two design arguments: complex adaptations and fine-tuning

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the two

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- The organismic design argument – Organisms have complex adaptations. This couldn't have happened by a mindless process.
- The fine-tuning argument – If the values of the physical constants were even slightly different, no life could exist in the universe. This couldn't have happened by a mindless process.

Outline

1 Adaptations of organisms here on earth:
ID versus Evolutionary Theory

2 The physical constants that characterize the whole universe: ID versus chance, the multiverse, and observation selection effects.

ID before and after Darwin (1859)

- William Paley (1802) in *Natural Theology:* the rock, the watch, and the eye.

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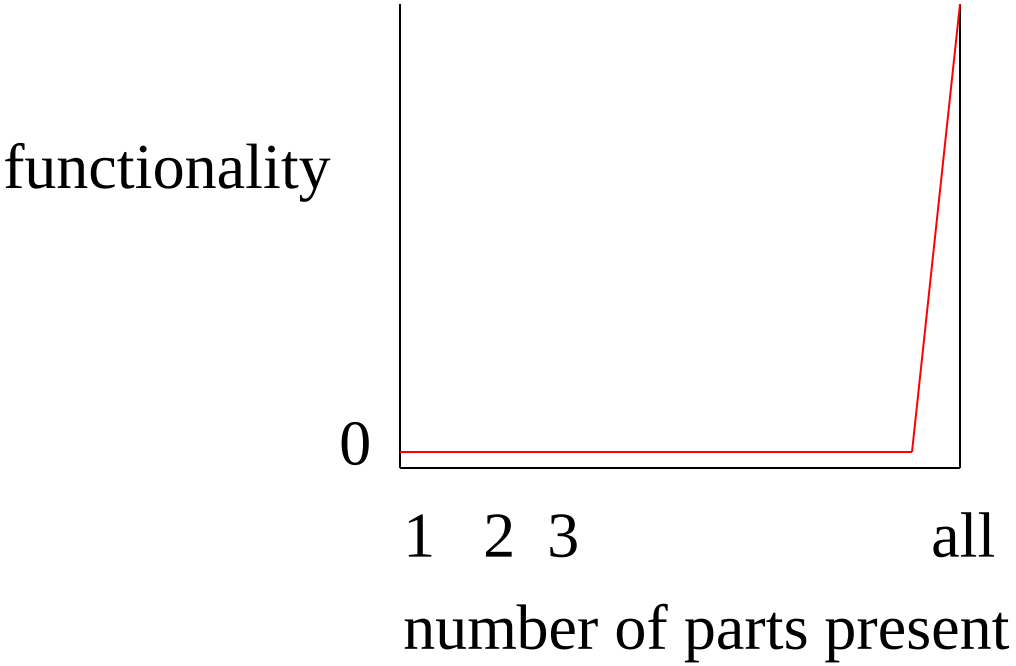
Paley and Behe's claim:

Complex adaptations cannot evolve by mindless processes; an IDer must be doing the work.

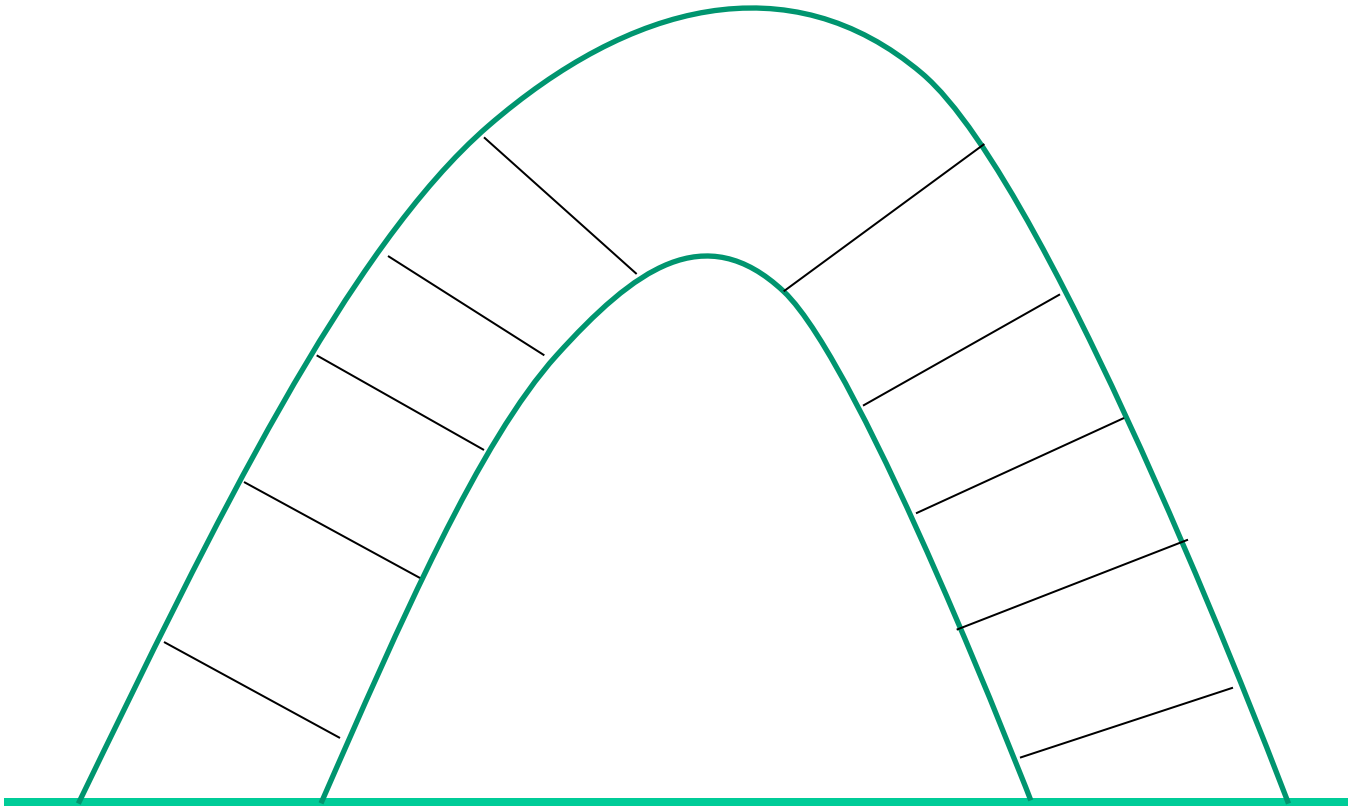
Darwin’s gradualism

“If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find no such case.”

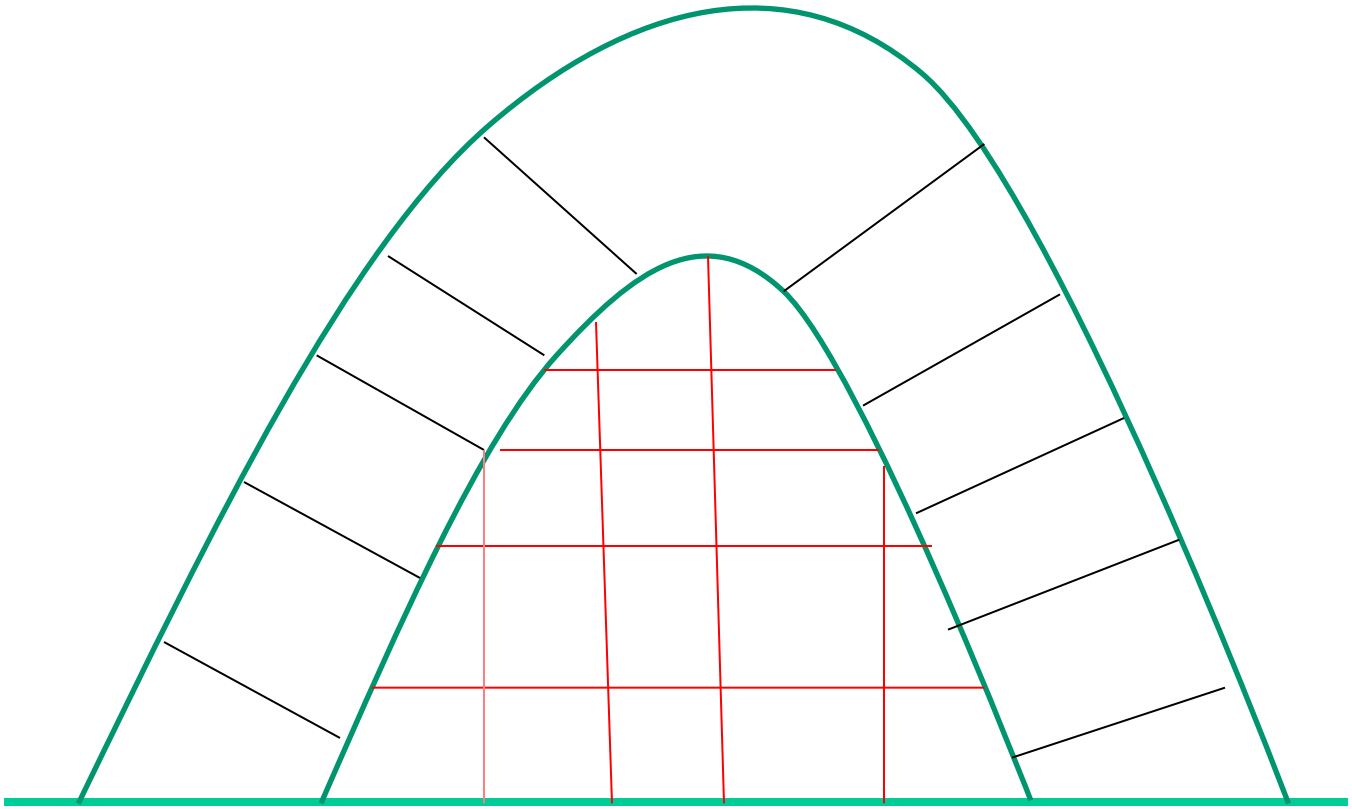
The Paley/Behe picture of a "delicate" adaptation



building an arch without mortar, one part at a time

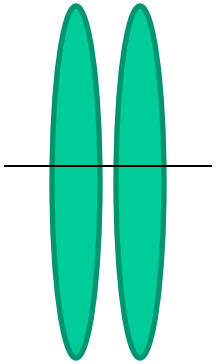


by adding and subtracting



A genetic example

Chromosomes in many species come in pairs.

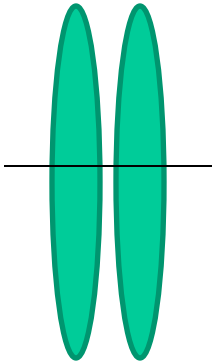


AA, Aa, aa

At a given “locus”, an individual will have two copies of gene A, or one, or zero.

A genetic example

Which pair of genes you have is your genotype.



AA, Aa, aa

At a given “locus”, an individual will have two copies of gene A, or one, or zero.

Genetic change in a population

Change in genotypes present

aa → aa,Aa → aa,Aa,AA → AA

100%a → 50%a , 50%A → 100%A

Change in gene frequencies

Can this happen if Aa individuals are not viable?

Change in genotypes present

aa → aa,Aa → aa,Aa,AA → AA

100%a → 50%a,50%A → 100%A

Change in gene frequencies

Yes, by adding and subtracting

	aa	Aa	AA
bb	**0.1**	**0**	**0.7**

Cell entries are an individual's chance of surviving.

Yes, by adding and subtracting

	aa	Aa	AA
BB	**0.3**	**0.4**	**0.5**
Bb	**0.2**		**0.6**
bb	**0.1**	**0**	**0.7**

Cell entries are an individual's chance of surviving.

Summary of Part I

- The Design Argument for the existence of God says that complex adaptations cannot be created by a mindless process.

- Darwin's theory of natural selection embraced gradualism.

- It might seem that a "delicate" adaptation cannot evolve gradually, but this is wrong if the trait evolves by adding and subtracting.

End of Part I !

the 2nd design argument

The organismic design argument – the complex adaptations of organisms here on earth are due to intelligent design, not to the mindless process of evolution.

The fine-tuning argument – the physical constants have values that permit life to exist; if they were even a little different in their values, no life could exist. So …

the physical constants

- The ratio of the strength of gravity to that of electromagnetism
- The strength of the force binding protons and neutrons into atomic nuclei
- Relative strengths of gravity and the expansion energy in the universe.
- Etc.

“fine-tuning”

If these physical constants were even a tiny bit different in their values, there would be no life in the universe.

The question: how are we to explain the fact that the physical constants are “right for life”?

a tool for comparing hypotheses

O: The two student essays match.

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H1: The students plagiarized from a file they found on the Internet.

H2: They worked separately and independently.

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the Law of Likelihood: observation O favors H1 over H2 precisely when

$$Pr(O \mid H1) > Pr(O \mid H2)$$

another example

H1: the urn contains 50% green balls.

H2: the ball contains 2% green balls.

another example

H1: the urn contains 50% green balls.

H2: the ball contains 2% green balls.

O: 60 of the 100 balls drawn are green.

another example

H1: the urn contains 50% green balls.

H2: the ball contains 2% green balls.

O: 60 of the 100 balls drawn are green.

$Pr(O|H1) > Pr(O|H2)$

A cosmic design argument

Suppose that

Pr(the constants are right for life | ID) is high.

What follows from this? Is this evidence for the ID hypothesis? What does the Law of Likelihood say about this question?

ID = an intelligent designer made the universe.

a simple fact about the LoL

You can't assess what an observation says about a single hypothesis. You need at least **two** hypotheses! The Law of Likelihood is all about discriminating between hypothes**es**.

the first alternative hypothesis: Chance

The Chance hypothesis says:
There is just one universe (ours)
and the values of the physical constants
are due to chance.

the first alternative hypothesis: Chance

Compare:

$$\Pr(\text{constants in our U are right for life} \mid \text{ID})$$

and

$$\Pr(\text{constants in our U are right for life} \mid \text{Chance})$$

the first alternative hypothesis: Chance

$$\Pr(\text{constants in our U are right for life} \mid \text{ID})$$

$$>$$

$$\Pr(\text{constants in our U are right for life} \mid \text{Chance})$$

the second alternative hypothesis: the multiverse

The Multiverse hypothesis says:
There are many universes and each has
the values of its physical constants set by chance.

the second alternative hypothesis: the multiverse

Compare:

$$\Pr(\text{constants in our U are right for life} \mid \text{ID})$$

and

$$\Pr(\text{constants in our U are right for life} \mid \text{multiverse})$$

the second alternative hypothesis: the multiverse

$$\Pr(\text{constants in our U are right for life} \mid \text{ID})$$

$$>$$

$$\Pr(\text{constants in our U are right for life} \mid \text{multiverse})$$

A new wrinkle:
observation selection effects

What's an observation selection effect?

You are using a net to fish in a lake and observe that the fish in your net are all over 10 inches in length.

You consider two hypotheses:

(H1) All the fish in the lake are over 10 inches in length.
(H2) 10% of the fish in the lake are over 10 inches in length.

Using the Law of Likelihood

(H1) All the fish in the lake are over 10 inches in length.

(H2) 10% of the fish in the lake are over 10 inches in length.

You may be tempted to conclude that

$$\Pr(\text{all the fish in the net are over 10 inches} \mid H1) > \Pr(\text{all the fish in the net are over 10 inches} \mid H2)$$

But then you notice …

The holes in the net are 10 inches across!

This means that what you observe (that all the fish in the net were over 10 inches long) was bound to happen regardless of whether H1 or H2 was true.

The likelihoods are equal!

(H1) All the fish in the lake are over 10 inches in length.

(H2) 10% of the fish in the lake are over 10 inches in length.

Give that you used this net,

$$\Pr(\text{all the fish in the net are over 10 inches} \mid H1) = \Pr(\text{all the fish in the net are over 10 inches} \mid H2)$$

The likelihoods are equal!

(H1) All the fish in the lake are over 10 inches in length.

(H2) 10% of the fish in the lake are over 10 inches in length.

Give that you used this net,

$$\Pr(\text{all the fish in the net are over 10 inches} \mid H1) = \Pr(\text{all the fish in the net are over 10 inches} \mid H2)$$

The net induced an observation selection effect!

back to fine-tuning…

Given that we are observing the values of the physical constants, they are bound to be right for life, regardless of whether ID is true!

back to fine-tuning…

Given that we exist, they physical constants in our universe are bound to be right for life, regardless of whether ID is true!

Given that we exist,

$$\Pr(\text{constants in our U are right for life} \mid \text{ID}) =$$

$$\Pr(\text{constants in our U are right for life} \mid \text{Chance})$$

back to fine-tuning…

Given that we exist, they physical constants in our universe are bound to be right for life, regardless of whether ID is true!

Given that we exist,

Pr(constants in our U are right for life | ID) =

Pr(constants in our U are right for life | Multiverse)

Summary of Part II

- The observation: our universe is “right for life.”
- Is this evidence for ID?
- The Law of Likelihood requires that we compare ID to alternative hypotheses.
- The alternatives: Chance, the Multiverse.
- An important consideration: Observation Selection Effects

Final comment

The two design arguments (one organismic, the other cosmological) fail, but this does not show that you should not believe in God.

Thanks!