

THINK THEISM

Welcome to Ratio Christi



at Texas A&M

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RATIO
CHRISTI

Methodology: How Should Carol Respond?

Why should I believe what you're saying is true?

???

Alvin the Atheist

Carol the Christian

"In your hearts honor Christ the Lord as holy, always **being prepared to make a defense to anyone who asks you for a reason for the hope that is in you**; yet do it with gentleness and respect" - 1 Pt. 3:15

The Structure of Classical Apologetics



	General Theism	Christian Specific
Positive <small>(i.e. making the case)</small>	Reasons why God exists	Reasons why Christianity is true
Defensive <small>(i.e. responding to objections)</small>	Responses to arguments for atheism	Responses to arguments against Christianity

	General Theism	Christian Specific
Positive (i.e. making the case)	<ul style="list-style-type: none"> • Arguments for God's Existence • Natural Theology • Cosmological Arguments • Design Arguments ← • Moral Arguments • Ontological Arguments 	<ul style="list-style-type: none"> • New Testament Textual Transmission • Historical Argument for the Resurrection • Reliability of the Bible • Uniqueness of Jesus • Undesigned Coincidences
Defensive (i.e. responding to objections)	<ul style="list-style-type: none"> • Problem of Evil • Divine Hiddenness • Incoherence of theism 	<ul style="list-style-type: none"> • Science vs Faith (e.g. Evolution) • Historical Errors in the Bible • Scientific Errors in the Bible • Contradictions in the Bible • Moral Objections to Biblical Stories • Religious Pluralism vs Particularism

The background features a dark space filled with numerous small white stars. A bright, glowing orange arc, resembling a horizon or a celestial body, spans across the upper half of the image. At the bottom, there is a complex, purple wireframe landscape that looks like a jagged, crystalline terrain or a series of interconnected lines forming a mountainous shape.

Is the Fine-Tuning of the Universe Evidence of Design?

Teleological Arguments for the Existence of God

Methodology: How Should Carol Respond?

The more we can explain with science, the less God is necessary. God is an ever receding pocket of scientific ignorance that gets smaller and smaller as time goes on.

Alvin the Atheist



Surprisingly, contemporary discoveries in the fields of astronomy, cosmology, and high energy physics have revealed delicate complexities in the structure of our universe which elicit metaphysical explanation. The heavens declare the glory of God; the skies proclaim the work of his hands....

Carol the Christian



"In your hearts honor Christ the Lord as holy, always **being prepared to make a defense to anyone who asks you for a reason for the hope that is in you**; yet do it with gentleness and respect" - 1 Pt. 3:15

Roadmap

1

Intro to Design Arguments

General framework and structure of the argument with historical examples.

2

The Fine-Tuning Argument

An exposition of a contemporary design argument from cosmic fine-tuning

3

Objections Considered

Discussion and evaluation of the fine-tuning argument.



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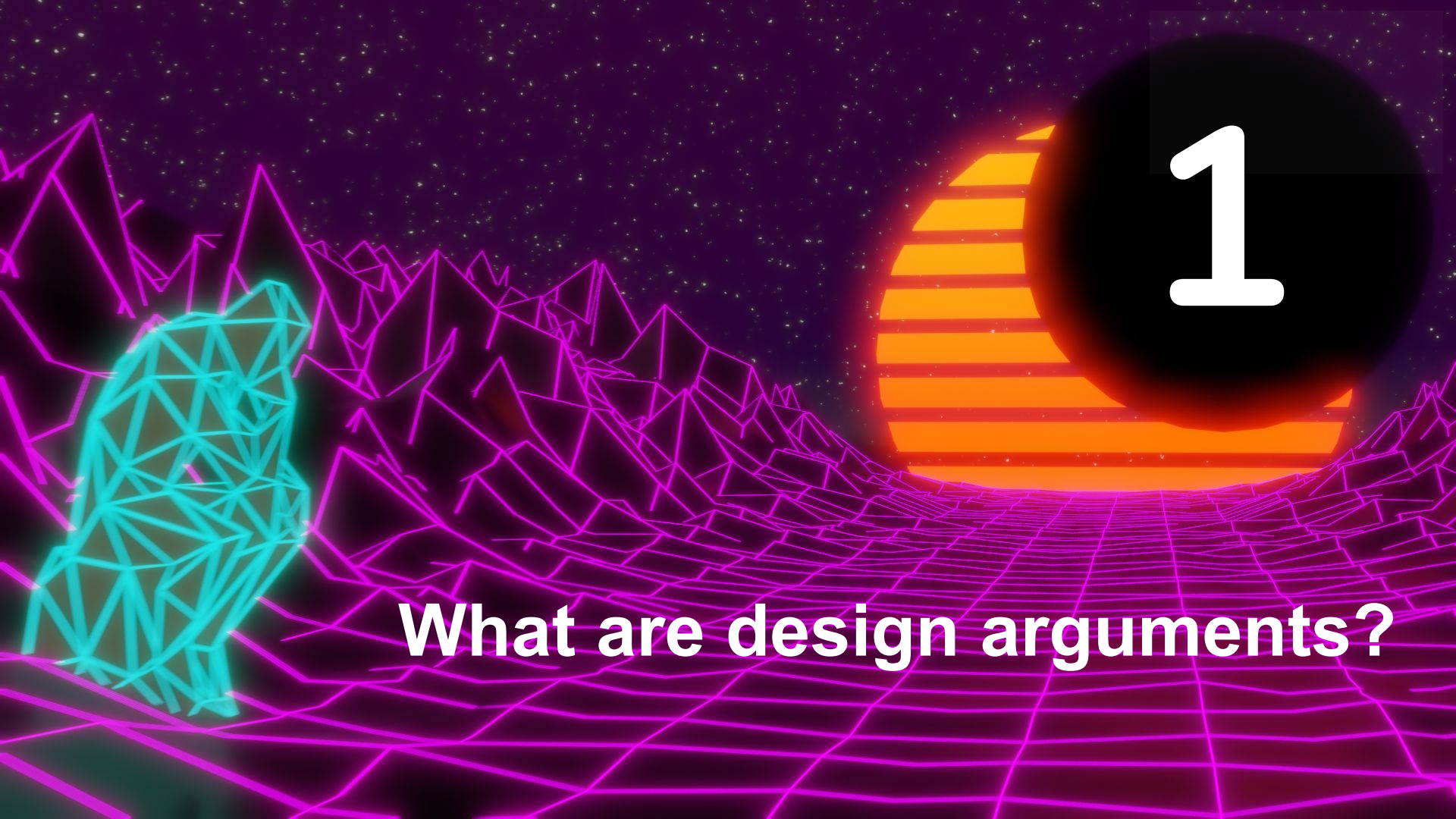
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Discussion and evaluation of the fine-tuning argument.



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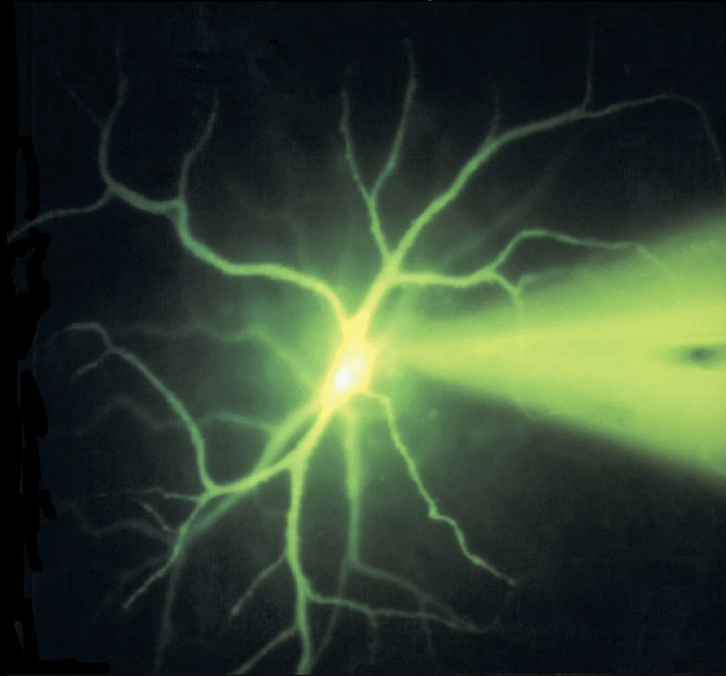
1

What are design arguments?

God and Design

The Teleological Argument and Modern Science

Edited by NEIL A. MANSON



Resource #1

God and Design

(2003), ed. Neil Manson

Recent discoveries in physics, cosmology, and biochemistry have captured the public imagination and made the Design Argument - the theory that God created the world according to a specific plan - the object of renewed scientific and philosophical interest. This accessible but serious introduction to the design problem brings together new perspectives from prominent scientists and philosophers including Paul Davies, Richard Swinburne, Sir Martin Rees, Michael Behe, Elliot Sober and Peter van Inwagen.

It probes the relationship between modern science and religious belief, considering their points of conflict and their many points of similarity. Is the real God of creationism the 'master clockmaker' who sets the world's mechanism on a perfectly enduring course, or a miraculous presence who continually intervenes in and alters the world we know? Are science and faith, or evolution and creation, really in conflict at all? Expanding the parameters of a lively and urgent debate, God and Design considers how perennial questions of origin continue to fascinate and disturb us.

Design Arguments in General

Teleological Arguments (from the Greek “telos” meaning “goal”) reason from seemingly **purposeful** features of the observable world to a supernatural designer.

Eutaxological Arguments (from the Greek “eutaxia” meaning “good order”) reason from the lawful regularity and comprehensibility of the world to the existence of an ordering being.



Warm-up: Basic Structure of a Design Inference

Scenario: Craig is found dead with two 9mm bullets in his back. A 9mm pistol is found near the crime scene with two fired bullets. Fingerprints on the gun match Jones. What does this mean?

**Unique Facts
(Bullets,
fingerprints)**



**Epistemic
Framework**



**This is not due to
chance (Jones
intentionally killed
Craig)**

Basic Structure of the Argument

**Unique
Features of
our Universe**



**Epistemic
Framework**

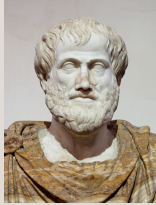


**These Features are
attributable to Design**

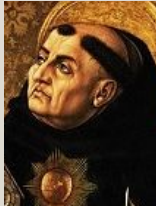
Design Arguments from Aristotle to Aquinas



"For his invisible attributes, namely, **his eternal power and divine nature, have been clearly perceived**, ever since the creation of the world, **in the things that have been made.**" - Apostle Paul, Romans 1:20 (ca. 50 A.D.)



"This is clear most of all in the other animals, which do nothing by art, inquiry, or deliberation; **for which reason some people are completely at a loss whether it is by intelligence or in some other way that spiders, ants, and such things work.** [...] **It is absurd to think that a thing does not happen for the sake of something if we do not see what sets it in motion deliberating.** [...] This is most clear when someone practices medicine himself on himself; for nature is like that." - Aristotle, Physics, II 8. ca (330 B.C.)



"**The fifth way is taken from the governance of the world. We see that things which lack intelligence, such as natural bodies, act for an end**, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence it is plain that **not fortuitously, but designedly, do they achieve their end.** Now whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence... Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God."- Thomas Aquinas, Summa Theologiae Ia, q. 2, a. 3.i (ca. 1270 A.D.)



"**The wonderful beauty and order of the universe is another proof.** For if order requires wisdom and intelligence, the most perfect supposes the most perfectly necessary and infinite wisdom which we call God...**There is so suitable a disposition of parts, so constant a concord of things so discordant...You may say perhaps that these things were so arranged by chance** and my a fortuitous concourse of atoms. But I know not whether such an impious and absurd opinion is worthy of refutation. - Francis Turretin, Elenctic Theology, V1.3 Q1.x-xii (ca. 1680 A.D.)

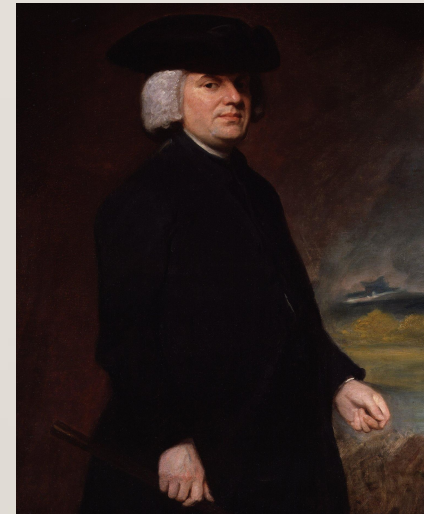
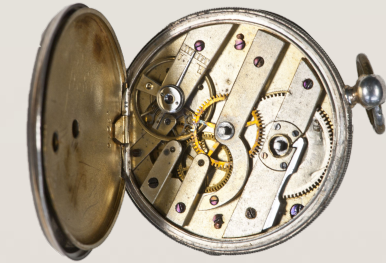
Paley's Watchmaker

"Suppose I found a watch upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think... that, for anything I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for a stone [that happened to be lying on the ground]?... **For this reason, and for no other; namely, that, if the different parts had been differently shaped from what they are, if a different size from what they are, or placed after any other manner, or in any order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it...**

Every indicator of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater and more, and that in a degree which exceeds all computation. I mean that the contrivances of nature surpass the contrivances of art, in the complexity, subtilty, and curiosity of the mechanism; and still more, if possible, do they go beyond them in number and variety; yet in a multitude of cases, are not less evidently mechanical, not less evidently contrivances, not less evidently accommodated to their end, or suited to their office, than are the most perfect productions of human ingenuity.

- William Paley, *Natural Theology*, pg.1,13 (ca. 1802)

"Design Arguments for the Existence of God," by Kenneth E. Himma, *The Internet Encyclopedia of Philosophy*, ISSN 2161-0002, <https://www.iep.utm.edu/design>



Basic Structure of Paley's Argument

Unique Features
of our Universe

Epistemic
Framework

These Features are
attributable to Design

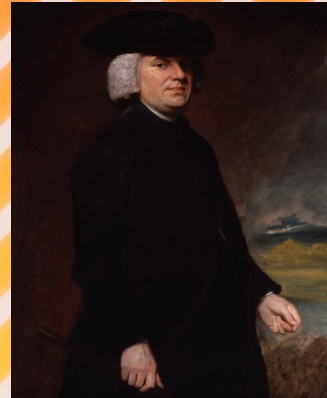
Biological
parts ordered
to a purpose

+

Analogical
relation
(pocket
watch)

→

The biosphere is
intentionally
designed



Hume's House of Analogical Ambiguity

Unique Features
of our Universe

Epistemic
Framework

These Features are
attributable to Design

Biological
parts ordered
to a purpose



Analogical
relation
(pocket
watch)



The biosphere is
intentionally
designed



If we see a house,... we conclude, with the greatest certainty, that it had an architect or builder because this is precisely that species of effect which we have experienced to proceed from that species of cause. But surely you will not affirm that the universe bears such a resemblance to a house that we can with the same certainty infer a similar cause, or that the analogy is here entire and perfect (Hume, Dialogues, Part II).

Darwinism's Blind Watchmaker

Unique Features
of our Universe

Epistemic
Framework

These Features are
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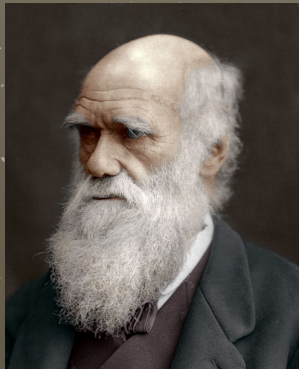
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Analogical
relation
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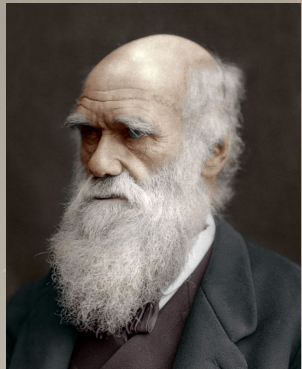
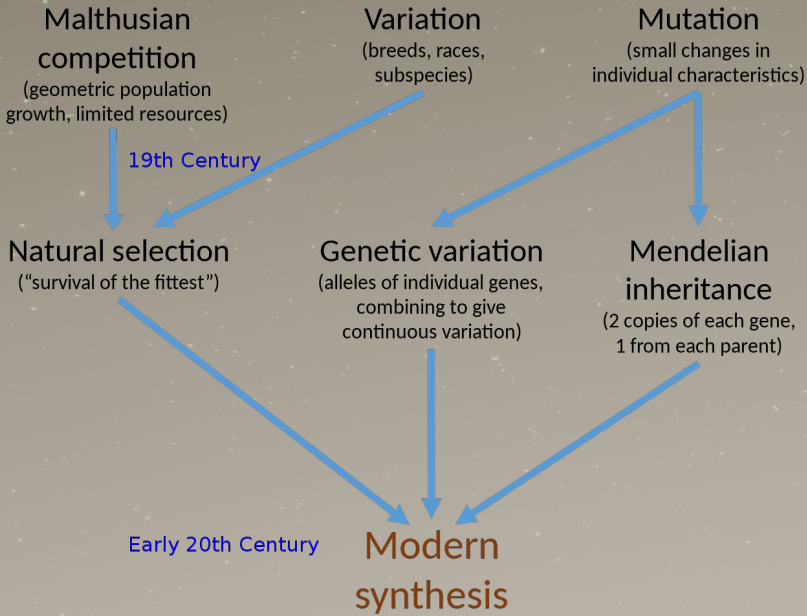


The biosphere is
intentionally
designed



Darwinism's Blind Watchmaker

- 1. Mendelian genetics provided the mechanism of inheritance.
- 2. Population genetics provided the mathematical framework for allele frequency.
- 3. The Modern Synthesis was still committed to Darwin's view of gradualism.



Bowler, Peter J. (1983). The Eclipse of Darwinism: anti-Darwinian evolutionary theories in the decades around 1900. Johns Hopkins University Press. ISBN 978-0-8018-4391-4.

20th Century Developments

1. Bayesian theory testing becomes the rigorous standard in philosophy of science. (1950s-)
2. Evolutionary biology reveals structural and procedural complexity that severely compromises the gradualist tenet of Darwinism. (1960s-)
3. Cosmology comes into its own and reveals a "wider teleology" in the fine-tuning of the Big Bang necessary for the evolution of life. (1970s-)



Check our YouTube channel for last semester's evolution discussion



"The anthropic principle and the structure of the physical world". B. Carr and M. Rees **1979**. Nature, 278(5705), pp.605-612.

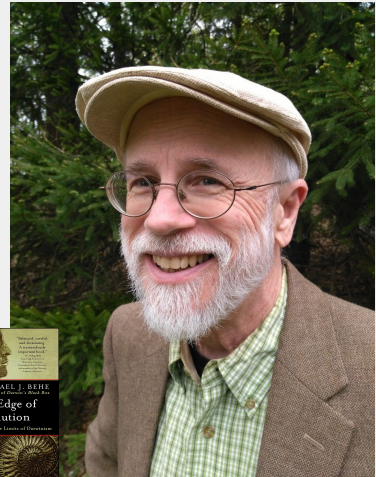
Barnes LA. Fine-tuning in the context of Bayesian theory testing. European Journal for Philosophy of Science. 2018 May;8(2):253-69.

Short Excursus: Intelligent Design

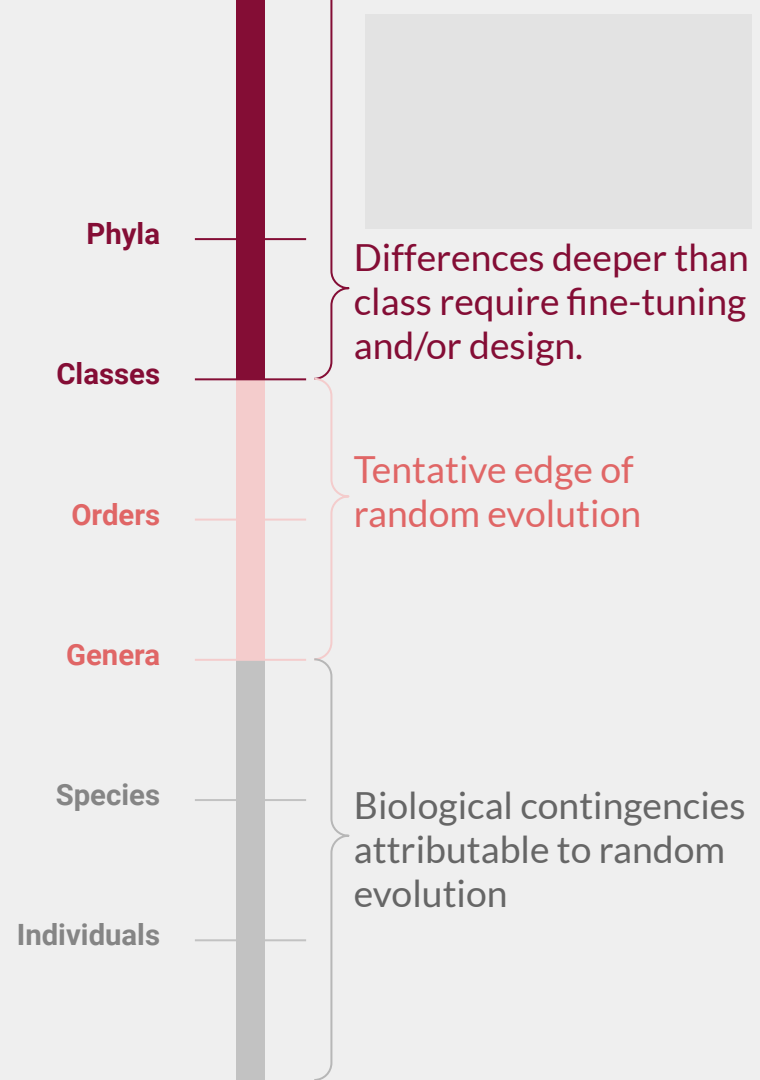
"From what has been learned in the past few decades about the complexity of the genetic basis of animal development, it seems reasonable to think that purposeful design extends into biology at least to the level of the major classes of vertebrates, perhaps further."

- Michael J. Behe

The Edge of Evolution (2007), pg. 217-218



"Michael Behe Interview"
<http://rc-tamu.org/podcast/darwinism-devolving-an-interview-w-dr-michael-behe/>



Phyla

Classes

Orders

Genera

Species

Individuals

Differences deeper than class require fine-tuning and/or design.

Tentative edge of random evolution

Biological contingencies attributable to random evolution

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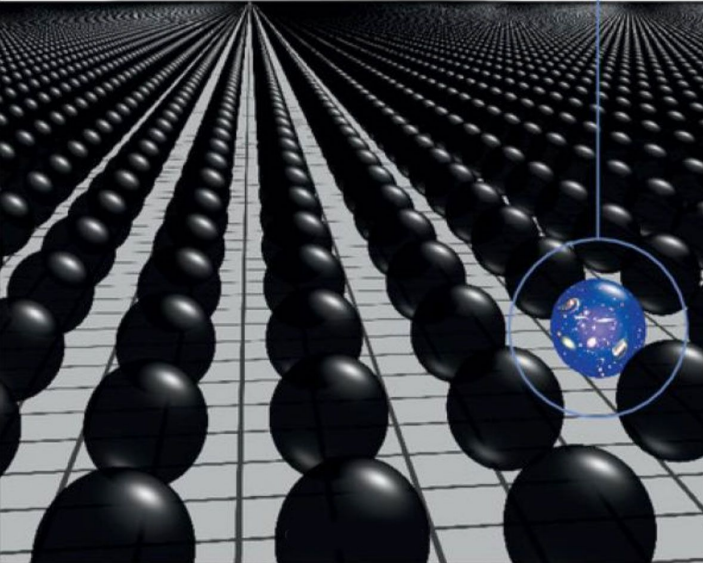
2

**What is the fine-tuning
argument?**

GERAINT F. LEWIS AND LUKE A. BARNES

A FORTUNATE UNIVERSE

Life in a Finely Tuned Cosmos



Resource #2

A Fortunate Universe

(2016), Geraint Lewis and Luke Barnes

Over the last forty years, scientists have uncovered evidence that if the Universe had been forged with even slightly different properties, life as we know it - and life as we can imagine it - would be impossible. Join us on a journey through how we understand the Universe, from its most basic particles and forces, to planets, stars and galaxies, and back through cosmic history to the birth of the cosmos. Conflicting notions about our place in the Universe are defined, defended and critiqued from scientific, philosophical and religious viewpoints. The authors' engaging and witty style addresses what fine-tuning might mean for the future of physics and the search for the ultimate laws of nature. Tackling difficult questions and providing thought-provoking answers, this volumes challenges us to consider our place in the cosmos, regardless of our initial convictions.



Defining Fine-Tuning

(Barnes, 2012): In the set of possible physics, the subset that permit the evolution of life is very small.

(Leslie, 1989): It looks as if small changes in this universe's basic features would have made life's evolution impossible.

(Collins, 2009): The laws and values of the constants of physics, and the initial conditions of any universe with the same laws as our universe, must be set in a seemingly very precise way for the universe to support life.

Despite the metaphor, to say something is “fine-tuned” is **NOT** to say it is “designed”!!



1

Life

Our universe allows for the existence of conscious, embodied, moral agents

2

Tuning

The conditions under which a universe can permit life of any kind are exquisitely fine-tuned

3

Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation

4

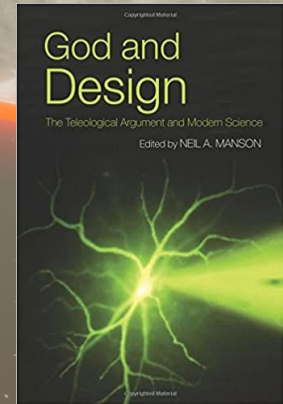
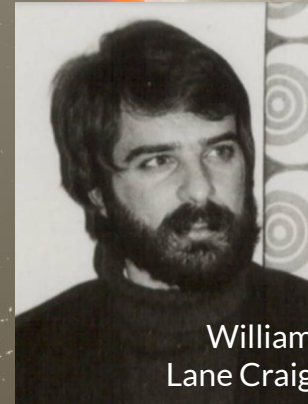
God

The best explanation of cosmological fine-tuning is a designer aka God



Craig's Chance Elimination Formulation

1. The fine-tuning of the universe is due to one of three options:
 - i. **physical necessity**
 - ii. **chance**
 - iii. **design**
2. Fine-tuning is **NOT** due to **physical necessity**
3. Fine-tuning is **NOT** due to **chance**
4. Therefore, fine-tuning is due to **design**.



Barnes's Bayesian Formulation

1. For two theories T_1 and T_2 , in the context of background information B , if it is true of evidence E that

$$p(E|T_1B) \gg p(E|T_2B)$$

then E strongly favours T_1 over T_2 .

2. The likelihood that a **life-permitting universe** exists on **naturalism** is vanishingly small.
3. The likelihood that a **life-permitting universe** exists on **theism** is not vanishingly small.
4. Thus, the existence of a **life-permitting universe** strongly favours **theism** over **naturalism**.



Luke A. Barnes is a theoretical astrophysicist, cosmologist, and postdoctoral researcher at Western Sydney University.

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Our universe allows for the existence of conscious, embodied, moral agents

Uncontroversial

2

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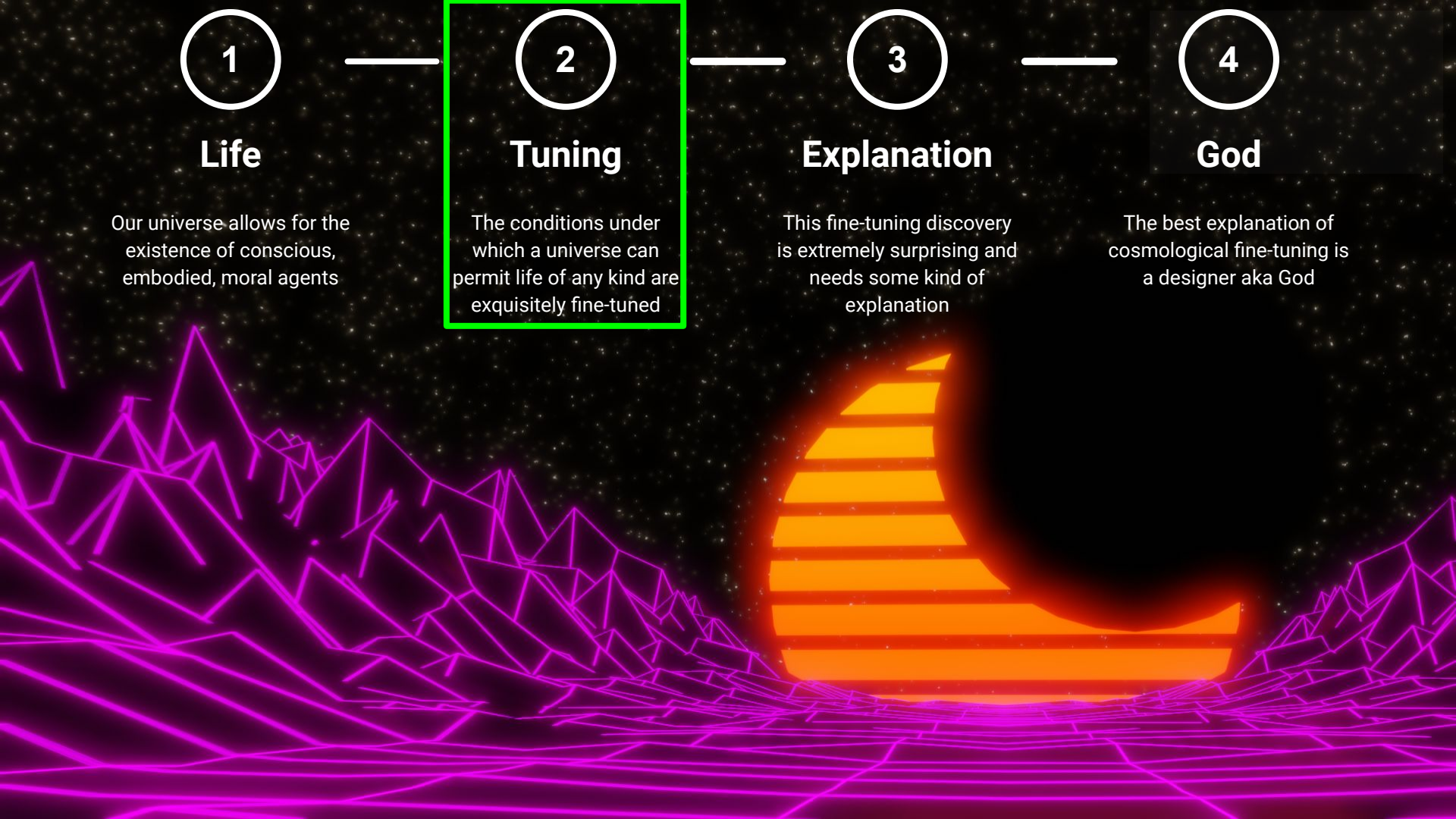
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3 Solid Cases of Fine-Tuning

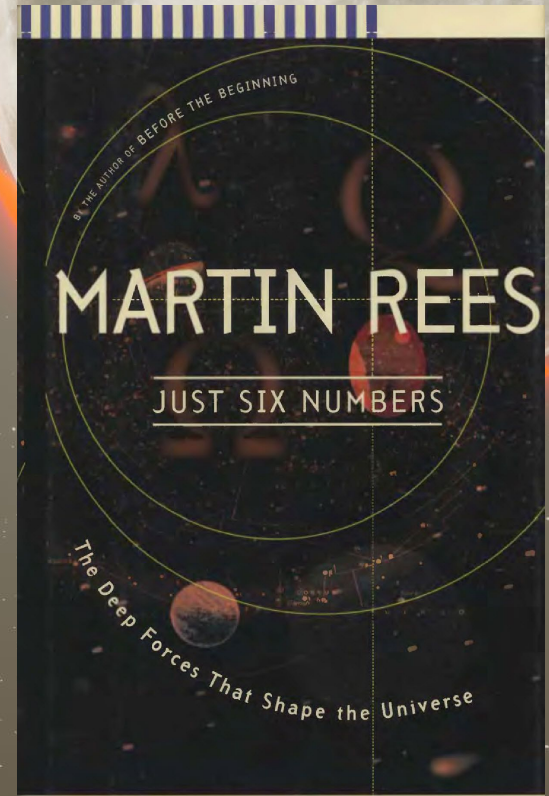
- Cosmological constant*
- Higgs vev
- Yukawa couplings



Cosmological Constant (Λ)

Measuring the [cosmological constant], Λ (lambda) was the biggest scientific news of 1998. An unsuspected new force - a cosmic 'antigravity' - controls the expansion of our universe, even though it has no discernable effect on scales less than a billion light-years...Fortunately for us (and very surprisingly to theorists), Λ is very small. Otherwise its effect would have stopped galaxies and stars from forming, and cosmic evolution would have been stifled before it could even begin.

Martin Rees, *Just Six Numbers* (2000), pg. 3



Cosmological Constant (Λ)

$$\underbrace{\tilde{R}_{ij}}_{\text{Curvature tensor}} - \frac{1}{2} R \underbrace{\tilde{g}_{ij}}_{\text{Metric tensors}} + \underbrace{\Lambda \tilde{g}_{ij}}_{\text{Cosmological constant}} = \frac{8\pi G}{c^4} \underbrace{\tilde{T}_{ij}}_{\text{Stress-energy-momentum tensor}}$$
$$\Lambda_{\text{eff}} = \Lambda_{\text{vacuum}} + \Lambda_{\text{bare}} + \Lambda_{\text{q}}$$

If $\rho_{\Lambda}/\rho_{\text{Planck}} < -10^{-90}$, the universe would re-collapse after 1 second.

If $\rho_{\Lambda}/\rho_{\text{Planck}} > 10^{-90}$, structure formation would cease after 1 second, resulting in a uniform, rapidly diffusing hydrogen and helium soup.

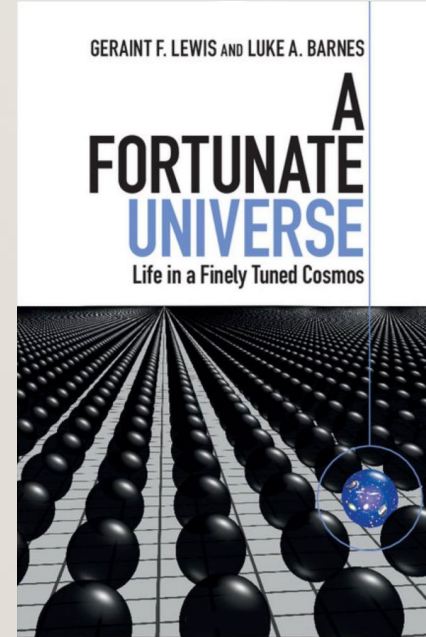
Thus, given a uniform distribution over ρ_{Λ} between the Planck limits $[-\rho_{\text{Planck}}, \rho_{\text{Planck}}]$, the likelihood of a life-permitting value of the cosmological constant is at most 10^{-90} .



Cosmological Constant (Λ)

Why the Cosmological Constant Problem is a Fine-Tuning Perfect Storm

1. It's actually multiple problems. Each quantum field (e.g. electron, quark, photon, neutrino, etc.) contributes enormously to the vacuum energy of the universe.
2. General Relativity won't help.
3. Particle physics (probably) won't help.
4. Quantum gravity (probably) won't help, as the problem extends beyond the Planck scale.
5. Alternative forms of dark energy have the same problem.
6. We can't aim for zero as the universe is accelerating.
7. The quantum vacuum has observable consequences and thus, cannot be dismissed as a useful fiction.
8. The (effective) cosmological constant is unambiguously fine-tuned. There is no simpler way to devoid a universe of life than to devoid it of structure altogether.



Additional Fine-Tuning Evidence

Vacuum expectation value (vev) of the Higgs boson (v): If $v^2/m_{\text{Planck}}^2 < 6 \times 10^{-35}$, then hydrogen is unstable to electron capture; if $v^2/m_{\text{Planck}}^2 > 6 \times 10^{-33}$ then no nuclei are bound and the periodic table is erased. Given a uniform distribution over v^2 between zero and the Planck mass $[0, m_{\text{Planck}}^2)$, the likelihood of a life-permitting value of the Higgs vev is at most 10^{-33}

Up-quark, down-quark and electron Yukawa couplings (y_u, y_d, y_e): this three dimensional subspace and the life-permitting subset is shown in Lewis and Barnes (2016, 256–260), building on Barr and Khan (2007). For stable atoms and stable stars, the region is bounded by:

$$\begin{aligned} 0 < y_u < 3 \times 10^{-5}, \\ 0.7 \times 10^{-5} < y_d < 7 \times 10^{-5}, \\ 3 \times 10^{-9} < y_e < 4 \times 10^{-5}. \end{aligned}$$

For simplicity, set the lower limits to zero. For dimensionless parameters, we expect a distribution that peaks at unity and smoothly decreases away from the peak. Thus, the likelihood of life-permitting up-quark, down-quark and electron Yukawa couplings is at most 10^{-13}



“Why should I believe you, a non-expert?”

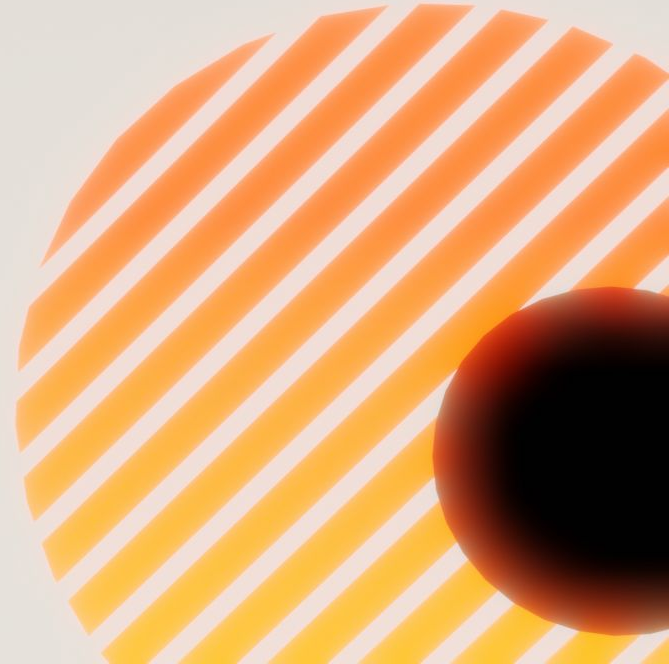
Those are a lot of claims for someone who has zero formal training in cosmology and astrophysics. Why should I believe you?



“Why should I believe you, a non-expert?”

- **Consensus:** The overwhelming majority of relevant experts agree cosmic fine-tuning is a real phenomenon.
- **Independence:** The relevant experts agree on the data despite having drastically different background beliefs (theist, atheist, agnostic, neo-Platonist, etc.)
- **Extravagance:** The multiverse hypothesis is being offered as a mainstream explanation despite its *a priori* extravagance; going to such lengths suggests there is a real phenomenon to be explained.

Caution! Check for consistency! If you use this method for fine-tuning, then use it for evolution, climate change, & other controversial scientific hypotheses.



“Why should I believe you, a non-expert?”

Those are a lot of claims for someone who has zero formal training in cosmology and astrophysics. Why should I believe you?

The broad consensus of professional cosmologists and astrophysicists, irrespective of philosophical leanings, is that there is a fine-tuning problem.



1

Life

Our universe allows for the existence of conscious, embodied, moral agents

2

Tuning

Astrophysicists & cosmologists have come to a fairly solid scholarly consensus that fine-tuning is a legitimate phenomenon.

3

Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation

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The best explanation of cosmological fine-tuning is a designer aka God



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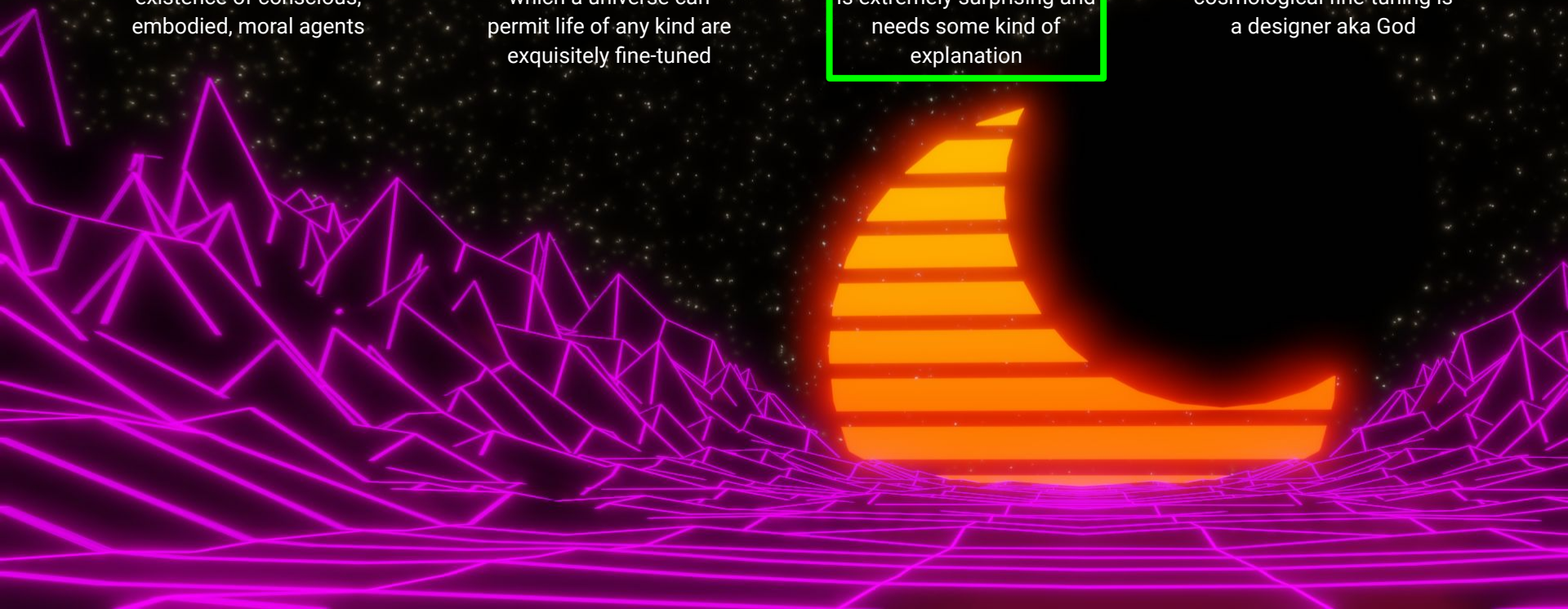
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How Probable is the Evidence given Theory & Background?



A diagram consisting of four arrows pointing from the question above to the corresponding parts of the probability formula below. A black arrow points from 'How Probable' to 'P'. A blue arrow points from 'Evidence' to 'E'. A red arrow points from 'Theory' to 'T'. An orange arrow points from 'Background' to 'B'.

$$P(E | T \& B) = \%$$

Thought experiment: what is the probability that your grandmother has a child?

Weak Anthropic Principle (WAP)

(Barrow & Tipler, 1986): "The observed values of all physical and cosmological quantities are not equally probable but they take on values restricted by the requirement that there exist sites where carbon-based life can evolve and by the requirements that the universe be old enough for it to have already done so."

(Carter, 1983): "[W]e must be prepared to take account of the fact that our location in the universe is necessarily privileged to the extent of being compatible with our existence as observers."

$$P(\text{Observing a LPU} \mid T_n \text{ \& \text{ LPU}}) = 100\%$$



Background Information & Old Evidence

$$P(\text{LPU} \mid \text{N} \ \& \ \text{Life}) = 100\%$$

$$P(\text{LPU} \mid \text{T} \ \& \ \text{Life}) = 100\%$$

LPU = Life Permitting Universe

N = Naturalism

T = Theism



Why the WAP Fails as an Explanation

- 1) Tautological: We only observe what we observe (e.g. distant stars are bright)
- 2) Doesn't bear any explanatory weight (e.g. the sharpshooter story)



Biblical Thought Experiment

The Lord said, “I will surely return to you about this time next year, and Sarah your wife shall have a son.” And Sarah was listening at the tent door behind him. Now Abraham and Sarah were old, advanced in years [90 years]. The way of women had ceased to be with Sarah [i.e. post-menopausal]. So Sarah laughed to herself, saying, “After I am worn out, and my lord is old, shall I have pleasure?” The Lord said to Abraham, “Why did Sarah laugh and say, ‘Shall I indeed bear a child, now that I am old?’ Is anything too hard for the Lord? At the appointed time I will return to you, about this time next year, and Sarah shall have a son.” - Genesis 18:9-15 (ESV)

Properly Scoped Background Information

Biblical thought experiment: What is the probability a 90 yr woman gives birth to a child?

$$P(\text{Child} \mid \text{xyz} \ \& \ \text{Background Info} \ \& \ \text{Child}) = 100\%$$

Background: At age 40, women have ~3% of ovarian reserve which continues to decline logarithmically approaching zero.

$$P(\text{Child} \mid \text{Natural} \ \& \ \text{Background Info}) < 3 \times 10^{-10} \% \quad 0.00000000003\%$$

$$P(\text{Child} \mid \text{Miracle} \ \& \ \text{Background Info}) \cong 100\%$$



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The conditions under which a universe can permit life of any kind are exquisitely fine-tuned

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Explanation

We need to be careful about describing the data to be explained to avoid any tautologies or observer effects

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2

Tuning

The conditions under which a universe can permit life of any kind are exquisitely fine-tuned

3

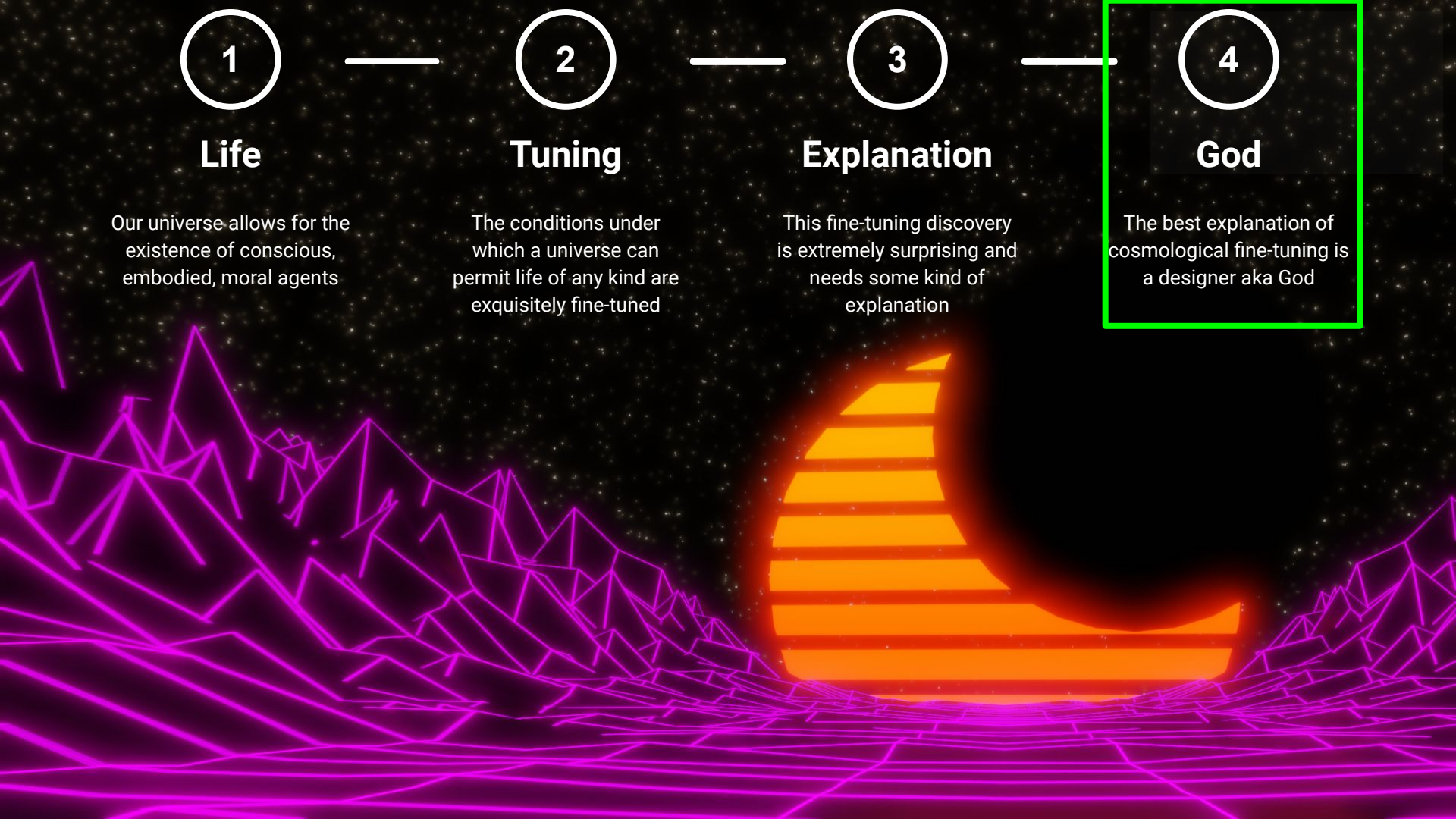
Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation

4

God

The best explanation of cosmological fine-tuning is a designer aka God



Barnes's Bayesian Formulation

1. For two theories T_1 and T_2 , in the context of background information B , if it is true of evidence E that

$$p(E|T_1B) \gg p(E|T_2B)$$

then E strongly favours T_1 over T_2 .

2. The likelihood that a **life-permitting universe** exists on **naturalism** is vanishingly small.
3. The likelihood that a **life-permitting universe** exists on **theism** is not vanishingly small.
4. Thus, the existence of a **life-permitting universe** strongly favours **theism** over **naturalism**.



Luke A. Barnes is a theoretical astrophysicist, cosmologist, and postdoctoral researcher at Western Sydney University.

Barnes's Bayesian Formulation

2. The likelihood that a **life-permitting universe** exists on **naturalism** is vanishingly small.
 - 2.1. To evaluate the likelihood that a life-permitting universe exists on naturalism (and on theism), we should restrict our focus to the subset of possible universes generated by varying the fundamental constants of nature.
 - 2.2. Given our restricted focus, naturalism is non-informative with respect to the fundamental constants.
 - 2.3. Physicists routinely assign non-informative probability distributions to fundamental constants, which we can use to calculate the likelihood that a life-permitting universe exists on naturalism.
 - 2.4. Using these distributions, the likelihood that a life-permitting universe exists on naturalism is vanishingly small (which establishes Premise [2]).



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Barnes's Bayesian Formulation

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Is a LPU Unlikely Given Theism?

$$P(\text{LPU} \mid \text{Naturalism} \ \& \ \text{B}) < 10^{-136}$$

What is the probability, given that God exists and created a universe, that God's primary reason would be to create a life-permitting universe?

Let G_1 be "God exists and created a universe and his primary reason was to create physical life".

$$P(\text{LPU} \mid G_1 \ \& \ \text{B}) \gg 10^{-136} ?$$

Positive arguments for a non-negligible value for $p(G_1 \mid \text{GLB})$ that appeal to God's goodness and the moral worth of embodied moral agents can be found in, for example, Swinburne (2004) and Collins (2009). But even if we consider theism to be completely non-informative about God's possible reasons for creating, we would (in this simple model) not be justified in assigning a probability that is smaller than $\sim 1/n$.

I contend that there are not, in fact, $< 10^{136}$ possible reasons for God to create that have comparable plausibility to that of a life-permitting universe. Unless the naturalist can produce a positive argument (not mere skepticism) to show that $p(G_1 \mid \text{GLB})$ is extremely small, zero, or inscrutable, the likelihood that a life-permitting universe exists on theism is not vanishingly small.





3

**Is the fine-tuning argument
any good?**

What Prominent Atheists Think

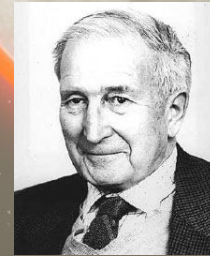


"I think every one of us [atheists] picks the 'fine-tuning' one as the most intriguing...You have to spend time thinking about it, working on it. It's not trivial. We all say that."

- **Christopher Hitchens** (1949-2011)

"There were two factors in particular that were decisive. One was my growing empathy with the insight of Einstein and other noted scientists that there had to be an Intelligence behind the integrated complexity of the physical Universe. The second was my own insight that the integrated complexity of life itself—which is far more complex than the physical Universe—can only be explained in terms of an Intelligent Source."

- **Antony Flew** (1923-2010) on his conversion from atheism to deism



"The teleological argument from fine-tuning: I'm very happy to admit right off the bat – this is the best argument that the theists have when it comes to cosmology. That's because it plays by the rules. You have phenomena, you have parameters of particle physics and cosmology, and then you have two different models: theism and naturalism. And you want to compare which model is the best fit for the data. I applaud that general approach. Given that, it is still a terrible argument. It is not at all convincing." - **Sean Carroll**

Roadmap

1

Intro to Design Arguments

General framework and structure of the argument with historical examples.

2

The Fine-Tuning Argument

An exposition of a contemporary design argument from cosmic fine-tuning

3

Objections Considered

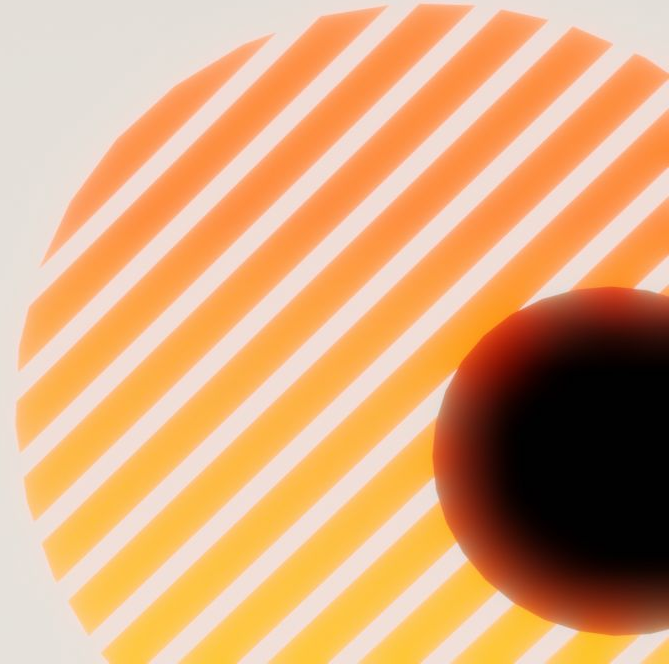
Discussion and evaluation of the fine-tuning argument.



**THINK
THEISM**

Objections to the Fine-Tuning Argument

0. "Ground Clearing" objections*
(based on a misunderstanding of fine-tuning)
1. The Multiverse*
2. Normalizability
3. Deeper Laws
4. God Wouldn't Fine-Tune
5. Too Fine-Tuned
6. Inscrutable God



Ground Clearing Objections

99.99999999999999...% of the universe is deadly and utterly inhospitable. To quote Carl Sagan, we inhabit an incomprehensibly small pale blue dot in a vast cosmos. This is like saying Kyle Field is designed for a single microbe on the bleachers.

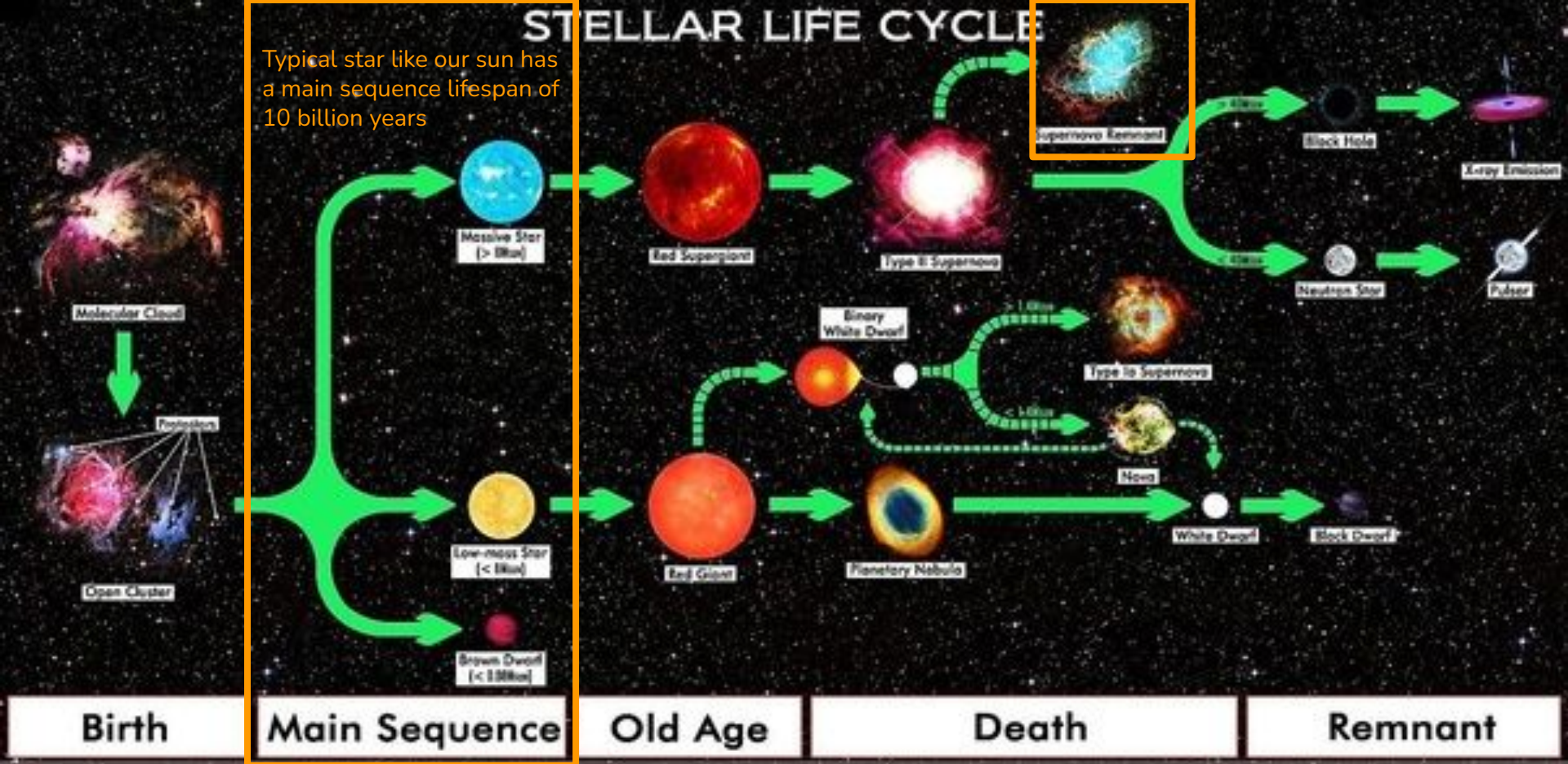


Since the universe is undergoing expansion, its size is a function of its age. To say "the universe is big" is just to say that the universe is old. Elements are made in the furnaces of stars and distributed by supernovae. This process takes about 10 bn years to forge enough heavy elements for our planet (FeNiMgSi) and its biosphere (CHNOPS). To also quote Carl Sagan, you need an entire universe to make something as simple as apple pie.

Moreover, some physicists and philosophers have argued that the rareness of earth constitutes additional evidence for design.

STELLAR LIFE CYCLE

Typical star like our sun has a main sequence lifespan of 10 billion years



The **triple-alpha process** (nuclear fusion reactions by which three helium-4 nuclei (alpha particles) are transformed into carbon) is ineffective at the pressures and temperatures early in the Big Bang. Consequently, no significant amount of carbon was produced in the Big Bang.

Ground Clearing Objections - Life Finds a Way

You're claiming that life is delicate, but, if there is one thing the history of evolution has taught us it's that life will not be contained. Life breaks free, it expands to new territories and crashes through barriers, painfully, maybe even dangerously. Life, uh, finds a way.



While it is true that life can thrive at surprisingly extreme conditions on our planet, the fine-tuning that we are discussing is for the existence of things such as planets in the first place. Life can find a way in a rich biosphere, but try finding "a way" in a universe devoid of all chemistry and atoms.

Also, you just said 99.999...% of the *actual* universe is prohibitively inhospitable.

Ground Clearing Objections - Probability of 1

How many universes have we observed? One. Of the universes we have observed, how many contain life? One. So there's your probability: one out of one universes contains life. No fine-tuning needed.

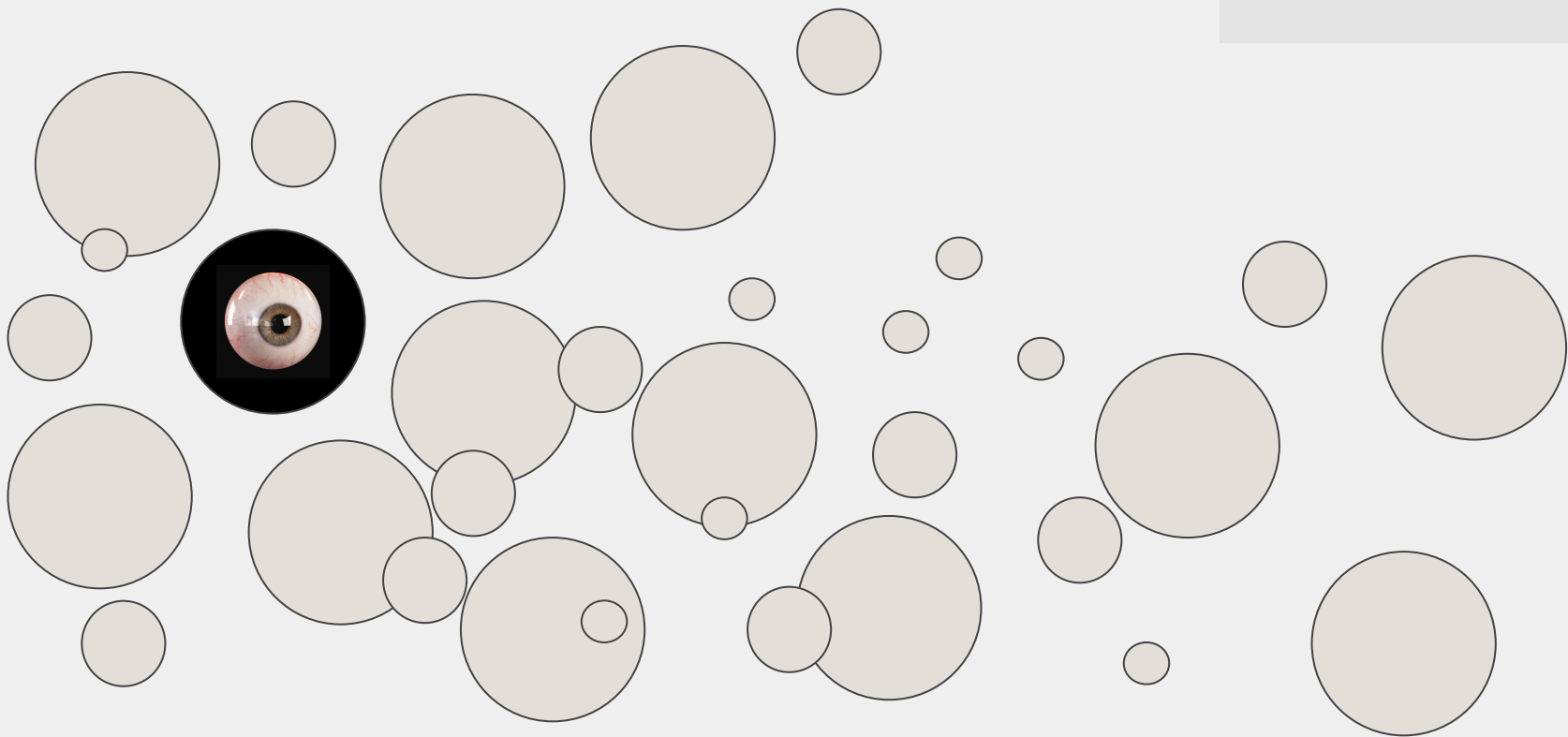
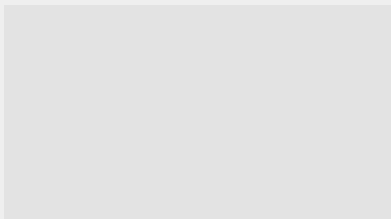


Physics is about more than observations; it is also about patterns, theories and laws. It's about exploring the "what-if". The universes of fine-tuning are theoretical universes that explore the possibilities left open by the laws of nature as we know them. So we're comparing *theoretical* universes; the number of *observed* life-permitting universes isn't the whole story.

The Multiverse

Reasonable extensions to current physical theories make it plausible that the constants and initial conditions that characterise our observable universe vary through time and space, effectively creating a vast number of variegated universe domains. Within this multiverse, the right conditions for life are likely to turn up somewhere.





The Multiverse

Stated: According to this hypothesis, there is a very large, if not infinite, number of regions of spacetime with different values of the fundamental parameters of physics, different initial conditions, and perhaps even different laws of nature. It then claims that in a sufficiently varied multiverse, it is no surprise that some universe is structured so that observers will arise in it. Finally, it invokes the so-called observer-selection principle, which is the tautological claim that embodied observers can only exist in a region of space- time that allows for them to exist. This renders it unsurprising that as observers we find ourselves in an observer-structured region of space-time since it is impossible for us to exist in any other type of region. (Collins, 2014)



The Multiverse

Response #1: It might not be Real Science™.

Response #2: The multiverse likely needs fine-tuning, thus not solving the problem.

Response #3: Revenge of the Boltzmann Brains!
aka The Measure Problem

Response #4: Additional fine-tuning data are not explained by the multiverse.



#1 Is the multiverse Real Science™?

By definition, we cannot observe any of the properties of a multiverse $\{M, f(m), \pi\}$, as they have **no causal effect on our universe**. We could be completely wrong about everything we believe about these other universes and no observation could correct us. The information is not here. The history of science has repeatedly taught us that experimental testing is not an optional extra. The hypothesis that a multiverse actually exists will always be untestable. The most optimistic scenario is where a physical theory, which has been well-tested in our universe, predicts a universe-generating mechanism. Even then...



#2 Does the multiverse need F.T.?

...such an inflationary multiverse must do the following:

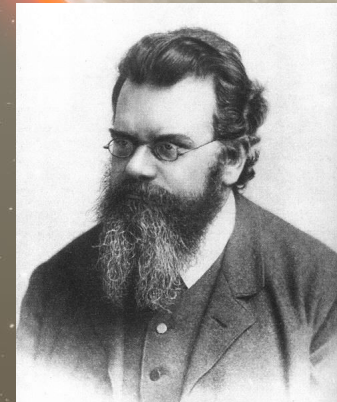
1. Cause the expansion of a small region of space into a very large region
2. Generate the very large amount of mass-energy needed for that region to contain matter instead of merely empty space
3. Convert the mass-energy of inflated space to the sort of mass-energy we find in our universe
4. Cause sufficient variations among the constants of physics to explain FT.

Each condition requires fine-tuning!



#3 Revenge of the Boltzmann Brains!

If universes are generated randomly, a small universe of a single observer is more likely than a large universe of many observers (like ours). Thus, the multiverse does not predict our universe.



#3 The Measure Problem

In particular, the multiverse faces the measure problem, about which there is an extensive literature. Many multiverse theories imply or assume that there are an infinite number of other sub-universes. But “in an infinite universe,” says Olum (2012, 6), “everything which can happen will happen an infinite number of times, so what does it mean to say that one thing is more likely than another?”. Olum (2012) argues with considerable force that because it is impossible to assign probabilities to an infinite number of things (regions, observers, etc.) in a way that is unchanged by simply shuffling their arbitrary labels, the measure problem is unsolvable. An infinite multiverse theory cannot justify probabilities and so cannot make predictions.

Jones wins the lottery 12 times in a row. Well, it was bound to happen somewhere in the multiverse! No need to accuse him of cheating.



#4 Fine-Tuning for Discoverability

The first two examples involve the fine-structure constant, commonly designated by the Greek letter α . This is a physical constant that governs the strength of the electromagnetic force. If it were larger, the electromagnetic force would be stronger; if smaller, it would be weaker. A small increase in α would have resulted in all open wood fires going out; yet harnessing fire was essential to the development of civilization, technology, and science – e.g., the forging of metals. Why would an increase in α have this result? The reason is that in atomic units, everyday chemistry and the size of everyday atoms are not affected by up to a nine-fold increase or any decrease in α . Hence, the combustion rate of wood would remain the same with such a change. In these units, however, the rate

rate of radiant output of a fire is proportional to α^2 -- for example, a two-fold increase in α would cause the radiant output of an open fire to be four times as great. A small increase in α – around 10% to 40% -- causes the radiant energy loss of an open wood fire to become so great that the energy released by combustion cannot keep up, and hence the temperature of the fire would decrease to below the combustion point. The above argument applies to all forms of biomass, not just wood: since in atomic units, chemistry does not change with the changes in α considered above, their combustion rate would also remain the same. Although some biomass is much more combustible than wood – such as oil – these types of biomass are either not readily available to primate carbon-based observers or would be less suitable for the size of fires needed for smelting metals; and hence it would be far less likely that primitive carbon-based observers would have regularly used them and thus discovered the smelting of metals. Going in the other direction, if α were decreased, light microscopes would have proportionality less resolving power without the size of living cells or other microscopic objects changing (when measured in atomic units). As is the maximum resolving power of light microscopes is about 0.2 microns, which happens to be the size of the smallest living cell. The only alternative to light microscopes for seeing the microscopic world is electron microscopes. Besides being very expensive and requiring careful preparation of the specimen, electron microscopes cannot be used to see living things. Thus, it is quite amazing that the resolving power of light microscopes goes down to that of the smallest cell (0.2 microns), but no further. If it had less resolving power, some cells could not be observed alive. The fine-structure constant, therefore, is just small enough to allow for open wood fires and just large enough for the light microscope to be able to see all living cells. (Collins, 2014)



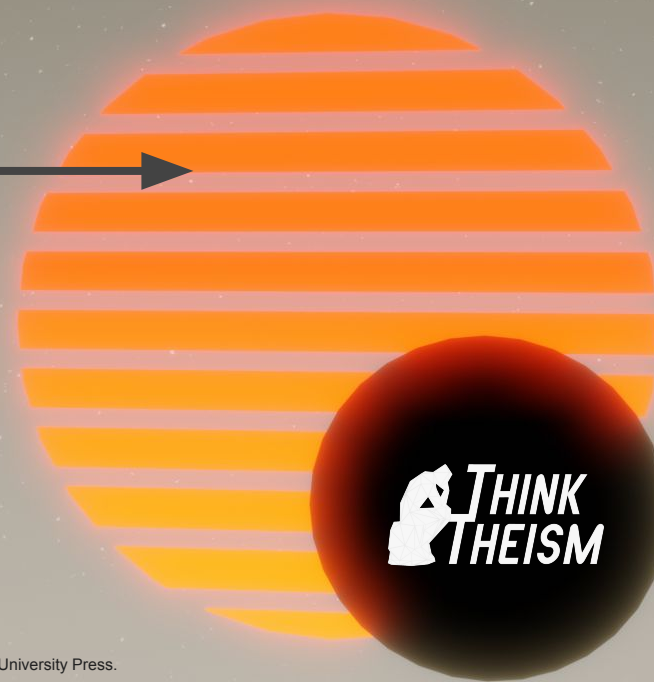
Fine-Tuning of the fine structure constant (α)

The value of α is within a small optimality range for the use of fire for smelting metals and hence for the development of civilisation. This range is very small compared to the possible values of α . The current value is $\sim 1/137$

Decreased α
Hellish landscape of unending forest fires
Resolving power of light microscopes drops off



Increased α by 10-40%
Radiant energy loss too high, preventing open biomass fires



The Multiverse

Reasonable extensions to current physical theories make it plausible that the constants and initial conditions that characterise our observable universe vary through time and space, effectively creating a vast number of variegated universe domains. Within this multiverse, the right conditions for life are likely to turn up somewhere.



First, the multiverse is totally cool with Christianity (see: the Church Fathers).

However, the multiverse might not be Real Science™, thus not an extension of current theories but extensions of speculative theories.

Lastly, the multiverse might not solve the problem as many proposed models have their own fine-tuning problems. Additional fine-tuning data can be considered which are not explained by the multiverse (e.g. the discoverability of the universe).

The Multiverse

Response #1: It might not be Real Science™.

Response #2: The multiverse likely needs fine-tuning, thus not solving the problem.

Response #3: Revenge of the Boltzmann Brains!
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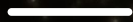
Response #4: Additional fine-tuning data are not explained by the multiverse.





Life

Our universe allows for the existence of conscious, embodied, moral agents



Tuning

The conditions under which a universe can permit life of any kind are exquisitely fine-tuned



Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation



God

Multiverse scenarios are the leading alternative but not obviously better.



Conclusion

The universe is fine-tuned for the existence of life. The leading interpretations are either theism or a multiverse: both are worldview-shattering conclusions.



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Useful Online Resources

<http://finetune.physics.ox.ac.uk/>

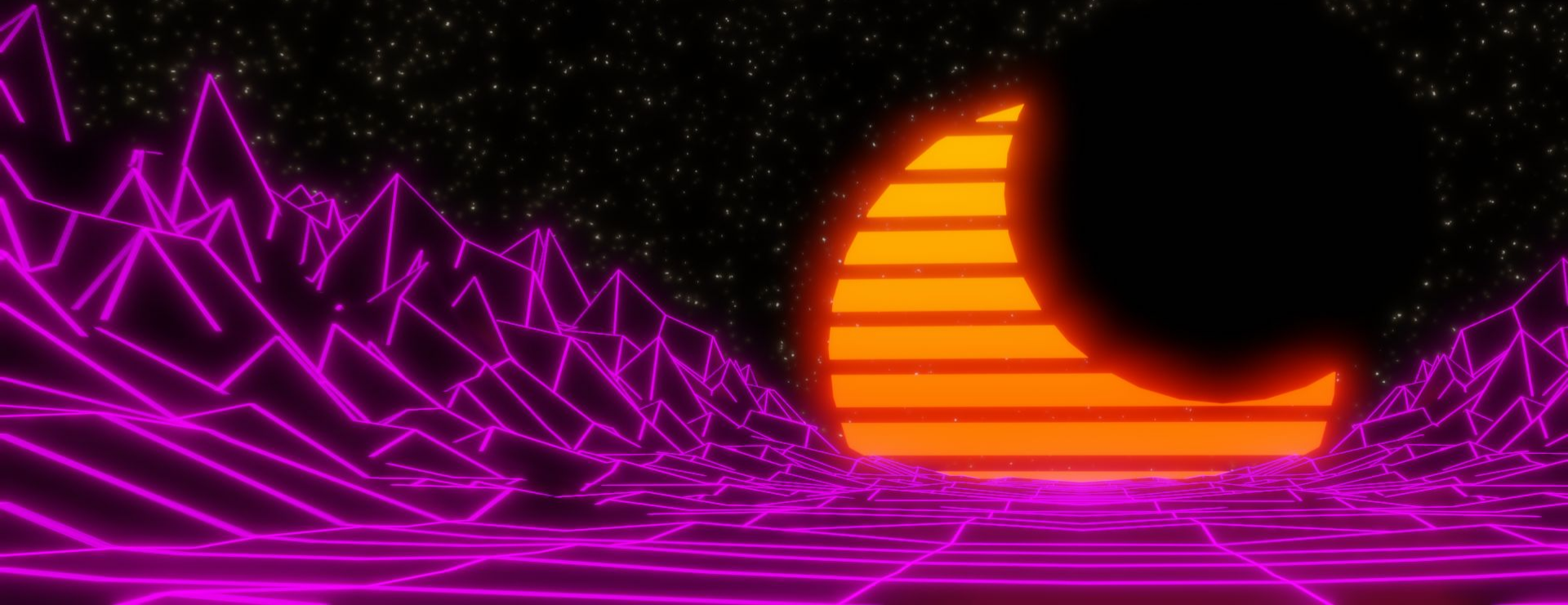
<http://philosophy-of-cosmology.ox.ac.uk/>

<https://www.youtube.com/user/PhilosophyCosmology>

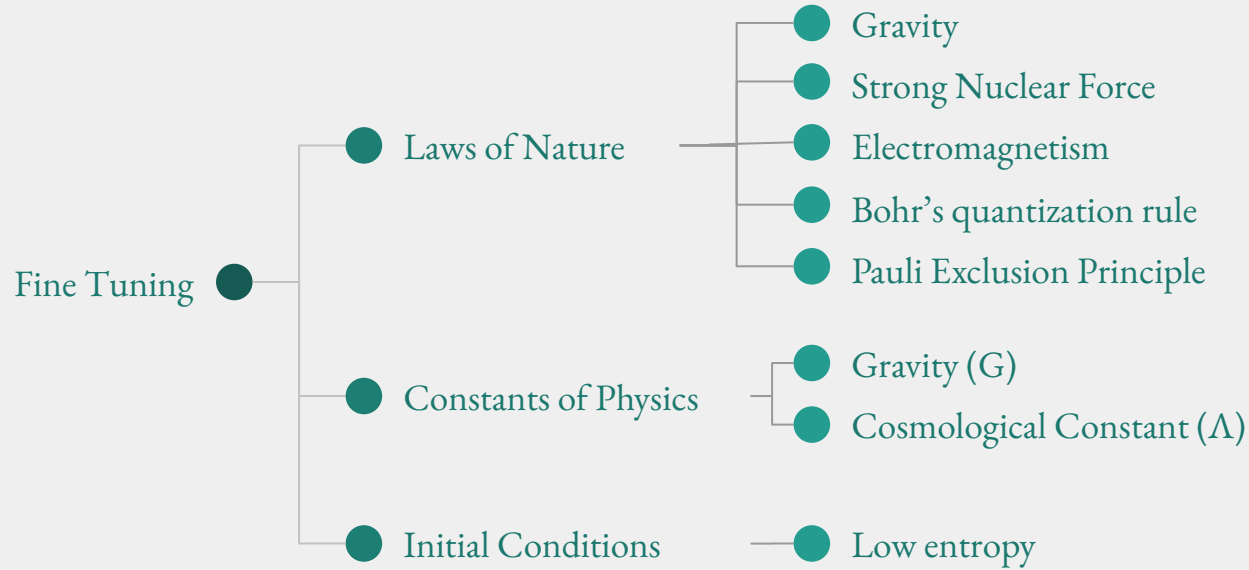
<https://www.thefinetuningargument.com/>



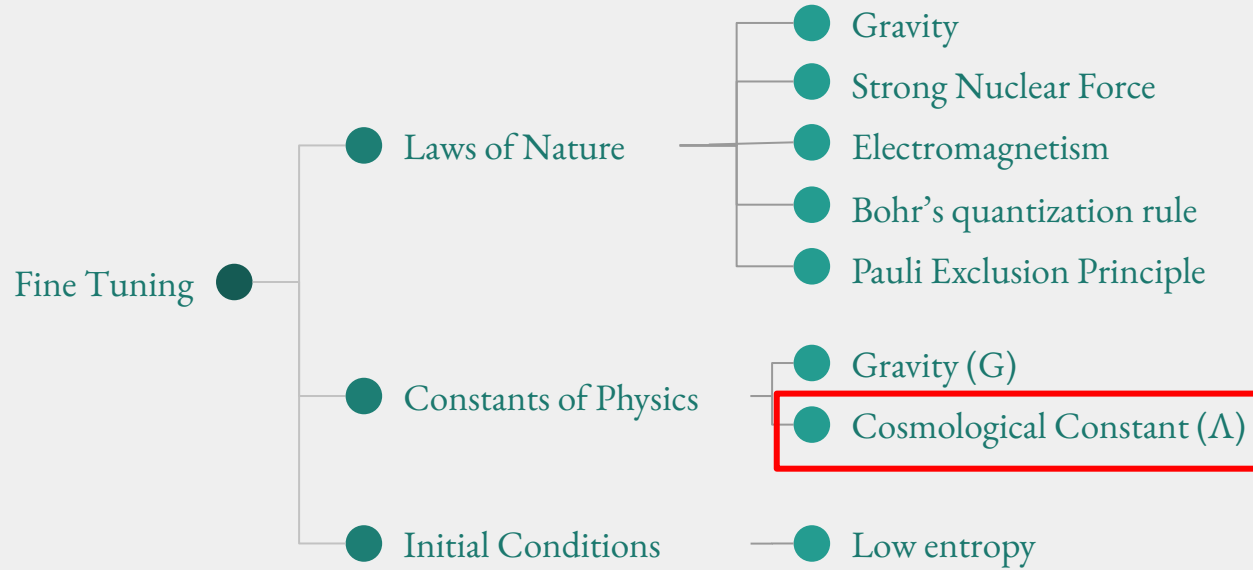
Appendix



Fine-Tuning Evidence



Fine-Tuning Evidence



Fine-Tuning Isn't Real

Stated: A number of scientists have looked closely at these fine-tuning claims and concluded that they are at least dubious, if not false. Fine-tuning has been debunked, no multiverse or God required.

Response: It may be the case that some instances of fine-tuning are artifacts - some have been shown to be so - but there are numerous cases of new instances of fine-tuning popping up as well. (Barnes, 2012) surveys the landscape illustrating the failure of most attempts to de-tune different constants. Relevant experts who offer arguments form a fairly solid consensus. Lastly, clues heaped upon clues can constitute weighty evidence despite any doubts attaching to each element in the pile. (Leslie, 1989)



General Argument

1

Life

Our universe allows for the existence of conscious, embodied, moral agents



2

Tuning

Response 1: Yes it is

Objection 2: FT isn't normalizable, thus inscrutable



3

Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation



4

God

Objection 3: The multiverse + selection effect is a better explanation than God

Objection 4: God is a bad explanation for other reasons

General Argument

1

Life

Our universe allows for the existence of conscious, embodied, moral agents



2

Tuning

Response 1: Yes it is

Response 2: Doesn't matter



3

Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation



4

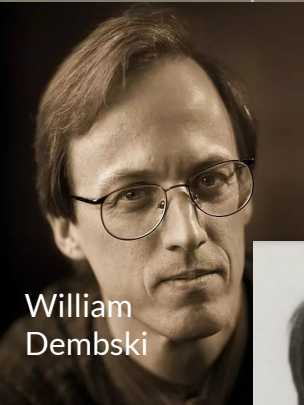
God

Objection 3: The multiverse + selection effect is a better explanation than God

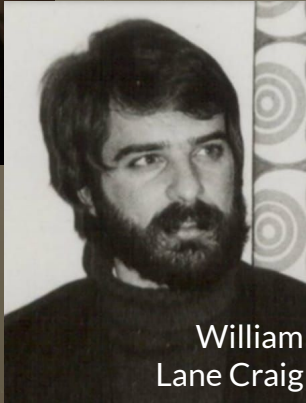
Objection 4: God is a bad explanation for other reasons

Formal Design Inference Approach

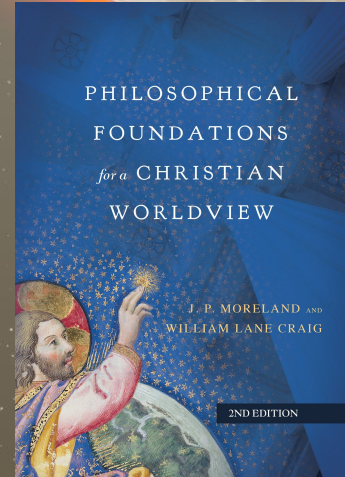
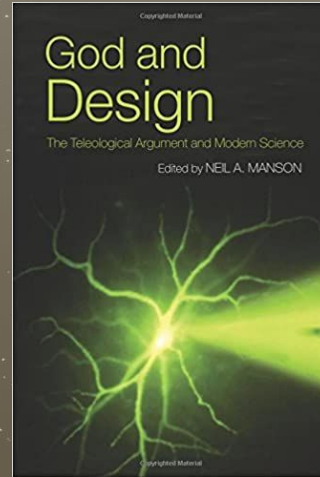
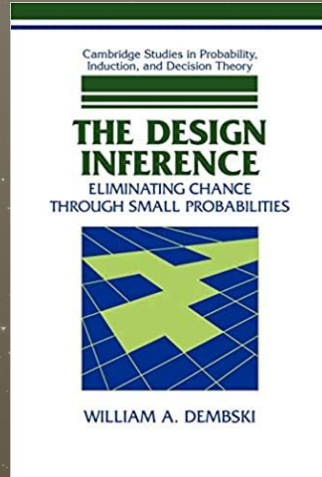
Considering Bayesian analysis alone insufficient to sort between chance and purposeful design, William Dembski developed a more formal algorithm to eliminate chance occurrence as the cause of a low probability outcome. Initially applied to the biological design argument, it was later appropriated by William Lane Craig for the general cosmic fine-tuning argument.



William Dembski



William Lane Craig



Bayesian Likelihood Approach

Most probabilistic arguments use the resources of Bayes Theorem to quantitatively assess the probabilities. The bane of this approach is addressing the “priors” i.e. the probabilities prior to evaluating the evidence. This is notoriously difficult, especially for theistic arguments (what is the prior probability of God?). Some FTA advocates use the entire formula (e.g. Swinburne). Others restrict analysis to just the relative weight of the evidence (e.g. Collins). More on this later.



Richard Swinburne



Robin Collins



THE PROBABILITY OF "B" BEING TRUE GIVEN THAT "A" IS TRUE

Collins focuses here ↓

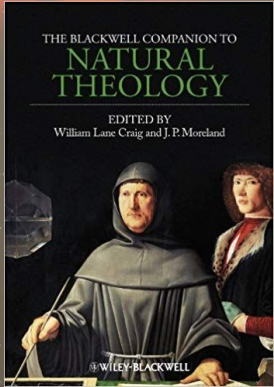
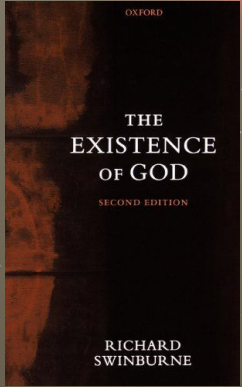
THE PROBABILITY OF "A" BEING TRUE

THE PROBABILITY OF "A" BEING TRUE GIVEN THAT "B" IS TRUE

THE PROBABILITY OF "B" BEING TRUE

$$P(A|B) = \frac{P(B|A) P(A)}{P(B)}$$

Swinburne addresses all of these



FTA 2.0



1. Given the **fine-tuning evidence**, a **life permitting universe** is very, very epistemically unlikely under a **naturalistic single universe**.
2. Given **fine-tuning**, a **life permitting universe** is NOT unlikely under **theism**.
3. **Theism** was (i) advocated prior to the fine-tuning evidence & (ii) has independent motivation.
4. Therefore, a **life permitting universe** strongly supports **theism** over a **naturalistic single universe**.



Design Arguments



The fine-tuning of the universe for conscious embodied agents is not as epistemically unlikely as a result of design given theism as it is given physical necessity or chance given a purely naturalistic single universe.



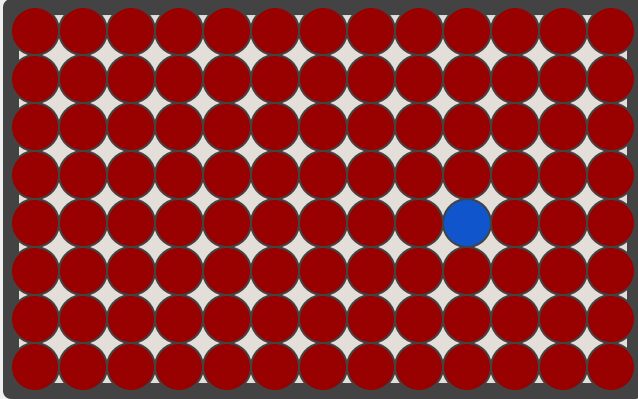
****Fact-** if the earth was 10 ft closer to the sun we would all burn up and if it was 10 ft further we would freeze to death... God is amazing!!



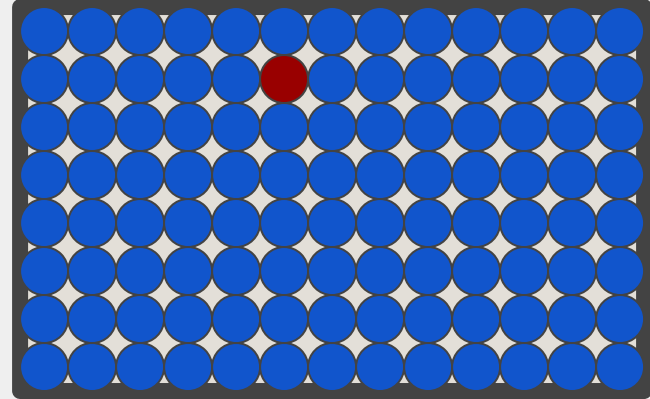
Behold, the atheists' nightmare. Now if you study a well-made banana, you'll find, on the far side, there are 3 ridges. On the close side, two ridges. If you get your hand ready to grip a banana, you'll find on the far side there are three grooves, on the close side, two grooves. The banana and the hand are perfectly made, one for the other. You'll find the maker of the banana, Almighty God, has made it with a non-slip surface. It has outward indicators of inward contents - green, too early - yellow, just right - black, too late. Now if you go to the top of the banana, you'll find, as with the soda can makers have placed a tab at the top, so God has placed a tab at the top. When you pull the tab, the contents don't squirt in your face. You'll find a wrapper which is biodegradable, has perforations. Notice how gracefully it sits over the human hand. Notice it has a point at the top for ease of entry. It's just the right shape for the human mouth. It's chewy, easy to digest and its even curved toward the face to make the whole process so much easier. Seriously, Kirk, the whole of creation testifies to the genius of God's creation.

Scenario: An **innocent** prisoner has been set free by one of two wardens

Mr. RaNdOm Ms. Justice



Cell Block A - 1000 prisoners
999 **guilty**, 1 **innocent**



Cell Block B - 1000 prisoners
999 **innocent**, 1 **guilty**

Probabilities, Background Information, & Old Evidence

All we know = all of our knowledge, including the fact that an innocent prisoner was released. If we include the old evidence...

$$P(\text{Innocent} | \mathbf{R} \ \& \ \text{all we know}) = \frac{1}{0} \text{ ?}$$

$$P(\text{Innocent} | \mathbf{J} \ \& \ \text{all we know}) = \frac{1}{0} \text{ ?}$$

I = Innocent person set free

R = Warden Random selected prisoner

J = Warden Justice selected prisoner

Probabilities, Background Information, & Old Evidence

All we know = all of our knowledge, including the fact that an innocent prisoner was released. If we include the old evidence...

$$P(\text{Innocent} | \mathbf{R} \ \& \ \text{all we know}) = 1.0$$

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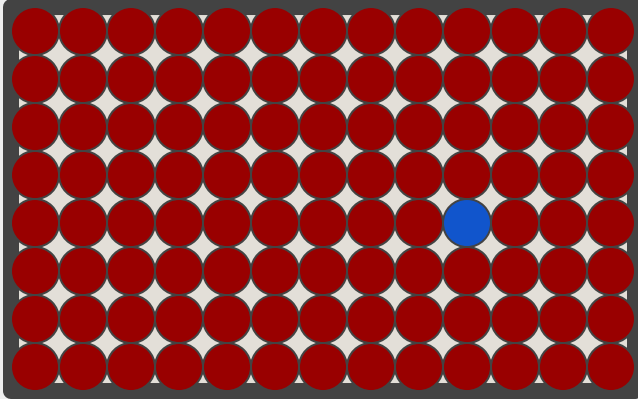
$$P(\text{Innocent} | \mathbf{J} \ \& \ \text{Innocent}) = 1.0$$

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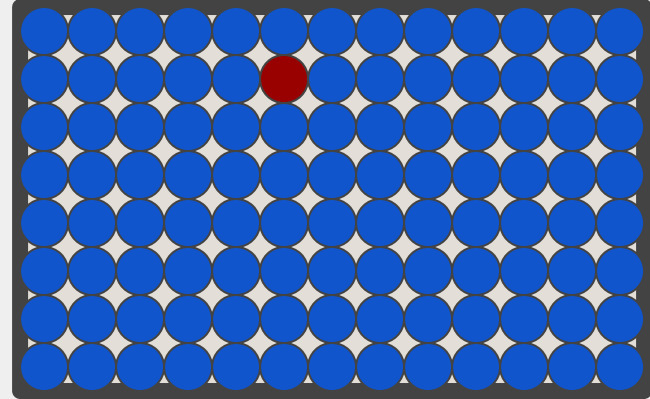
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Scenario: An **innocent** prisoner has been set free by one of two wardens
Mr. RaNdOm **Ms. Justice**



Cell Block A - 1000 prisoners
999 **guilty**, 1 **innocent**



Cell Block B - 1000 prisoners
999 **innocent**, 1 **guilty**

New information: The prisoner is from Cell A. This provides an evidential bump to the Ms. Justice hypothesis.

Probabilities, Background Information, & Old Evidence

Define k as all of our knowledge and k' as a subset of relevant background information. For the jail case, k' = the prisoner came from cell block A

$$P(\text{Innocent} | R \ \& \ k') = \boxed{?}$$

$$P(\text{Innocent} | J \ \& \ k') = \boxed{?}$$

I = Innocent person set free

R = Warden Random selected prisoner

J = Warden Justice selected prisoner



THINK
THEISM

Probabilities, Background Information, & Old Evidence

Define k as all of our knowledge and k' as a subset of relevant background information. For the jail case, k' = the prisoner came from cell block A

$$P(\text{Innocent} | R \ \& \ k') = 0.001$$

$$P(\text{Innocent} | J \ \& \ k') = \approx 1.0$$

I = Innocent person set free

R = Warden Random selected prisoner

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THINK
THEISM

Probabilities, Background Information, & Old Evidence

$$P(\text{LPU} \mid \text{NSU} \ \& \ \text{Life}) = \text{?} \%$$

$$P(\text{LPU} \mid \text{T} \ \& \ \text{Life}) = \text{?} \%$$

LPU = Life Permitting Universe

NSU = Naturalistic Single Universe

T = Theism



THINK
THEISM

Probabilities, Background Information, & Old Evidence

Define k as all of our knowledge and k' as a subset of relevant background information. k' = the region of possibility space epistemically illuminated by our physics

$$P(\text{LPU} \mid \text{NSU} \ \& \ k') = \boxed{?}$$

$$P(\text{LPU} \mid \text{T} \ \& \ k') = \boxed{?}$$

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THEISM

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LPU = Life Permitting Universe

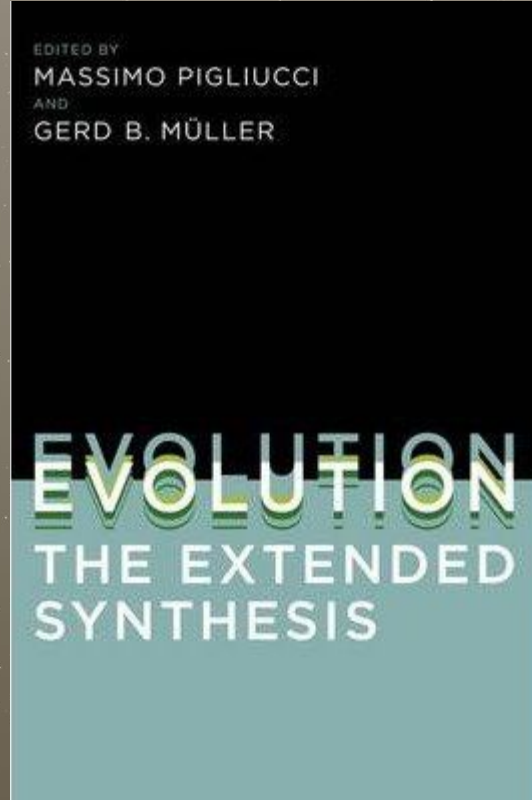
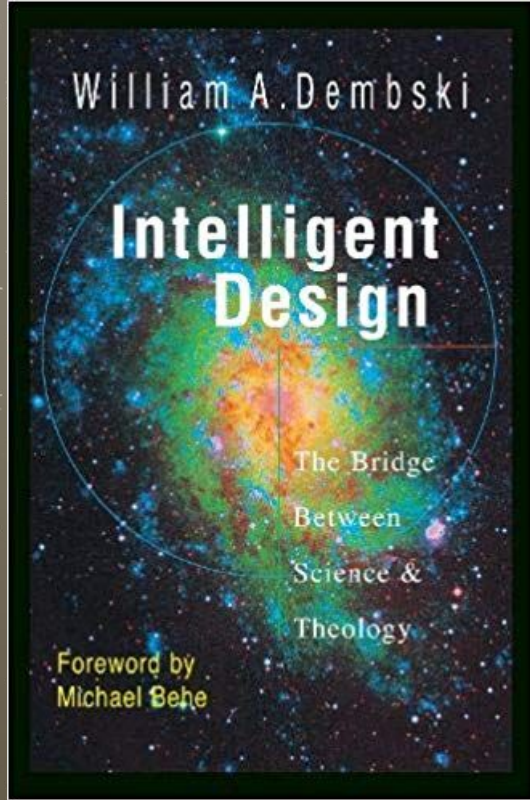
NSU = Naturalistic Single Universe

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THINK
THEISM

Short Excursus: Design and Evolution



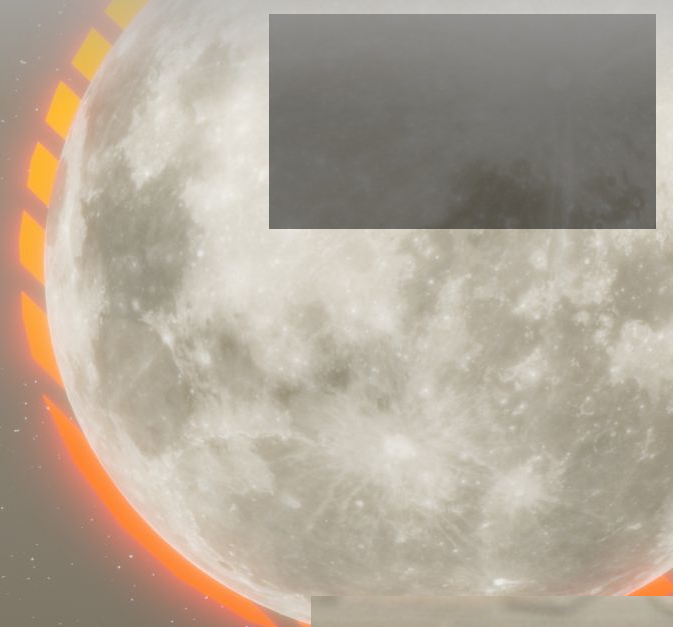
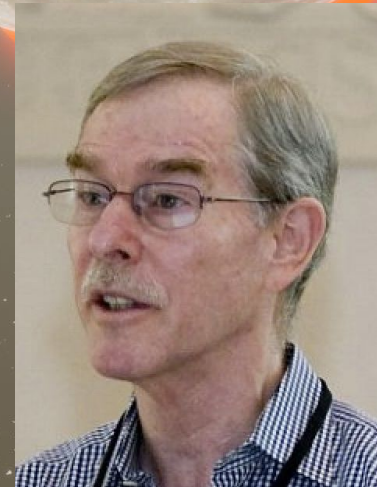
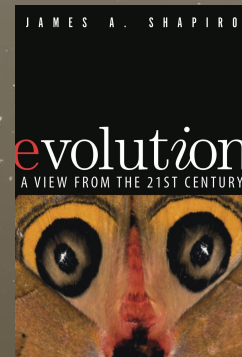
Check our YouTube channel for
last semester's evolution
discussion

Short Excursus: Extending Evolution

“The one issue that has effectively been settled in a convincing way is the evidence for a process of evolutionary change over the past three billion years. However, little evidence fits unequivocally with the theory that evolution occurs through the gradual accumulation of 'numerous, successive, slight modifications' (Darwin, 1859).”

- Dr. James A. Shapiro

Evolution: a view from the 21st century (2011) pg. 128



General Argument

1

Life

Our universe allows for the existence of conscious, embodied, moral agents



2

Tuning

Objection 1: FT isn't real

Objection 2: FT isn't normalizable, thus inscrutable



3

Explanation

This fine-tuning discovery is extremely surprising and needs some kind of explanation



4

God

Objection 3: The multiverse + selection effect is a better explanation than God

Objection 4: God is a bad explanation for other reasons

The Normalizability Problem

Stated: All this fine-tuning gobbledygook is meaningless unless you have a finite region of comparison. The natural assumption for any value is that its possible range encompasses $[0, \infty)$. For any finite range, r , $r/\infty = 0$. This means “fine-tuning” is meaningless.

Response: The selection of the range shouldn't be the fully *conceivable* range but rather, the *epistemically illuminated* range a.k.a., k' . Moreover, the three cases discussed above (cosmological constant, Higgs vev, and Yukawa couplings) *are* normalized

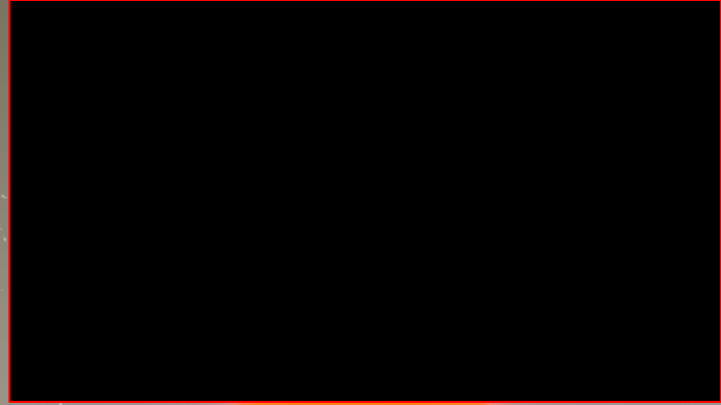


Goddidit is a bad explanation

Stated: Ah, but whomst've'd designed the Designer?

Response:

- 1) This only applies *if* God is posited to explain fine-tuning, but, there is independent motivation.
- 2) It's not immediately obvious that a designed thing must have a more complicated designer (e.g. A.I.)
- 3) Begs the question against divine simplicity



Wrap-Up

The universe we live in is super neat. It is delicately balanced to allow for our own existence and for discovery. This is worth exploring even for non - apologetics reasons. These fine-tuning facts point in the direction of either a multiverse or God. These are both worldview shattering conclusions!

