reasons to doubt that monotheism can be “antecedently proved” by empirical considerations *alone*.

But if it is the true import of Philo’s refusal to apply the principle of simplicity here, then he seems to be a bit muddled about the nature of the principle of simplicity mentioned by him. He does suggest this is something like an a priori principle of true philosophy (science), but if this is the case, its application to favor monotheism over polytheism *after all the empirical facts are in* should be legitimate. His further demand of empirical proof that “all these attributes are united in one subject” is not only unnecessary, but also illegitimate. Were Cleanthes smart enough to press these points (& revise his wrongheaded inductive principles), he should have won the debate with Philo over this point. Of course, Philo may simply deny the principle of simplicity, but this would flatly contradict widely accepted philosophical traditions (from Occam onwards) as well as Newton’s universally respected natural philosophy (his Rules of Reasoning in Philosophy). This would then bring out clearly the inadequacies of the rules of reasoning agreed upon by Philo & Cleanthes.

In any case, the success of modern science suggests the best methodology is not naïve empiricism but a form of rational empiricism. Scientific inferences do require rational criteria which are not derived from experiences alone. Rather they are used to evaluate the empirical data. In fact Hume himself seems to adhere to the principle of simplicity- he requires few causes to be postulated as well.

Defective Deities?

Philo also talks about possibilities of “botched & bungled *world*”, “infant deity” or “some superannuated Deity.” Gaskin is a bit critical of this objection: “it *could* be a botched effort etc. But this thesis is somewhat less clear-cut as an objection to DA” (Gaskin 1978, 18). If by “world” Hume is referring to the Earth, then his charge is implausible: “by the standard of these ... ‘earths’ [such as moon or Venus], we can confidently pronounce our earth as veritable Eden in the solar desert.” So Hume is probably talking about the universe, but then on his own principles, “we cannot find a standard whereby to judge its merits” (Gaskin 1978, 19). So again “Hume’s point is not that these logical possibilities ... have an equiprobability based on equal positive evidence, but that DA leaves us with no good reason to choose one possibility rather than another” (Gaskin 1978, 19).

I think this objection is very weak, & the Principle of Simplicity similarly covers those cases of infant or superannuated deities- it is obviously much simpler to postulate an eternal God with a stable nature rather

than such deities, especially as candidates for ultimate explanation. It is reasonable to supplement DA with whatever rational principles which are widely adopted in common life & scientific research.

Critical Evaluation of the More Like An Organism Objection

Philo's Principle of Generation Objection to the Design Argument

One ingenious criticism of DA is to point out that there are alternative explanations which can equally explain order & design in the world, or can even do the job better than the principle of intelligence. In Parts VI-VII of DNR, Philo argues that we can also say the world is like an organism. From our experience, order of an organism is generated (reproduced by a biological process) rather than designed. So by an argument from analogy, we can equally use a principle of generation to explain order. This means that we cannot claim that God is the best explanation of order & design in the world; nor can we say that God is the only justifiable conclusion of an argument from analogy. So the DA fails.

I'll call this Principle of Generation Objection (PGO) or sometimes Generation Objection in short. The proposal to explain the origin of the world in analogy with the principle of generation is called the generation hypothesis. The design hypothesis is sometimes called ID (intelligent design). We also note that Philo often talks about the principle of vegetation & the principle of generation separately. They seem to refer to the reproductive power or processes in plants & animals respectively. However, it seems to me the basic pattern of these processes for both plants & animals are largely the same. So I will include the principle of vegetation within the principle of generation, & later mainly speaks of the principle of generation (or just "generation"). Moreover, the full-blown theory of evolution will make a lot of difference to the arguments discussed below, but it was not really available in Hume's time. Since my focus is on Philo's arguments concerning generation in DNR, I will first bracket the theory of evolution, & only discuss its implications later.

Exposition of Philo's Objection in the *Dialogues*

Philo starts to launch the PGO in Part VI in a more aggressive form: "as the universe resembles *more* a human body than it does the works of human art & contrivance," the "world, therefore, I infer, is an animal, & the Deity is the Soul of the world, actuating it, & actuated by it" (DNR, 144; italics mine). In Part VII, Philo again makes a similar claim: "The world plainly resembles more an animal or a vegetable, than it does a watch or a knitting-loom" (DNR, 149-150). Since the analogy is supposed to be stronger, Philo can also claim that the generation hypothesis is better than the design hypothesis. But note that the meaning of generation is vague from the beginning: the analogy proposed initially is that between the universe & a *human* body, but the generation hypothesis arrived at is that the world is some kind of *animal*, without specifying which kind of animal. But even the bodies of different animals differ a lot. Or is Philo having some general form of animal, whatever it is, in mind?

Philo gives some details about the analogies he is talking about. There are four aspects, which are all abstract properties of a system rather than concrete properties like external appearances: “A continual circulation of matter in it produces no disorder; a continual waste in every part is incessantly repaired; the closest sympathy is perceived throughout the entire system; and each part or member, in performing its proper offices, operates both to its own preservation, & to that of the whole” (DNR, 144). Note that this description of the general or systemic characteristics of an animal looks rather like a complex living machine designed to survive- all its parts are precisely adjusted to realize this purpose/end! These are exactly the features which call for Cleanthes’ DA, because these are exactly features which resemble those of machines. If Philo’s analogy with organism is successful, it also means Cleanthes’ analogy with machine is at the same time successful! So what is happening here? Perhaps Philo’s point is exactly that if the salient analogies which support a generation hypothesis & those which support a design hypothesis are basically the same, then the latter is no better than the former- this is enough to defeat the design hypothesis. But here Philo’s claim is that the generation hypothesis is better than the design hypothesis. Unfortunately he does not really provide the comparison, & then shows that those salient analogies support a generation hypothesis *more than* a design hypothesis.

So Philo’s claim is at least not well supported at this stage, but surprisingly Cleanthes’ initial reply is: “This theory ... has never occurred to me” (DNR, 145)! Apparently from Part V onwards, Cleanthes seems to be jaded & incapable of giving a sharp reply to Philo’s objections. He later does suggest that Philo’s “analogy [between the universe & the animal] is defective in many circumstances”: there seem to be “no organs of sense; no seat of thought or reason; no one precise origin of motion & action” for the universe. This part of reply seems better, because Cleanthes does highlight some salient disanalogies concerning external appearances. But then Cleanthes oddly says, the universe seems to “bear a stronger resemblance to a vegetable than an animal” (DNR, 145). But this concession to the generation hypothesis (broadly construed) is disastrous because it seems to admit that in the game of finding analogies, the design hypothesis loses! However, in point of fact, Cleanthes doesn’t need to say that. He can press similar questions for the plant analogy: “Where are the structures in the universe corresponding to root, branch, leave or flower?” I won’t pursue this issue further here because I think that when we compare the universe with the entire group of organisms, it is superficial just to look at their external appearances or sizes, because even among the organisms, they have very diverse sizes & different external appearances. So we need to find some abstract properties of the group of living things instead, & then use them to make comparison. Philo’s approach above is the correct way to compare the universe with organisms.

In Part VII, in response to Demea’s request for more clarification about the mechanism of the generation hypothesis, Philo elaborates on the vegetation hypothesis: “Very easily, in like manner as a tree sheds its seed into the neighbouring fields, & produces other trees; so the great vegetable, the world or this planetary system, produces within itself certain seeds, which, being scattered into the surrounding chaos, vegetate into new worlds. A comet, for instance, is the seed of a world; & after it has been fully ripened, by passing from sun to sun, & star to star, it is at last tossed into the unformed elements, which everywhere surround this universe, & immediately sprouts into a new system” (DNR, 150). Or perhaps “a comet is the egg of this animal [the world]; & in like manner as an ostrich lays its egg in the sand,

which ... hatches the egg, & produces a new animal” (DNR, 150).

Characteristics of Life

Before evaluating the More Like Organisms Argument, a better understanding of the characteristics of life would help. I will heavily draw on the insights of Franklin Harold, an eminent cell biologist, & especially his book, *The Way of the Cell: Molecules, Organisms & the Order of Life*. Harold has highlighted four major qualities of life:

- 1) **Flux of Matter & Energy:** a hallmark of life is metabolism which designates the totality of all the chemical transformations carried out by an organism internally as well as in exchange with the external environment;
- 2) **Self-reproduction:** “Living things are generated autonomously, not by external forces, & what they generate is their own kind. Like begets like... characteristics are transmitted from parent to offspring by a program or recipe that embodies instructions for producing the next generation” (Harold 2001, 10), & it is a very accurate process.
- 3) **Complex Integrated Organization:** “Even the simplest unicellular creatures display levels of regularity & complexity that exceed by orders of magnitude anything found in the mineral realm. A bacterial cell consists of more than 300 million molecules (not counting water), several thousand different kinds of molecules, & requires some 2,000 genes for its specification” (Harold 2001, 10). He later says: “Organized complexity is one of the essential characteristics of life” (Harold 2001, 31). However, notwithstanding this huge amount of complexity, the cell still “constitutes a unitary whole... its molecular constituents have functions... molecules are parts of an integrated system” (Harold 2001, 11). The organization of life is often manifested in a hierarchical system.
- 4) **Adaptation:** an organism is constantly tracking changes in both the internal & the external environment in order to maintain its survival. There are various homeostatic systems to achieve this goal. In short, “the activities of the cell as a whole- [life]..... has purpose; order does not” (Harold 2001, 11), & the purpose is to perpetuate their own kind.

In all the above features, life clearly possesses extremely high degree of complexity. And “complexity is not hard to recognize & is commonly more a matter of degree than of kind... emergence in the system as a whole of properties that cannot be assigned to any one of its components, invariance of the whole even though its components fluctuate, & a complementary interplay between local causes & global causes... dynamic rather than static, & open to the input of energy & matter from the environment... non-reducibility... *Living systems ... represent the epitome of complexity by these (or any other) criteria*” (Harold 2001, 222; italics mine).

To sum up, we may formulate some definitions of life, a by no means easy task; for example, J. Perret says: “Life is a [property of] potentially self-replicating open systems of interlinked organic reactions, catalyzed stepwise & almost isothermally by complex & specific organic catalysts which are themselves produced by the system” (quoted in Harold 2001, 12). Another simpler definition of life emphasizes holism: “living organisms make up a set of unique, hierarchically organized systems each of which functions as a whole” (Harold 2001, 14).

Given so many unique properties of life, we can point to the “sharp division between the organic & inorganic spheres... characteristics [of living things are] ... essentially absent from non-living ones: intricate organization & purposeful behavior that unfold over time, both on the individual level & that of the total assemblage. Here yawns a great chasm” (Harold 2001, 218). It is rather obvious that inanimate systems like flame, whirlpool, electrical circuits, & circulation of ocean currents are rather unlike living things. Some scientists want to find some new laws, e.g., thermodynamics of dissipative structures to bridge this “great chasm” in order to say that “simple systems such as gases or planetary orbits are special & limited instances, while complex systems represent the general case.” However, “after half a century, the thermodynamics of irreversible processes (those that predominate in the real world) has chalked up few concrete achievements & remains largely outside the main stream of both physics & biology” (Harold 2001, 224). In others words, this great chasm remains as ever.

Evaluation of the More Like Organisms Argument

Is it really true the world is *more* like an organism than human artifacts (which include but not confined to machines), as Philo initially claims? It is interesting that quite a number of commentators find this claim hardly credible. For example, T. McPherson, in *The Argument from Design*, has said, "when one examines the way in which the analogy with animals and plants is presented in the *Dialogues*, the overall effect is not, I think, of an analogy that deserves to stand alongside the analogy with machines. Philo's development of it is in extravagant terms" (McPherson 1972, 56). Similarly, Pike says, “I find this argument unconvincing. Who is to say whether the universe is more like an organism than a machine? The premise ... seems to me shaky to the point of being unavailable” (Pike 1970, 173). Basically I am sympathetic with these intuitive reactions. However, to further the discussions, we may need to consider whether more detailed and plausible analogies between the world and organisms can be offered, & then critically assess them.

Let us first investigate Philo’s 4 points of analogy between the world & animals (called points (a) to (d) below). When we talk about the “world” here, we are referring to either the physical universe as a whole & its large-scale structure (excluding the organisms we find on earth), or the inanimate systems contained in the universe like mountains & oceans, the solar system, the galaxies & so on.

(a) “A continual circulation of matter in it produces no disorder”

- Concerning this first point of Philo, if we understand “disorder” in terms of the concept of “entropy” in contemporary thermodynamics, then in fact there is a great disanalogy between the world & animals. According to the second Law of Thermodynamics, the degree of disorder in a closed system as measured by entropy can only increase & not decrease with time. Since presumably the universe is a closed system, as the “continual circulation of matter” goes on, its entropy has to increase & disorder produced. In contrast, organisms (including animals) have an amazing “ability to grow, develop & evolve, generating mounting levels of order in apparent defiance of the second law of thermodynamics.” Of course, this conflict is only apparent rather than real because organisms are not closed systems- they are continuously having interactions with their external environment. In

this way, “Organisms *extract* ‘negentropy’ from their surroundings... [&] drew upon external sources of free energy to support their various work functions” (Harold 2001, 227; italics mine). But of course this extraction mechanism is extremely ingenious: “The molecular & physiological devices by which energy is harvested & coupled to the performance of useful work make up the discipline of bioenergetics” (Harold 2001, 228).

- So although logically speaking, the existence of ingenious organisms is compatible with the second Law, “there remains a troublesome discrepancy: classical thermodynamics would never lead one to *expect* a world that contains bugs, rainforests & all that lies between” (Harold 2001, 228). If we compare organisms to almost all inanimate systems with any significant degree of complexity, there is also disanalogy. It is because although these inanimate systems (e.g., luminous stars) are not closed system, they do not possess anything like life’s ingenious extraction mechanism. So normally they will still tend to disorder, just as the luminous stars will explode in the long run, leaving only debris behind. We can conclude that point (a) fits animals but not the universe or most inanimate systems- Philo is wrong here.
- If we interpret “disorder” in a much looser sense of chaos, then the analogy will be slightly better because many inanimate systems can maintain some degree of stable order over time without breaking down into absolute chaos. So concerning this minimum level of order, the analogy will hold true but the level of achievement for organisms is much higher than that for the universe, as indicated above- so there is disanalogy on this level. Moreover, this minimum requirement seems to be a kind of definition for any system- if they easily become disordered & chaotic, how can we recognize their existence in the first place? Because this analogy is so easy to come by- it also exists between the universe, inanimate systems & machines, it cannot be said to be very significant either. We cannot say that concerning point (a), the generation hypothesis is superior to the design hypothesis.
- Concerning the “continual circulation of matter”, there is also an disanalogy: for organisms, this circulation also happens between the organisms & their *external* environments (part of metabolism). But for the universe, it has no external environment, hence this kind of circulation of matter simply does not exist. To summarize, for point (a), disanalogy is more salient than analogy.

(b) “the closest sympathy is perceived throughout the entire system”

- If it refers very broadly to the uniform applicability of natural laws to all systems in the universe, & to the universe as a whole, then this analogy between the world & animals can be accepted. But in this aspect, there is no difference between the generation hypothesis & the design hypothesis. Moreover, this kind of mechanical application or uniform order seems more typical of the regular behavior of machines than of complex variegated behaviour & reactions of organisms.
- It is arguable that “closest sympathy” should mean more than mere consistency with formal laws, & also suggests close interaction between & integration of all the parts of “the entire system.” It seems that organisms satisfy point (b) to a much higher degree than the universe as a whole, or its inanimate systems. The universe or galaxies are vast systems, & stars are separated by literally astronomical distances. So their parts do not enter into close interaction most of the time. This is a big contrast, say, with a cell in which the parts are closely interacting with one another incessantly

within an extremely small space- & all these activities are integrated into a complex specified system (CSS), serving to perpetuate its existence- “the closest sympathy throughout the entire system” indeed!

- According to the Webster Dictionary, a machine is ‘an assembly of parts that transmit force, motion & energy to one another in some predetermined manner & to some desired end.’ So the parts of a machine also exhibit “the closest sympathy throughout the entire system.” Moreover, both life & machine seem to be “a system of interacting parts with well-defined functions, joined together in service to a greater whole” (Harold 2001, 219), whereas the inanimate systems do not manifest this feature so clearly. In short, both life & machine have complexity, functional parts & purposeful behavior, & regarding this aspect of “closest sympathy,” machines & organisms resemble one another more than they resemble the universe as a whole or its inanimate systems. So Philo is again wrong on this point.

(c) “a continual waste in every part is incessantly repaired”

- Concerning points (c) & (d), they are more concerned about purpose, & the analogy between life & the universe & its animate systems is undeniably weak. To begin with, the concept of “waste” is only well-defined for a functional system. For the rubbish in a house & the toxins in an organism, they can be clearly recognized as wastes which should be disposed of & expelled from the systems. Waste is a serious challenge to life due to the tendency towards degeneration & increasing entropy. The wonder of life is that it has a counter-entropy principle, which helps to maintain life & its proper functions. In this aspect, it is like a machine in which the concept of waste is intelligible, e.g., the rust on metallic machine parts. There is some analogy as well: life systems have this mechanism of repair, such as healing the wound on the skin, & using phagocytes to remove the dead tissues, the waste. Similarly, some advanced machines have a system of repair, such as the repair software which helps to remove viruses in a computer. The disanalogy here is that in many machines, human beings need to do the repair or remove the waste themselves.
- However, the universe as a whole does not seem to have this feature to any significant degree or at all. What is more serious, what constitutes a waste in inanimate systems is rather hard to tell. Naturalists may just see every event as interaction between parts of matter which leads to their transformation in accordance with natural laws. Sometimes it produces this or that thing, but we cannot say which is a waste & which is an intended outcome.
- The weakness of the concept of repair here should also be obvious. For example, after the stars exploded, would the universe collect back the debris quickly to form another star? Do the radioactive atoms go back to their former states after decay? Concerning point (c), the disanalogy is quite conspicuous.

(d) “and each part or member, in performing its proper offices, operates both to its own preservation, & to that of the whole”

- Some points made above are equally applicable here. First, point (d) seems to be very good description of life, & is also applicable to machines to a great extent. There is some disanalogy here because perhaps most machines do not exactly tend to their own preservation, but only to serve the

ends imposed by the designer. But apart from this, both organisms & machines are unmistakably complex organized systems which constitute wholes, with their parts having clearly defined functions- their proper offices, e.g., the interlocking gears in a mechanical watch.

- However, for the universe as a whole, it is not clear that the concept of “proper office” is well-defined for the parts of the universe for reasons explained above. For example, what are the proper offices of a sun or Jupiter or a distant galaxy or pulsar (neutron star)? If the critics acknowledge the applicability of this concept to the universe, then they may already implicitly accept the DA. Indeed, from the perspective of DA, the sun is supposed to provide energy for the life forms on earth; the Jupiter is our giant protecting brother, shielding the Earth from the attack of comets or asteroids, etc.
- Does the universe have mechanisms which tend to preserve the whole? This is also unclear- many galaxies have been destroyed but the whole universe does not seem to care, & they go on existing as before! It is not like organisms which are really sensitive to the destruction of the heart or a kidney, not to mention brain death! The parts in the organism are much more closely knitted together, & they have a higher degree of mutual dependence.

Yet another disanalogy: according to Harold, organisms typically exist in a community (ecosystem), but the universe does not belong to a higher “ecosystem” of universes. For a machine, we can build a parallel processing system of computers, & a kind of neural connectionist network, which somewhat resemble ecosystems. We may also compare the community of organisms to a novel which has several sub-stories of different characters integrated into a whole, or a very complicated computer program, or the DNA genome project which requires the collaboration of hundreds of scientists. (Remember: scientific theories are also human contrivances, products of intelligent design (ID).)

To conclude, for Philo’s 4 alleged analogies, they are either non-existent or weak; if they exist, they equally hold, or are even manifested in a greater degree, between the universe & human contrivances. There are also some disanalogies between the world & animals as well. The problem is that Philo’s description does not entirely ring true for the universe as a whole, especially when we consider generation/reproduction. The universe does resemble a complex system but first, it is not observed to self-replicate itself; second, its degree of complexity seems to be much less than that of organisms- the “epitome of complexity by any criteria.” Human contrivances like machines in general have a higher degree of complex organization than inanimate systems, but they are inferior to organisms in this aspect. So the overall conclusion is: the universe is more like machines than living systems. Philo’s claim that the universe is more like organisms than like machines is not only ungrounded, but positively contradicted by data on the whole. Abstractly conceived, the analogies mentioned by Philo exactly are those aspects of living things which invite postulation of the design hypothesis.

Moreover, the universe as a whole is more like inanimate systems than life. For example, a mountain is not like an organism at all because it lacks internal differentiation- nothing like the respiratory system, the digestive or reproductive systems, etc. Moreover, it lacks close integration of various parts to serve the same purpose, e.g., lack of any kind of homeostatic system, or high degree of sensitivity to internal or

external environments. Perhaps a mountain does contain different metals, but even then they are not in any sense integrated into a whole. Hence the inference to the generation hypothesis is hardly convincing. In contrast, there are good reasons to believe that the universe as a whole & the organisms included therein (together with their power of generation) can be explained by ID. More on this below.

The Chasm between the Inanimate Systems & Life

To strengthen the above conclusion let us consider Harold's 4 characteristics of life. This can further help us see the disanalogy of universe with living things.

- 1) **Flux of Matter & Energy:** we have pointed out that since the universe does not have an external environment, there cannot be an influx of matter & energy from the universe's external environment. So there is disanalogy on this point. For machine, this is at least possible. For example, a hydroelectric plant will receive input of the water power & output electricity to other places.
- 2) **Self-reproduction:** it is not observed that our universe is generated autonomously, namely, generated by another universe; nor have we observed the universe generating another of its own kind (Like begets like)- so there is no confirmed analogy here. In fact, for organisms, they can reproduce when they are living- they can live with their offsprings at the same time. But our universe cannot exist & interact with another universe at the same time. In our universe, we cannot detect any "program or recipe that embodies instructions for producing the next generation" – no genes, reproductive organs observed in the universe. So there are significant disanalogies here.
- 3) **Organization:** both our universe & organisms are ordered systems in some sense but the degree of complex organization in the universe on the whole (excluding organisms) seems to be much less because "Even the simplest unicellular creatures display levels of regularity & complexity that exceed by orders of magnitude anything found in the mineral realm" (Harold 2001, 10). In general, the universe does not have the internally differentiated but highly integrated parts of life forms. This is an disanalogy; nor can we clearly say that molecular constituents of inanimate systems have functions of an integrated system. The universe is a hierarchical system, though its organization does not clearly have purpose- more like order than life because it does not clearly aim to perpetuate its own kind. However, after the discovery of the phenomena of fine-tuning, the hierarchical system of the universe is now plausibly seen to be a purposive system aiming at the emergence of life & rational consciousness. This fits the design hypothesis better than the generation hypothesis because according to the latter, the cosmic process of our universe should be aiming at the preservation of itself, our universe, but it does not. Rather, like a machine made to serve a purpose imposed by the Designer, it is aiming at the emergence of life & rational consciousness.
- 4) **Adaptation:** The universe cannot adapt itself to the external environment because there is no external environment. We may argue that something like homeostasis exists, e.g., the conservation laws about mass/energy. But this analogy is rather general, & rather unlike life's adaptation to maintain a constant form. Mass/energy can be conserved without much constraint on organization- even when marching towards its heat death, the conservation laws about mass/energy still hold.

So the analogy between universe & life is indeed weak, much weaker than the analogy between universe & machine or ordered systems. For example, "the chasm that divides molecules from organized cells is

wider still. Cells make themselves, but not by self-assembly of pre-formed molecules; they grow, thanks to a generative biochemistry that produces a restricted subset of molecules within a confined & structured space. If complex systems are to arise from raw chemistry, hold out against the forces of decay & multiply themselves in space & time, energy must supply the driving force... What distinguishes the cell from the [primeval] soup [of organic molecules] is the former's purposeful organization; how strange, then, to find the literature all but silent on the genesis of that organism!" (Harold 2001, 244).

The wide chasm between inanimate components/ systems & life forms is due to two factors: the latter have complex purposeful organizations & are capable of autopoiesis (self-generation). By making machines, human beings impose complex purposeful organizations on inanimate components/ systems, but they still cannot create systems capable of autopoiesis. Consider these 3 categories on this line of scale with increasing complexity, from left to right:

Inanimate components => complex purposeful machines => life (complex purposeful systems with power of autopoiesis)

On this scale, it can be clearly seen that inanimate systems are more like machines than life! So the More Like An Organism Objection fails. I will further evaluate the claim that the generation hypothesis provides an equally good explanation of the marks of design below.

Critical Evaluation of the Generation Objection

Analysis of the Principle of Generation

What exactly is the principle of generation? Philo uses this & related terms rather widely & indiscriminately without carefully defining these concepts. His suggestion is that generation is a general kind of power which can be used to explain a wide variety of things. We need some explication of generation before we can evaluate the comparative strength of different principles like generation versus intelligence. Let $O1(K1)$, $O2(K1)$, & $O3(K1)$ represent 3 individual organisms belonging to kind $K1$. Since organisms are paradigms of CSPs, we can suppose there exist a set of detailed descriptions about the complex structures & processes of a certain organism- they can be said to be the complex specified information (CSI) embedded in that organism. Let $CSI(O1)$ be the amount of complex specified information embedded in organism $O1$. Generation refers to the process whereby $O1(K1)$ is produced by one or more organisms of the same kind, say, $O2(K1)$ in the case of asexual reproduction, or $O2(K1)$ together with $O3(K1)$ in the case of sexual reproduction, & so on. In this case, $CSI(O1)$ is derived from & explained by exactly the same kind of complex specified information which exists in another organism of the same species, $CSI(O2)$, & a mechanism which can transfer CSI from $O2$ to $O1$. In general & *roughly*, $CSI(O1) = CSI(O2)$. The implication is that organisms can't actually *create* (rather than duplicate) order or information through generation- they just *reproduce* or *duplicate* it.

Another crucial point to note: it is not possible for organism of one kind to generate another kind. In normal processes of generation in our common life, cats can produce cats but not cockroaches, & so on. So $O1(K2)$ cannot be derived from $O2(K1)$, nor vice versa. It also means that for each kind of organism

(K_i), there will be a unique principle of generation (G_i). Suppose there are n kinds of organism (K₁, K₂, ... K_n). There should also be n separate & independent principles of generation (G₁, G₂, ... G_n). Although the general name “generation” sounds simple & unitary, in fact it refers to a myriad of principles of generation operating on myriad kinds of organism, each principle being distinct from & independent of others. The name “generation” is hiding very complicated things below the surface. Generation is no unitary explanation of the emergence of so many principles of generation, but only a collection of those principles (G₁, G₂ ... G_n). But G₁ cannot be used to explain G₂, & so on. (At least it was the case in Hume’s time.)

We also need to note that not every kind of system in the universe has the power of generation- only living things have, & inanimate systems do not. For example, inanimate systems like a mountain or a garden have no power to generate another mountain or a garden. Why? They don’t have the mechanism of self-replication, & do not possess required structures like the reproductive organs. It seems that only systems with CSI can have the power of generation- this is at least a probable conclusion supported by our common experiences. Indeed, modern science tells us that it *has to* be the case because K₁’s power of generation at least depends on the CSI possessed by O_i(K₁)- stored in its DNA or structure of the living thing.

Interestingly, intelligence can to some extent mimic generation by ingenious machines like 3D printer or photocopying machine. In this way, a copy of Shakespeare’s *Hamlet* can lead to another copy of Shakespeare’s *Hamlet*. (In ideal situation, the book produced should be identical to the original book, but in some cases the o/p may be deformed.) But as with generation, this machine cannot be used to create a completely new literary work. Nor can you generate *Paradise Lost* by feeding *Hamlet* into a copying machine. So there is some significant analogy between generation & human contrivances like copying machines, but as far as we know (still bracketing evolution), there is no significant analogue of generation in the inanimate world. Growth of crystal does not count because its repetitive order is far from a CSPA like life.

Given the above analysis, the principle of generation clearly leads to problems of regress:

O₁(K₁) ≤ O₂(K₁) ≤ O₃(K₁) ≤ ... [≤ stands for “is produced by”]

Does this chain from offspring back to ancestor ever end? There are two major possibilities:

- ◆ This line of generation will go on forever to form an infinite chain back in time, but one kind of organism will generate one infinite chain. So there exist myriad eternal chains of organisms, one for each kind of organism.
- ◆ The chain stops with the first organism of that kind Z(K₁). Then 3 more possibilities: the appearance of Z(K₁) is a brute fact, or it can be explained by either ID or natural laws. The generation hypothesis, *ex hypothesi*, will not apply here. If this is a brute fact, the whole thing looks rather mysterious- such a CSPA just popping into existence from nowhere, for no reasons & by no causal power? If this can be explained by either ID or natural laws, then generation can no longer be regarded as an ultimate principle.

If we insist to see generation as an ultimate principle, then we must postulate either a myriad of infinite eternal chains of organisms, or a myriad of first ancestors (or various combinations of these two schemes). No matter what we do, the whole picture is rather messy, mysterious & complicated. In fact, if the principle of generation can be reduced to another principle, the whole scheme will become simpler. That is why both secular & religious scholars in the contemporary world tend not to take generation as an *ultimate* category, despite Philo's apparently powerful arguments. For example, Swinburne seems to suggest there are only two serious alternatives: scientific explanation or personal explanation (Swinburne 1973). The secular side tends to reduce generation to natural laws by scientific explanation. Many on the religious side reduce it to ID, either directly (special creationism) or indirectly (theistic evolution). These indeed seem to be more reasonable options in the contemporary scene.

Comparative Assessment of the Principle of Generation & the Principle of Intelligence

We have pointed out that organisms can't actually *create* order or information through generation- they just *reproduce* or *duplicate* it. This seems to be rather different from the principles of design or intelligence: "In the case of design, materials which are in a nonorderly state are transformed into an organized system; but in the case of vegetation or generation, this is not the case. What we find instead is a process by which organized bodies generate other organized bodies. There is no genesis of order here, but rather its transmission from one body to another. Generation & vegetation are themselves orderly processes which the DA tries to account for" (Pearl 1970, 282). Suppose a collection of components contains exactly all the parts of an integrated machine, a CSPA. The principle of intelligence can transform the collection of components to the integrated machine, which did not exist before, with an huge increase of complex specified information: CSI(integrated machine) >> CSI(collection of parts). This process is not mysterious at all- I have already explained it before. ID can create completely new order which never existed before, such as the *invention* of the first aeroplane, & not only transmit or duplicate pre-existing order.

Consider this analogy: some time ago a great philosopher like Karl Popper wrote a completely new book then, say, *Conjectures & Refutations*, & this was a manifestation of the creative power of intelligence. But once the book was written, anyone can use a copying machine to make numerous copies of exactly the same book, while lacking any understanding of the book- this is generation! So it seems that intelligence can provide a real solution to the problem about the *genesis or creation* (rather than duplication) of astounding order like CSPA, while generation cannot. At least we naturally feel that the latter answer is somehow less satisfactory. This point is not affected by the fact that the number of copied or printed copies of *Conjectures & Refutations* is much greater than the number of original manuscript produced by Popper, which may be just one. Suppose only 10,000 copies of *Conjectures & Refutations* have ever existed, & among them, only one was written & produced by Popper, & the rest (9,999 copies) came from the printing or copying machines. Given any copy, it is much more likely (in fact almost certain) that it is produced by the printing or copying machines ($p=0.9999$) than it is produced by intelligence ($p=0.0001$, close to zero!) Can we therefore say that the explanation by intelligence is not necessary or even improbable, statistically speaking? No! Because no doubt in this case the really satisfactory answer to the question "why this *kind* of book expressing this school of philosophy of science ever existed" is that it

was originally produced by a great mind, Popper. (In fact, even the other explanation has to invoke intelligence to explain the existence of printing or copying machines.)¹⁷

In view of these considerations, let us reformulate the principle of ID as follows:

(PID) For all *original* creations of CSPSs, the kinds of which did not exist before, as far as we know, they all come from ID.

So the *original* cause of organisms, the epitome of CSPSs, is likely to be ID. The premise (PID) is supported by our uniform experiences- i) we know of many CSPSs caused by ID; ii) we never know of completely novel CSPSs which are formed merely under the influence of law & chance, or come from generation.¹⁸ The principle of generation cannot falsify PID because it is *not* original creation of CSPSs.

The Compatibility between Generation, Mechanism & Intelligence

Generation, mechanism & intelligence can be seen as three major ways of explaining the world. My example of an infinite chain of copies of *Hamlet* show the compatibility between mechanism & intelligence. It also suggests the irreducibility of purpose or meaning to mechanism. Even if we already have a *complete* mechanistic explanation of the infinite chain of copies of *Hamlet*, we still feel that the questions about the meaningful content of *Hamlet* have not been answered at all. The dimension of purpose & meaning cannot be reduced to the mechanistic level.

D'Arcy Wentworth Thompson was a pioneer in the study of the mathematics of biological growth & forms. He emphasizes that “mechanism & teleology are interwoven together, & we must not cleave to the one nor despise the other; for their union is rooted in the very nature of totality... Maupertuis ... found at last, taking the final & the efficient cause one with another... nor need the naturalist either exaggerate or belittle the mechanical phenomena which are profoundly associated with Life, & inseparable from our understanding of Growth & Form” (Thompson 1992, 7). Similarly Ernest Nagel argues that mechanism & teleology do not only not conflict, they can also be united. Teleological explanations “view the operations of things from the perspective of certain selected ‘wholes’ or integrated systems” whereas “nonteleological explanations ... direct attention primarily to the conditions under which specified processes are initiated or persist & to the factors upon which the continued manifestations of certain inclusive traits of a system are contingent” (Nagel 1961, 422). In fact it seems to me the integration of mechanism & teleology in a CSPS or highly ordered system (HOS) often evinces greater beauty & intelligibility, & hence more readily invites an explanation by intelligence. Contemporary defenders of DA do not need to seek gaps in natural or mechanistic explanations. Even if the evolutionary theory is true, it does not mean the end of DA. Indeed, as Thompson suggests, it is at least possible to “liken the course of organic evolution ... to the building of a temple, divinely planned, & the crowning of it with its polished minarets” (Thompson 1992, 5).

¹⁷ Of course many readers will recognize that my analogy is very similar to one of Cleanthes’ analogies, the vegetable library, in Part III of DNR.

¹⁸ The imaginary case of the hopeful monster, a completely new species suddenly “generated” by a previous species, is not generation as we understand & experience it. It is really more like chance or natural necessity.

Cleanthes' analogy of vegetable library & my analysis of generation above show the compatibility between generation & intelligence. Again even the infinite succession & generation of organisms do not seem to give a satisfactory answer to the question about the origins of all these numerous & diverse principles of generation- remember: there is no single universal principle of generation! Hume seems to be aware of this problem. In the NHR, he writes about the vulgar: "an animal compleat in all its limbs & organs, is to him an ordinary spectacle... Ask him, whence that animal arose; he will tell you, from the copulation of its parents. And these, whence? From the copulation of theirs. A few removes satisfy his curiosity... Imagine not, that he will so much as start the question whence the first animal; much less, whence the whole system, or united fabric of the universe arose" (NHR, 35). This paragraph seems to suggest that Hume is aware of the theoretical inadequacies of the generation hypothesis as an irreducible principle. Because if we use generation to explain several times the existence of animals, then naturally the question about the origin of the first animal will arise, if we do not want to say that an infinite series of organisms exist. (In fact Hume is still not aware of the problem of using "animal" as a general category, because each generation principle is different for each kind of animal!) Refuse to think about this problem, for Hume, is a sign of lacking intellectual curiosity! This means that the generation hypothesis is not theoretically complete- as is shown by the further questions about "the whole system, or united fabric of the universe"! It is the wholeness or unity or coherence of the entire universe which includes the varieties of animal which is striking & cries out for explanation.

Nor does generation give a satisfying explanation of prodigious beauty in nature & organisms: "in things both great & small, the naturalist is rightfully impressed & finally engrossed by the peculiar beauty which is manifested in apparent fitness... - the flower for the bee, the berry for the bird" (Thompson 1992, 3).

So a reply to the PGO is a counter-question: "Granted that the world is equally like an organism, why should it damage the DA?" Obviously, if it is argued that similarity to organisms is incompatible with being designed, then it has already been assumed that organisms are not ultimately brought about by Intelligence. Clearly it begs the question against the DA. So the point may be: "Right, we can't assume that organisms are not designed. Nor can we assume that they are. So there can be an ultimate explanation with reference to something like organisms which is independent of postulating Intelligence"- this is the generation hypothesis. However, to defeat DA, its mere possibility is not enough. To destroy completely the DA, the critics need to demonstrate the generation hypothesis is *significantly better than* the design hypothesis.

Assessing the Generation Hypothesis

There are two possible ways to spell out the generation hypothesis. First it can be argued that the world is like some orderly product of some specific organisms, e.g., a web spun from the bowel of a spider. So the world might have been spun from the bowel of an Infinite Spider. Philo seems to take this theory seriously: "The Brahmins assert, that the world arose from an infinite spider, who spun this whole complicated mass from his bowels, & annihilates afterwards the whole" (DNR, 154). Of course it is clearly extravagant. One obvious rejoinder is that the world doesn't look like a web at all. Moreover, a

web is a kind of repetitive order which does not really possess the same degree of order as our universe (HOS), not to mention numerous organisms in this universe (CSPSs). (If we postulate a Infinite Cosmic Bird instead, it is also not clear that the world is like a nest or some other specific product of organism.) But the major problem with this specific generation hypothesis is that it is not really an analogical argument based on our common experiences of generation, as Philo suggests. Far from it! This Spider's Web generation hypothesis is supposed to explain our entire universe, which includes the galaxies, various organisms like spiders, cats, whales, a million other biological species, as well as rational conscious persons. Besides being an extremely tall order, we in fact have experiences against this generation hypothesis: from what we know about spiders, they *cannot* build a nest, nor can they directly spin out any other complex organism of another kind, not to mention the capacity for producing consciousness. The critic is under the spell of an illusion about a single, unitary or omnipotent Principle of Generation generated by a misleading singular noun "generation"! Of course, it doesn't help to postulate an Infinite Cat generation hypothesis or Infinite Whale generation hypothesis either. Similar problems plague each of these & every other possible generation hypothesis based on the analogy of "generation".

Second, we may argue from a more general premise: "Organisms in general can produce something orderly and purposive. Similarly, the world is produced by some Infinite Organism." This reasoning is fallacious because even given the capacity for each kind of organism to produce *some* kind of order, it does not follow that any kind of organism has a general capacity for producing *widely diverse forms* of order in our world, not to mention the world as a whole with a hierarchy of interlocking levels.

(A) $G1 \Rightarrow K1, \& G2 \Rightarrow K2, \& \dots \& Gn \Rightarrow Kn$ [$\Rightarrow$ stands for "explains"]

(B) Some $Gi \Rightarrow K1 \& K2 \& \dots \& Kn$

The inference from (A) to (B) is clearly fallacious. Look at Philo's eloquent speech again: "A tree bestows order & organization on that tree, which springs from it... an animal, in the same manner, on its offspring: a bird, on its nest" (DNR, 152). Note that a tree never bestows order & organization on a bird or any other animal, or build a nest. Neither can a bird bestow order & organization on a tree. Because our experiences tell us that for any kind of organism, its capacity for producing order is highly specific to its kind & within well-defined boundary. So with respect to this kind of generation hypothesis, we have to ask. "What are the defining characteristics of this Infinite Organism? To which specific form or kind does It belong?" Of course, *ex hypothesi* It can't have Intelligence, because this generation hypothesis is proposed as an *alternative* to the design hypothesis. If we say that It has no specific form but just a kind of general power, It looks more & more like an omnipotent immaterial Mind, absent intelligence. It is not clear that this is a coherent or attractive proposal with much or determinate explanatory power.

If we insist that It does have some specific form, then we can ask what is the physical basis of this form. Presumably It is characterized by the complex specified information all organisms have. Maybe It has some kind of Super-DNA inherited from a former Organism or it is just there for eternity. But the problem is that judging from the empirical basis of the very idea of generation, even Super-DNA may be able to

generate only limited kinds of beings, & it is doubtful this generation hypothesis can explain the *widely diverse forms* of order in our world. If we postulate this Infinite Organism to be just there for eternity, then it is contrary to all our experiences of organism. The more likely hypothesis may be to postulate an infinite chain of Infinite Organisms, each one being produced by its Parent & so on. Then it would imply infinite time, & this is open to refutation by empirical data, or was it already refuted by the Big Bang Theory?

We can go on forever with these speculations but it surely seems that the resulting explanation is very *ad hoc* & much more complicated and unintelligible than the thing to be explained! Indeed the reason that the organisms can produce order is that the order is *already* there in the DNA. Presumably no nest can be more complicated than the genes the bird has. So the ability to produce order is confined by and explained by the genes of organisms which have an even higher complexity. So it seems that if we use an Infinite Organism to explain order, we are actually using a more complicated thing *of the same kind* to explain a less complicated thing of the same kind. In other words, according to a principle of explanation enunciated by Philo himself, this is not *explaining* at all!

In all these generation hypothesis, there is the general problem of explaining the *genesis* of the kind of order in our immensely complicated world with so many CSPSs. The principle of generation cannot provide a satisfactory answer. The more it postulates a *general* order-creating capacity in the Infinite Organism or whatever proposed as the Ultimate, the more it is moving away from the principle of generation towards the principle of intelligence.

Twyman tries to argue that Philo is successful in showing that the ID hypothesis is not superior to the generation hypothesis. (Pike also thinks highly of this PGO.)¹⁹ But I think their judgment is based on an abstract analysis of the structure of the arguments on both sides. But if we really elaborate the details of each generation hypothesis in accordance with the general features of generation we know, we invariably find it implausible. Is it just an accident that in the modern world, so few thoughtful persons (even among the common people) have taken seriously the principle of organic generation as the ultimate explanation of the world, & the foundation of a comprehensive worldview? Even for the naturalists who reject theism, they would tend to accept the position that the organic realm is largely reducible to, or at least supervenient upon, the realm of matter & natural laws. It is hardly plausible to maintain that the principle of generation is in a superior or equal position, despite Philo's eloquent objections & flamboyant rhetorics. Indeed it is doubtful that Hume in the end would accept the PGO himself, & here it may be more reasonable to treat the PGO as a cavil & sophism, in accordance with Philo's own self-evaluation in Part X. (Also see Hume's comments on generation in NHR.)

The Design Hypothesis as the Better Explanation

¹⁹ Although the generation hypothesis may not be intuitively plausible to Pike, he admits that he is "unable to discover a serious 'fallacy' in Philo's reasoning" in Part VII, which maybe "one of the most sophisticated & effective critiques" of DA (Pike 1970, 176).

Let us now explain the reasons why we can deem ID rationally superior to generation as the ultimate principle of explanation. Firstly, DA qua order can at least provide an explanation of the natural laws (even J. S. Mill accepts this possibility).²⁰ However, it is obvious that taking the generation hypothesis as ultimate already presupposes the existence of natural laws. So the generation hypothesis cannot do the job which DA qua order can. It would be difficult to see how the generation hypothesis can explain the existence of natural laws: “as analogous processes to explain regularities of succession [natural laws], generation or vegetation will not do, because they only produce regularities of co-presence- & those through the operation of regularities of succession outside their control. The seed only produces the plant because of the continued operation of the laws of biochemistry” (Swinburne 1973, 148).

Second, ID conforms to the Principle of Simplicity much better than generation. As explained above, the abstract concept of generation is a kind of hypostatization which hides the fact that it is in fact a collection of many independent principles. Suppose there are a million kinds of organisms (the actual number of species should exceed this). This means we also have one million kinds of principles of generation, irreducible to one another: G1, G2, ... G₁₀₀₀₀₀₀. In short, to postulate generation as the ultimate category means to postulate a million ultimate principles or one million brute facts. The design hypothesis just needs to postulate one Designer Creator.

Third, the generation hypothesis, as I have also explained, suffers from various problems regarding the *ultimate* origin of generation: either all these million of principles eternally exist or popped into being some time ago. The sudden appearance thesis is of course extremely baffling, inviting external causation. If organisms are eternal, then our world has to be eternal as well. This commitment to infinite time is open to falsification by science, as it seems to be the case now (Big Bang). Even if the world were eternal, we have reasons to believe that organisms cannot always exist in this world. They certainly could not exist at the early stage of the Hot Big Bang. So the thesis of an eternal chain of organisms is subject to falsification, & it should be regarded as already falsified by contemporary scientific knowledge. In contrast, the design hypothesis does not suffer from similar problems. In fact the Big Bang Theory provides data for the Kalam Cosmological Argument which is vigorously defended by scholars like William Lane Craig, Andrew Loke & others.

Fourth, the generation hypothesis does not seem to have enough explanatory power to explain & unify all the data we have about the universe. The generation hypothesis is supposed to provide us ultimate unification of all phenomena, which seems to be the goal of science. So how can the generation hypothesis explain the existence of a coherent ecosystem? Although the principles of generation are completely independent, they somehow come to exist as interacting members of an integrated system. There is also the question about the intimate & interlocking relationship between the ecosphere & the natural system. They also seem to be interdependent. How did all these come about? All these are really puzzling. The whole picture is messy, complicated, & hardly intelligible & the addition of the name

²⁰ Mill talks about “a God governing the world by invariable laws” (Mill 2009, 144), & thinks that “Science contains nothing repugnant to the supposition that every event which takes place from a scientific volition of the presiding Power, provided that this Power adheres in its particular volitions to general laws laid down by itself” (Mill 2009, 145).

“generation” does not help much. Perhaps this is why Hume seems to be dissatisfied with the vulgar people who relies on the generation hypothesis- they do not understand the questions about “the whole system, or united fabric of the universe.”

In contrast, if we accept ID as the ultimate explanation, this can unify everything. The Principle of Simplicity is of utmost importance here. We only need to postulate one eternal Mind who is immensely powerful & wise. The natural system, all the organisms, & all the coherent interrelations among the organisms & between the ecosphere & natural system, are designed by One God & carefully planned beforehand. As demonstrated, this grand system of systems does manifest many indicators of ID. So this explanation is intellectually satisfying, & much more superior to the Ultimate Generation Hypothesis.

Fifth, if the world is produced by an Infinite Organism which does not have a conscious mind and intelligence, then the emergence of conscious intelligence and conscious purpose has also to be explained by it. This seems to be another difficult problem for this hypothesis. Presumably, this Infinite Organism also has no aesthetic sense or capacity for scientific theorizing. How this generation hypothesis can adequately explain the mind-like qualities of the universe like beauty & intelligibility is also a mystery. Of course, the DA has no problems here, & in fact the data in this category are congenial to the design hypothesis.

Therefore overall speaking, this allegedly "equally valid" alternative of generation hypothesis is found wanting, & Philo's parity thesis is false. Hence it's not surprising that the Theory of Infinite Organism has never gained a secure foothold in human intellectual history- it seems to be inferior to both the design hypothesis & the naturalistic hypothesis of ultimate natural laws. Pike & Tweyman have tried to defend Hume's generation objection but they seem to ignore all the above considerations. In the end, it seems the ultimate choice is in fact between the system of natural laws or Designer God as the Ultimate.

Critical Evaluation of the Immanent Order Objection

Philo says, “were I obliged to defend any particular system of this nature... I esteem none more plausible, than that which ascribes an eternal, inherent principle of order of the world; though attended with great & continual revolutions & alterations... How could things have been as they are, were there not an original, inherent principle of order somewhere, in thought or in matter? And it is very indifferent to which of these we give the preference” (DNR, 148).²¹ Similarly, Mackie claims that "the supposition that there simply is temporal order, as an ultimate, not further explainable, brute fact, is much more probable" (Mackie 1982, 149).

²¹ The justification of this immanent order hypothesis is related to the regress objection: “By supposing it [the material world] to contain the principle of order within itself, we really assert it to be God; & the sooner we arrive at that divine Being, so much the better. When you go one step beyond the mundane system, you only excite an inquisitive humour, which it is impossible to satisfy” (DNR, 135).

To evaluate this objection, we must have more understanding of the implications of the assertion that "the temporal order can just be a brute fact." Sometimes the temporal order is hypostatized as another SINGLE thing standing alongside God. I suggest it is this misconception that makes the above objection sound plausible. Temporal order is not a THING; it is the DESCRIPTION of the behaviours of DISPARATE entities of the universe OVER A LONG PERIOD OF TIME. It's true that natural law is sometimes thought to be necessary but this idea has never been explicated clearly. The existence of natural laws does not seem to be logically necessary. The necessity of natural laws may mean that they have universal applications and validity independent of time. But what does it mean to say that those laws have the POWER to make the bodies follow them?

This temporal order we only find necessary to postulate because of the success of science (and also because of rational intuitions). In relying on it and producing spectacular successes, science makes us justified to believe in such an order but it does not explain it. First of all, there is no reason why the world couldn't consist of infinite pluralities. Why should there be *elementary* particles? Why any elementary particle has consistent properties over all places? For example, an electron's mass or charge might vary from zero to infinity. It may not be called electron then but we can ask again, why is there an electron at all? Secondly, there's no reason why the particles hold to their properties over time? For example, at time t1 the universe is orderly. It does not imply at t2 it should be orderly. However, it turns out that at t1, t2, t3 and so on the world is orderly. All these *could* have no explanations. Temporal order *could* be "a" brute fact. But this is misleading. It actually implies an *infinite number* of brute facts. It is a brute fact that there are protons or electrons or neutrons and so on. It is also a brute fact that they behave orderly at t1 or t2 or t3 and so on. Talks of cosmos, universe, law, etc. conceal the fact that the naturalists owe us a principle of unity which holds together disparate entities over space and across time.

So I suggest Mackie has not fully grasped Swinburne's point: "we should say in order to avoid hypostatizing laws of nature, the vast coincidence that there are objects of a very few kinds... all of each kind having identical powers and liabilities, is a very striking coincidence, which is *a priori* very unlikely. The hypothesis of a common creator explains the coincidence, since he has the power to bring it about and reason to do so" (Swinburne 1983, 390). We choose the theistic hypothesis instead of the 'brute fact' hypothesis "on the grounds that its simplicity is high and it gives some probability to what we observe" (Swinburne 1983, 391). If both God and this world can be brute facts, we have reason to prefer theism because it has only one brute fact and the latter assertion actually consists of infinite number of brute facts. Horigan says, "it would be most difficult indeed to say that the conditions that were requisite to the makeup of our known world could have been fulfilled other than by a unified creative essence that exists externally to it... There are far too many antecedents, component parts, active forces, subdivisions of general laws, and precise relationships in the nature of things that would otherwise be too disjunctive of one another unless harmonized into a functioning whole" (Horigan 1979, 27-28).

So the main thrust is that this world seems unable to provide any principle of unity for itself. All the specific and contingent facts about the universe could be brute facts but this complexity calls for explanation. There are simple *kinds* of particles, & each kind consists of numerous particles. Their

behaviours conform to simple formula but their histories actually consist of distinct, unrelated moments. So this conformity is indeed surprising. It is the fact that the complex spatio-temporal universe can conform to simple formula which demands explanation.

The refusal to seek explanation for order is counterintuitive: "when we are confronted with orderly arrangements of things where there might have been chaos, and unless we have positive evidence that no intelligence has brought them about, we simply do seek to account for them with reference to intelligence. Numbers on a set of 50 pages could be set down in a totally random way; but once we discover that they can be regularly translated into something strongly resembling a language, we presume that we are dealing with a code... Musical notes could be written down in a totally random way; but if they can be read so as to produce a symphony when played, we call the notes a score" (B Davies 1982, 59). Hence the explanation of world order by Mind is supported by our experience. It also has a theoretical virtue: it achieves a simplification in explanation. Scientific explanation is only possible because of a personal act of God. Ultimately there's only one kind of explanation instead of two, but scientific explanation is in no way denied its validity.

The Explanatory Sterility of the Immanent Order Thesis

The reasons adduced by Philo for favoring the immanent order hypothesis are basically two: first, there is no gain in going beyond the immanent order by appealing to God; second, it seems better to stop earlier. Both replies are problematic. If we posit the natural order as the ultimate brute fact, then it means that logically speaking, there could be no answers to further questions about the particular shape of this natural order. But there are facts about this interesting, creative, & amazing order which naturally cry out for explanation. Let us accept some kind or other of immanent order as a brute fact. But we can't help ask why this order is mathematical, & amenable to the quest for scientific intelligibility by mere humans thrown up accidentally by the cosmic process. Also: why should mind, moral values & the quest for meaning emerge from this cosmic process? Why should the natural order be so beautiful at so many levels? Why should the natural order be hierarchical & immensely creative? Why should matter possess such inherent powers to make the emergence of CSPSs possible? The phenomena of fine-tuning tell us that all these should not be expected, but they did happen. So all these again are brute facts? Even Gaskin admits that this idea of immanent principle of order "is not even very satisfactory for the sceptic. It is just to acknowledge that order does somehow inhere in nature & we can *all* agree to that" (Gaskin 1978, 36).

The Quest for Depth & Intelligibility in Science: Constructive Empiricism versus Scientific Realism

If it is really better to stop earlier in our quest for explanation & intelligibility, then there is no guarantee that we will stop at the "right" place as conceived by the naturalists (in what follows I simply assume that it is better to accept scientific realism instead of antirealism- this is a big question which I cannot go into in this paper). Philo wants to "limit all our enquiries to the present world" (Gaskin 1978, 34). But the problem is: there are different interpretations of "the present world." Consider the debate between the constructive empiricists & scientific realists. They all say they limit enquiries to the present world, but by the present world one side means the observable regularities within our common experiences, & the other side includes the depth dimension of the world- the unobservables like black holes & quarks. Suppose we

have *all* the facts about regularities & we also have deeper theories to explain them, but we have no direct experiences to prove those deeper theories. Those theories are not known independently & can predict no new facts on the empirical level (because all have been known). So according to Philo's principle, there is no need for deeper theories & hence it is better to stop earlier at the level of empirical regularities instead of going beyond them to the deep structure of nature. But this conclusion does not seem right & the victory claimed by the antirealists seems to come by too easily. So I suggest there is something wrong with Philo's principle.

To sustain the scientific project, we do need something like the Presumption of Intelligibility. Otherwise it is difficult to explain the point of scientific explanation itself. If by explaining a particular event, we need to postulate some initial conditions plus some general laws, but in the end we may not be able to further explain those initial conditions plus some general laws, then there is also no overall gain in intelligibility in the end. Why not abandon the project of scientific explanation & stop the quest from the beginning? This is indeed the argument of van Fraassen: we'd better stop at the level of empirical regularity. No depth of explanation is required. So there is also some kind of regress argument against scientific realism.

Even before van Fraassen, the phenomenologists have already insisted on not going beyond the empirical level. For example, Ernst Mach thinks that "in the case of the mechanical molecular theory- the investigator has done more than science, whose aim is facts, required of him- & this work of supererogation is an evil... molecules are merely a valueless image"! (quoted in Nagel 1961, 126, n. 17). At one time, some scientists such as Rankine favor abstractive theories over hypothetical ones due to former's "freedom from assumption about 'occult' components of physical phenomena" (Nagel 1961, 126). However, the "subsequent history of physics has not confirmed Rankine's claims concerning the superior merits of abstractive theories. Indeed, the impressive successes of atomistic theories of matter in predicting new phenomena & in unifying systematically large parts of physics & chemistry have persuaded many distinguished scientists that one must turn from abstractive to microscopic theories for a 'deeper' understanding" (Nagel 1961, 126). This example suggests that it is important to develop the depth dimension of science. The refusal to search for deep explanations in the remote areas exactly seems to be the logical consequence of Philo's epistemic pessimism.

In 1600, "physicists gave different accounts why unsupported bodies near the surface of the earth move vertically to the ground... & why planets move along closed curves symmetrical about at least two axes... Kepler thought that the force of gravity between material bodies was what explained both types of movements" (Schlesinger 1988, 129). For Aristotelians, the terrestrial motion is not surprising because "Whatever moves is bound to move along *some* curve." For Kepler, there is "a remarkable conjunction of two different classes of objects: the movement of terrestrial bodies, as well as the movement of celestial ones." Hence we need "to explain what could otherwise legitimately be regarded as a puzzling phenomenon" (Schlesinger 1988, 130).

Note that one who upholds Flew's Stratonician Atheism or Philo's Immanent Order Thesis²² can say that

²² Hume is in fact deeply impressed by Strato as shown in his early notes.

if bodies on earth are observed to fall to the ground, then we can assume that these powers are natural to them & belong to their intrinsic nature. Similarly we can say that for the planets moving in curves, they can just do that. So there is no need of a higher level of explanation at all! The discovery of universal gravitation would then be impossible! This example also shows that there should not be any prohibition of deeper explanations. This prohibition would make modern science impossible. Similarly, there are good reasons to search for the wonderful order & design in our universe. It is rather implausible to say it just happens. If Philo's arguments are correct, we can stop even earlier than the pervasive order of the world. All these consequences may not be welcome by the critics of the DA.

Critical Evaluation of the Epicureanism/Chance Objection

Sometimes Philo says: "Chance has no place... Every thing is surely governed by steady, inviolable laws... Instead of admiring the order of natural beings, we should clearly see that it was absolutely impossible for them, in the smallest article, ever to admit of any other disposition" (DNR, 148). However, in other places, Philo uses chance to explain order: "The continual motion of matter... in less than infinite transpositions must produce this economy or order, and by its very nature, that order, when once established supports itself for many ages if not to eternity." This can be called an Epicurean hypothesis.

First, it has to be noted that it is a mere possibility. No analogy can be produced to show how chance can throw up a thing as complex as a human brain because all chance explanations have to postulate a very long time for this feat. So we can never observe that analogy. Neither do we have any experience analogical to chance production of an orderly cosmos. Paley asks, "What does chance ever do for us? In the human body, ... chance ... may produce a wen, a wart, a mole, a pimple,, but never an eye. Amongst inanimate substances, a clod, a pebble, a liquid drop, might be; but never was a watch, a telescope, an organized body of any kind, answerable to a valuable purpose by a complicated mechanism, the effect of chance. In no assignable instance hath such a thing existed without intention somewhere" (Paley 2006, 38).

So in this aspect, the chance hypothesis is inferior to the DA which has basis in our experiences. Since mere possibility does not establish actuality, we have to see whether chance can really explain all the data, whether the time is enough for this chance process, etc. All sorts of questions have to be asked. Many philosophers have supposed that biologists and astronomers have produced full explanations by chance of the biological order and astronomical order respectively. Hence all DA's fail automatically. This is to confuse possibility with plausibility. For example, there are many theories about the emergence of the first self-replicating system. However, if we think that none of them has any solid evidence or plausible mechanism (it seems to me this is the case), why are we obliged to accept them?²³

²³ Concerning the difficulties of explaining the origin of life, see Davies 1998; Dembski & Wells 2008; Fry 2000; Overman 1997; Rana & Ross 2004.

Second, Hume's suggestion is not very clear. What does he postulate in the beginning- what kinds of matter? particles? Do they have definite properties or not? Are their motions governed by natural laws? What kind of order is it supposed to be produced by chance? The spatial order or not? Hume's hypothesis has to be spelled out more clearly to be convincing. Gaskin thinks that "the account of order is confined to the origin of settled structures... But the difficulty becomes acute if we ask of the processes themselves how they could have evolved out of a state in which there was neither mechanical nor statistical order... Hume seems to be thinking not of a world of total disorder, but of one comprising matter behaving in accordance with fundamental physical laws though having no fixed or semi-permanent structures... In this weak interpretation, his hypothesis would account for the development of structures but not for the regular processes" (Gaskin 1978, 38). If this interpretation is correct, then the chance objection would not affect the DA qua order & the DA qua purpose which is based on fine-tuning of natural laws. It would only affect the DA qua purpose on the basis of biological design, even *if* the chance explanation is credible. But this is a big if. For example, Paley contemplates the chance formation of complicated machines like watches & steam-engines in this fashion: "a mass of metals & other materials having run when melted into all possible figures, & combined themselves in all possible forms & shapes & proportions, these things which we see, are what were left from the accident, as best worth preserving; &, as such, are become the remaining stock of a magazine, which ... has, by this means, contained every mechanism, useful & useless... I cannot distinguish the hypothesis as applied to the works of nature, from this solution, which no one would accept, as applied to a collection of machines" (Paley 2006, 40).

Perhaps Hume really thinks that we can use chance to explain the apparent existence of natural laws: "There are in fact no natural laws. Matter just happens to behave regularly in times coincident with human history. For example, apples can fly upwards, sideways and downwards randomly after being released in air. By chance, however, they all fall downwards in such a way that Newton's laws are true during these several thousand years." Well, what can we say to that? It's surely logically possible but it doesn't seem plausible at all. This way of argument can knock down almost every argument. We can never call a man liar because even though he did apparently lie a thousand times, it is possible that by chance every time he tells the truth, but we believe in the wrong thing or are being deceived by others, etc. I think it's fair to ask a critic of the DA to substantiate this alternative before presenting it as a threat to DA.

Conclusion

It seems to me that if we adopt a reasonable standard for plausible arguments & refrain from imposing some unrealistic demands which cannot even be satisfied by our common sense & scientific arguments, then all of Philo's objections to the DA appear to be far from conclusive. Many of them in fact are quite weak. Moreover, no better alternative to the DA has been offered by Hume to explain the world order together with its marks of design. As a conclusion, I think the claim that Philo has offered conclusive & devastating criticisms of the DA is simply false. Of course, there are also updated criticisms of DA which need to be dealt with, e.g., the multiverse hypothesis. So the debate will go on, but any premature farewell to the DA is unwarranted.

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