

**INTELLIGENT DESIGN: DEFINITION.** Individual intervention: each observable event is a direct result of God's intervention. Single intervention: God decrees laws that 'produce' individual processes. The difference can be paraphrased in terms of explanation. Intelligent design: each complex adaptation is a direct result of God's intervention. Theistic evolutionism: God decrees sets in motion evolutionary processes that are responsible for complex adaptations. Theistic evolutionism is a thesis about the origin of the universe, and is consistent with the atheist evolutionary theory.

**BACKGROUND: AQUINAS** Darwinism does not dismiss the functionalist way of speech. So from the point of view of evolutionary biology, adaptations have certain functions. This is unlike natural science where teleology was dismissed. But we must distinguish, as, for example, Aquinas did not, between necessity and probability:

- (1) If a mindless system appears teleological, it *must* have been made by an intelligent designer. [Rejected]
- (2) If a mindless system appears teleological, it *probably* was made by an intelligent designer.

**PALEY: WATCHES, HEATH, EYES.** Suppose we find a rock on the ground. Then one might well say it was there by accident (by chance). Suppose now I find a watch. Then it makes no sense to say it was there by chance. But why? Paley argues that we can perceive and understand the purposeful nature of the watch. Similarly, eyes have purposeful nature. Just like watches, eyes were planted by an intelligent designer.

Let us examine this argument probabilistically:

- (1)  $P(H|E)$ : posterior probability of  $H$ . That is, the probability of the hypothesis  $H$  given the evidence  $E$ .
- (2)  $P(E|H)$ : likelihood of  $H$ . That is, the probability of the evidence  $E$  given the hypothesis  $H$ .
- (3) Bayes's Theorem:

$$P(H|E) = \frac{P(H)P(E|H)}{P(E)}.$$

We must now formulate the claim that one hypothesis is probabilistically better than another. One way to do this is to state:

$$P(\text{ID}|O) \gg P(\text{Chance}|O).$$

But this involves assessing priori probabilities  $P(\text{ID})$  and  $P(\text{Chance})$ . How can we determine these probabilities?

**LIKELIHOOD PRINCIPLE.** Observation  $O$  supports hypothesis  $H_1$  more than it supports  $H_2$  just in case:

$$P(O|H_1) > P(O|H_2).$$

This is a claim of how to interpret evidence: namely, how much empirical support a hypothesis gets from the given observation. The probability  $P(O|H)$  should not be confused with the probability  $P(H|O)$ . The latter is a key concept of the Bayesian approach. In the posterior probability we evaluate the probability of a hypothesis *given* the already available evidence. In the likelihood probability we evaluate the probability of the event *given* the hypothesis.

*Example 1.* We can illustrate the relation between  $P(H|O)$  and  $P(O|H)$  as follows. Suppose I am driving on the Eskişehir highway and the lights are out. This is our evidence  $O$ . This event would be expected, i.e. unsurprising if the aliens were charging their spaceship batteries from the Ankara city power station (hypothesis  $H$ ). So  $P(O|H) \approx 1$ . However,  $P(H|O)$  is still very low. Intuitively, the evidence need not increase the probability of my inane hypothesis. Why? Because it is too inane. Formally:

$$P(H|O) = \frac{P(O|H)P(H)}{P(O)} \text{ and } P(H) \approx 0.$$

Of course, this requires us to assign prior probabilities to hypotheses (and on what basis?).

The likelihood principle departs from the influential Bayesian approach. It does not tell you which hypothesis you ought to believe, or which hypothesis is likely to be true. All it does is tell us how observations 'discriminate' between hypotheses. (Though, as far as I can tell, the same can be said of the principle based on posterior probabilities.)

It is useful to think of likelihoods as reflecting the surprisingness of a given event. In particular, we get: Observation favours Intelligent Design over Chance if and only if  $P(O|\text{ID}) \gg P(O|\text{Chance})$ . But we won't be able to conclude whether design is more or less probable than chance. To do that we would have to evaluate the *prior* probabilities of these hypotheses, and this cannot be done (according to Sober, not according to Bayesianism).

**THE LIKELIHOOD VERSION OF ID: CLARIFICATIONS.** In other words, we can put the disagreement schematically as follows:

- (1) ‘Orthodox Darwinism’:  $P(O|Darwin) \gg P(O|ID)$ .
- (2) Creationism:  $P(O|ID) \gg P(O|Darwin)$ .
- (3) Sober: one conclusion is that there is *some* designer, another conclusion is that there is the *perfect* designer. Paley can only establish the first conclusion.

The Likelihood Principle does not rely on inductive reasoning. It should separate between the claim ‘There is a designer’ and the claim ‘There is a designer who is *F* (perfect, just etc.).’ [But some of his properties must be assumed. . . ] In general, the design argument has two premisses: that  $P(O|Chance)$  is very low and that  $P(O|ID)$  is higher.

Is  $P(O|Chance)$  very low? It is highly probable that the universe has order and adaptation somewhere. But it is highly improbable that the universe has order and adaptation *here*. Compare the inverse gambler’s fallacy:

$$P(6 \star 6(\text{now})|Many \text{ rolls}) > P(6 \star 6(\text{now})|One \text{ roll}).$$

This claim is false. This is because the rollings of dice are stochastic: their probabilities are insensitive to the state of the system in the past. But:

$$P(6 \star 6(\text{sometime})|Many \text{ rolls}) > P(6 \star 6(\text{sometime})|One \text{ roll})$$

is true.

This result is irrelevant, however: we observe *our* planet, so the likelihoods of the two hypotheses should be judged equal.

To make the design argument work, we need to make assumptions about the designer. Perhaps he was incompetent and could not create the vertebrate eye. Or perhaps he was not interested. Or perhaps he was. And so forth.

Herein is a lack of analogy with the watch on the heath where we assumed the existence of a human designer with transparent goals and abilities. The moral we are to draw is to assume the existence of such a designer whose goals/abilities we understand.

Gould’s panda argument is vulnerable to the same criticism:

- (1) Pandas have a thumb serving them to peel off bamboo.
- (2) This thumb is an imperfect tool.
- (3) This fact sits well with the evolutionary theory: adaptations are often imperfect.
- (4) So  $P(\text{Thumb}|ID) < P(\text{Thumb}|Evolution)$ .

But this assumes that we know why the designer would design such a thumb. I.e. we reason (probabilistically): the designer should have wanted to make panda’s life easy, but the thumb does not make it so, so there is no designer. The assumption is unjustified, since we may be in the dark about the designer’s goals. Also: The designer need not be perfectly competent either (as in the Hitchhiker’s Guide to the Galaxy).

YSB