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Book Review: A Fortunate Universe: Life in a Finely Tuned Cosmos, Part 2

By Dan W Reynolds, PhD

The book *A Fortunate Universe: Life in a Finely Tuned Cosmos* (Cambridge University Press, 2016, Fig.1), by Geraint F. Lewis and Luke A. Barnes, is one of the most recent and comprehensive books on the fine tuning of the physical laws of our universe. Last month, I reviewed the first six chapters of the book in which they summarized current thinking on the subject.¹ In this article, I'll review the final two chapters. These chapters give Lewis and Barnes's views on the various responses to fine tuning they have encountered from people who have read their book or heard them speak. They also lay out their own personal interpretations of fine tuning.

The first six chapters of the book explained how the fine tuning of physics is seen in the masses, electrical charges, and spins of elementary particles; the four elementary forces; the number and type of dimensions in our universe; the geometry of space-time; and the various symmetries and constants associated with physical laws. We also touched upon quantum mechanics, wave-particle duality, coupling constants, radioactivity, the Big Bang, inflation, nucleosynthesis, and more. We now turn to what people think about fine tuning.

Chapter 7: A Dozen (or so) Reactions to Fine Tuning

Here are several common responses the authors have encountered to fine tuning.

1. *It's all a coincidence. There may be yet undiscovered deeper laws that will account for fine tuning.* The laws of physics as we know them are probably not the ultimate laws. We may someday have theories that predict the values of some of the constants. But even if there were no constants left to account for and a complete theory of everything (TOE) was in hand, we would still want an explanation for why the laws of the universe are the way they are. Fine

tuning would not go away, it would just relocate to the deeper laws.

2. *Low probability events happen all the time.* This is true for events within our universe, but most low probability events such as our universe, where there are dozens of "coincidences," suggest there is something important left unexplained beyond random events. The authors compare this response to the following short story.

"Sure, the lawyer says, the DNA evidence makes it extraordinarily unlikely that my client is innocent. But, your honour, unlikely events happen all the time! Eggs and sperm and such! The defense rests."

3. *Fine tuning has been disproved.* Not according to some of the most notable physicists, including Carter, Silk, Carr, Rees, Davies, Barrow, Deutch, Ellis, Greene, Guth, Harrison, Linde, Hawking, Linde, Page, Penrose, Polkinghouse, Sandage, Smolin, Susskind, Tegmark, Tipler, Vilenkin, Weinberg, Wheeler, and Wilczek. Barnes has written a review article on fine tuning containing more than 200 references.² The idea of fine tuning has withstood careful scientific scrutiny and is taken seriously by the world's leading physicists.

4. *Evolution will find a way.* Life is able to exist under extreme conditions of temperature, pH, radiation, pressure, dryness, ionic strength, and lack of food. However,

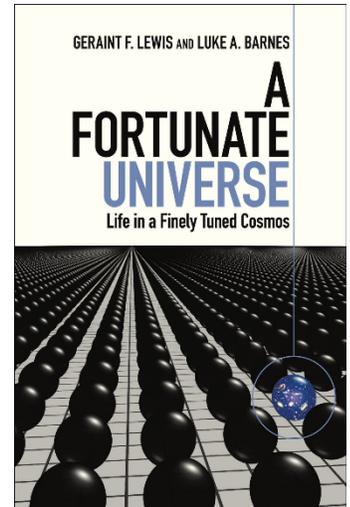


Figure 1

¹ Reynolds DW (2019 Oct) Book review: *A Fortunate Universe: Life in a Finely Tuned Cosmos*, part 1. <https://tasc-creationscience.org/sites/default/files/newsletter_pdf/oct2019.pdf>

² Barnes, LA (2012) The fine-tuning of the universe for intelligent life. *Publications of the Astronomical Society of Australia*, 29 (4):529–64. <<http://dx.doi.org/10.1071/AS12015>>

without the fine tuning we see in our universe, the periodic table would be different, and biochemistry would be impossible. There would never be any life forms to evolve and adapt. As the authors point out, “[E]ven the most extreme conditions on Earth are a paradise compared to the horrors that await in most of parameter space. Forget the thermostat, we’ll dissolve your atoms and crush your particles in black holes and big crunches.”

5. *The universe is not fine-tuned since it is mostly inhospitable to life.* This is the wrong comparison. We are comparing universes, not different places in this universe. Lewis and Barnes say we don’t understand abiogenesis except to say it is very unlikely and rare. Most of the universe is empty space, an inhospitable place for life, yet the vacuum is necessary for our atmosphere,³ without which there would be no life.

6. *The universe is just as improbable as any other universe.* Yes, yet only a tiny fraction of those can support life as we know it. Why does one of the very few universes that can support life just happen to exist?

7. *We don’t really know what would happen in other universes.* That’s true, but fine tuning may be telling us something deeper about the universe. From what we know now, most other universes are unable to support life as we know it.

8. *Fine tuners only turn one dial at a time.* Several different constants are coincidentally related to each other in ways that make life possible. There are no known reasons these numbers should be related to each other. Spinning multiple dials is just as destructive as spinning one. Looking at just the masses of the up quark, down quark, and electron, there is only a very small portion of parameter space that is life-permitting.

9. *Life Chauvinism—why think that life is so special?* Science does its work without regards to the worth of humans. Life is special because it is rare and needs an explanation.

10. *We don’t have a good definition for life.* So what? Whatever defines it, it cannot exist without fine tuning.

11. *There could be other forms of life that could be based on silicon or other chemicals.* Fine tuning says there is very little room in parameter space that could permit chemistry complex enough to support life anywhere nearly as complex as life as we know it. Carbon is unique in that it has the ability to form a vast number of complex molecules, more than any other element. Carbon can make information-storing molecules. Silicon can’t make nearly as many different molecules as carbon, so its potential to create information carrying molecules is smaller than for

carbon. Hence the fine tuning that would be needed for silicon to support life is greater than for carbon.

12. *The anthropic principle explains our existence.* No, it doesn’t. The anthropic principle does not explain why our universe is the way it is or why there are observers in it. It does not explain why our universe, and not some other, exists.

13. *Whence the possibilities?* The question is saying we really don’t have any idea how the constants of physics were determined or what other kind of universes are possible or exist. Lewis and Barnes say that the other universes are mathematically consistent with known physics. They have not changed any of the laws in any way that would make them mathematically inconsistent. From Lewis and Barnes:

If you believe that there is some stronger principle that dictates what is possible and impossible, that for some reason disqualifies mathematically consistent universes, then define it, defend it, and explain why it is so fond of stars, planets, chemistry and life. Those are exactly the kinds of explanations we are looking for!

Lewis and Barnes close the chapter by saying there are more important reactions to fine tuning such as the possibilities of deeper physics that requires fine tuning, the landscape of a multiverse, or a designer. These and other topics are the subject of the final chapter.

Chapter 8: A Conversation Continued

Lewis and Barnes summarize the message of fine tuning:

The message: messing with the makeup of the Universe can have a disastrous effect on the emergence of complex life like you and me, and especially the physical conditions that underlie life, such as useable energy and organic chemistry. Our conclusion is that the fundamental properties of the Universe appear to be fine-tuned for life. We need a cosmos that expands not too fast and not too slow, that forms structure [stars and galaxies], with a mix of stable elements that can form stars, planets and cells, with the right mix of forces for stars to burn for billions of years, with plenty of carbon and oxygen, with a low entropy past and free energy for the future, with a life-supporting number of dimensions, and even with mathematically elegant and discoverable laws. Such a cosmos is a rarity among our Universe’s cousins and distant relatives.

³ If the universe were filled with a breathable atmosphere, it would have several negative effects. For example, there

would be a drag on the earth orbital speed, causing it to slow down and eventually fall into the sun.

Most alternate universes are dull and simple and would not support life as we know it.

Physicists want to understand why our universe is the way it is. They hope for a TOE that will unify all of physics, especially quantum mechanics and relativity, into one theory. They want a theory that can explain why the constants in the equations of physics have the observed magnitudes.

One theory that is sorely lacking is a quantum theory of gravity. String theory is an attempt to fill this void. Unfortunately, it does not constrain the values of the constants but uses them as starting conditions—they are still free parameters.

Even if we had a TOE that explained the constants, fine tuning would not go away; instead, it would move from the constants of nature to the laws that determined the constants.

The authors move to a discussion about inflation. Recall that inflation is a theory invoked to explain the flatness and horizon problems discussed in part 1. In a theory called *Eternal Inflation*, small patches of space-time inflate differently, resulting in universes with different physical laws and different constants. This process can allegedly go on forever, creating universes with different physical laws. The ensemble of universes is often referred to as the *landscape* (Fig. 2).

String theory is an attempt to formulate a quantum theory of gravity. It says that each piece of matter and light is an

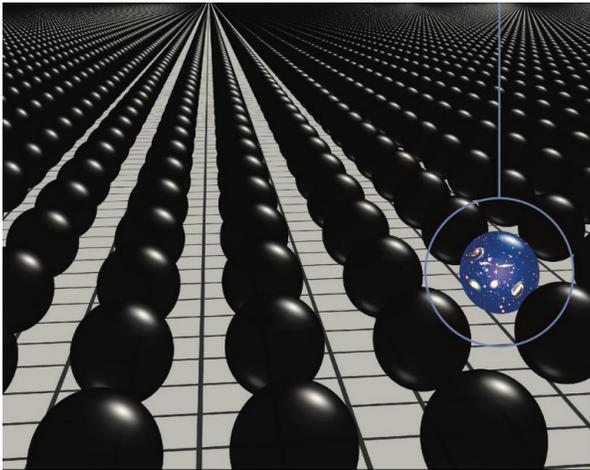


Figure 2. The landscape with our universe

eleven-dimensional vibrating string. The way a string vibrates determines which particle it produces. Constants are still free parameters (not predicted or constrained) that describe initial conditions. Our universe has three spatial and one time dimension. In string theory, the remaining seven dimensions are curled up or *compactified*. They are so small they have eluded our detection. These extra dimensions affect how strings vibrate, which in turn affects

the properties of the particles and forces produced. There are an estimated 10^{500} possible universes according to current theory. This multiverse is created by a universe generator. These other alleged universes are unobservable due to their extreme distances which result from inflation. So far, there is no direct evidence for inflation, other universes, other dimensions, or string theory. So far, there is no multiverse theory that makes potentially falsifiable predictions. They say a testable multiverse theory should be able to predict the physical constants we observe in our universe. This leaves the multiverse in the realm of metaphysics and speculation.

The probability of our low entropy universe resulting from random quantum fluctuations is extremely low. So low, in fact, that some say that that a brain with memories of a life that never happened is more probable. These brains are referred to as Boltzmann Brains. In other words, it is more likely that reality as we perceive it is actually a mere simulation played out in a disembodied brain than that our fine-tuned universe occurred by chance. This outcome is related to the relative size of our universe compared to a brain. The low entropy of a universe like ours is less probable than the low entropy associated with a brain. The problem, say Lewis and Barnes, is that our theories predict Boltzmann Brains as more probable than our universe, and yet our observations say we have our universe, not Boltzmann Brains, so there must be something wrong with our theories. Some say that these considerations make inflation an unlikely explanation.

The discussion then turns to a designer as an explanation for fine tuning. Was the universe designed and constructed? This seems to be a reasonable idea. On the other hand, many events once attributed to gods have been shown to have physical causes. Lewis says that gods are not part of science.

Thomas Aquinas said the universe appears to have been created for a purpose. What is needed as an explanation is something that is eternal and uncaused, an unmoved mover. Nothing can create itself. The universe could have been different. We must explain why the universe is the way it is. We need to explain why anything exists at all.

Why can't the universe be an uncaused cause? There is nothing about our universe that suggests it is eternal, that it could create itself, that it must be the way it is, or that it must exist at all. Cosmological expansion and the second law of thermodynamics seem to require that the universe had a beginning. Logic forbids something from creating itself. Fine tuning raises the question of why our universe is the way it is. All this suggests a designer.

God must exist by His own nature—He must be self-subsistent. God can explain why there is anything at all, why the universe appears to be designed, and why the universe is not another way. Barnes prefers God over

naturalism as the explanation for fine tuning. Naturalism does not answer the ultimate “why?” questions. Science is agnostic about whether God explains the ultimate laws of nature. God does not compete with science but with naturalism. Theism was the belief of most of the founders of the scientific revolution.

The predictions of science are not the predictions of naturalism. The success of science is not the success of naturalism. Neither God nor naturalism are scientific theories. Perhaps not, but this does not mean that there is no evidence to consider when making a choice between the two. Fine tuning is one piece of evidence that makes more sense if God created the universe than to say the universe just happens to be the way it is.

Barnes appeals to the personal. He says people have a moral sense—love is better than hate, we have dignity, etc. It makes sense that a good God would create beings like ourselves. Barnes offers four steps in the argument for theism:

1. Naturalism is uninformative with respect to the ultimate laws of nature.
2. Theism prefers ultimate laws of nature that permit the existence of moral agents, such as intelligent life forms.
3. The laws and constants of nature as we know them are fine-tuned—vanishingly few will produce intelligent life.
4. Thus, the probability of this (kind of) universe is much greater on theism than naturalism.

Fine tuning is found everywhere in physics. Even if we had an ultimate theory with no free parameters, it would not show that the universe could not have been otherwise. It would still raise the question of why the universe happened to be that way.

Lewis says if theism were true, we should be morally perfect beings. There should be no evil.

Barnes replies with a quote from Augustine: “God judged it better to bring good out of evil than not to permit any evil to exist.” Barnes says free will allows for the possibilities of love and evil. Barnes says the theist is surprised by evil while the naturalist is surprised by both evil and good.

The authors close respectfully agreeing to disagree.

How about you, dear reader? Is the cosmos a fluke or a creation? Will you put your faith in a multiverse or in a benevolent creator? Psalm 19:1 says: “*The heavens declare the glory of God, and the sky above proclaims his handiwork.*” As we have seen, God has left us ample evidence for His creative power in the fine tuning of physics. This is seen in the masses of the fundamental particles, the constants in the equations of physical law, the balance of the four fundamental forces, the number of spatial and temporal

dimensions in our universe, the flat geometry of space-time, the dominance of matter, the charge neutrality of the universe, etc. All these things are just what is required for our existence. Seem suspicious, doesn't it, and not at all like an accident? On the other hand, there is precious little evidence to support a multiverse. So far, at least, there is no evidence for other dimensions or universes. And insofar as the Big Bang theory is concerned, one of its pillars, inflation, has failed at least one test (absence of expected polarization in the cosmic microwave background) and has no mechanism for starting, stopping, or controlling the rate and duration of expansion. Inflation is an *ad hoc* theory to the Big Bang. Even if one accepts the Big Bang, then more fine tuning must be explained: the low entropy of the starting conditions, the rate of expansion during inflation, the initial density, the dominance of matter over antimatter, the distribution of matter with slight heterogeneities that would lead to star formation, the formation of carbon and oxygen in stars, the geometry of space-time, etc. Then, even if you assume our universe is a fluke, one must then explain abiogenesis, an astronomically improbable event. So, it is clear that our existence is not an accident. We were meant to be here. My hope is that you will “*taste and see that the LORD is good! Blessed is the man who takes refuge in him!*” (Psalm 34:8) God loves us and wants to have a relationship with each of us (Romans 10:9–10). Cry out to Him and He will answer. ☩

COMING EVENTS

Thursday, November 14, 7:00 pm, Providence Baptist Church, 6339 Glenwood Ave., Raleigh, Room 237

Old Earth vs Young Earth Creationism: What's the Big Deal? by Ben LaCorte, president and founder of Reasons2Believe, a Christian apologetics ministry devoted to *Raising Up the Next Generation of Christians to Lead the Church in America.*

- What Does the Bible say? A Hermeneutical Approach?
- Some OEC interpretations
- The YEC Interpretation
- Historical Interpretations
- What Does the Science Say: “Problems” with OEC and YEC
- Personal Anecdotes:
 - The Ross-Lisle Debate
 - Please Say You're Not Supporting Evolutionary Creationism
 - Those Darn YECs!
 - Why I Believe in a Young Earth
 - Interviewing with God: Why I Teach a Young Earth

- Resources