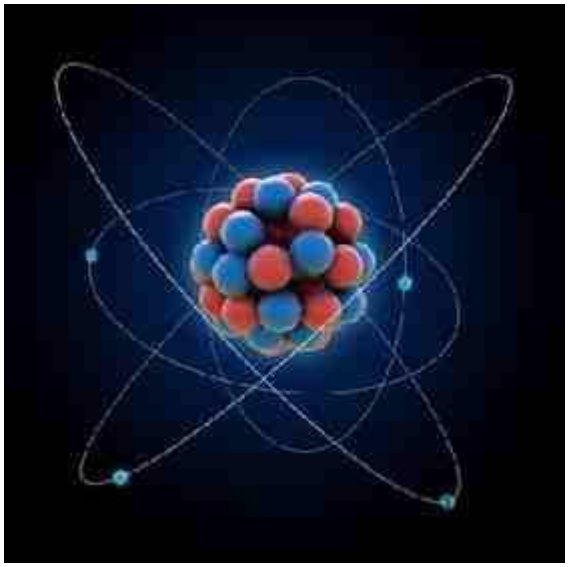
Evidence for God: Fine Tuning Argument Summarized (part 1 of 2)



What is Fine Tuning?

Over the past century, scientists have discovered that if certain properties of the universe were changed very slightly from what they are, we would not be here. They have to be within a very narrow range for our universe to make life possible and be habitable.

The universe is fine-tuned for the existence of intelligent life with a complexity and delicacy that literally defy human comprehension.

Types of Fine-Tuning

1. Fine tuning of the laws of nature.
2. Fine-tuning of the constants of physics.
3. Fine tuning of the initial conditions of the universe.

1. Fine tuning of the laws of nature

There are two ways to look at this aspect of fine-tuning:

A. Precisely the right laws are needed for highly complex life to exist. If one of these were missing, such life would not be possible. An example is the the law of gravity. Without it, there won't be any stars or planets. Another example is the electromagnetic force without which there would be no atoms because there would be no force to hold the negatively charged electrons with the positively charged protons that allow for chemical bonds.

B. Harmony between nature and mathematics: Only in the 20th century have we come to understand that what we observe in nature can be described by only a few physical laws, each of which is described by simple mathematical equations.

2. Fine-Tuning of the Constants

The 'constants' are the unchaning numbers that appear in the methamatical equations that express the laws of nature. The laws of nature do not determine the value of these constants. There could be a universe governed by the *same* laws, but with *different* values of these constants. Depending on the values of those constants, a

universe governed by the *same* laws of nature will look very *different*. An example is G, the Gravitational Constant. If one increased the strength of gravity by one part in 10^{34}, even single-celled organisms would be crushed, and only planets less than around 100 feet in diameter would sustain life with our brain-size. A 400-fold measure in G would result in any such planet having a surface force at least 10 times as large. Such a planet would be far less ideal than earth for humans.

3. Fine-Tuning of the Initial Conditions of the Universe

In addition to the constants, there are certain arbitrary quantities that are just put in as initial conditions on which the laws of nature operate. Because these quantities are arbitrary, they are also *not* determined by the laws of nature.

Scientists have discovered that that these constants and initial conditions must fall into an extremely narrow range of values for the universe to exist. This is what is meant by 'the universe has been fine tuned for life.'

An Example of Fine Tuning

This is an example of fine-tuning that allows a habitable planet. A number of factors must be fine-tuned in order to have a planet that supports life:

- It must be a single star solar system, in order to support stable planetary orbits.
- The sun must have the right mass. If it was larger, its brightness would change too quickly and there would be too much high energy radiation. If it was smaller, the range of planetary distances able to support life would be too narrow; the right distance would be so close to the star that tidal forces would disrupt the planet's rotational period. Ultraviolet radiation would also be inadequate for photosynthesis.
- The distance from the earth to the sun must be just right. Too near and water would evaporate, too far and the earth would be too cold for life. A change of only 2% and all life would cease.
- Earth must have sufficient mass in order to retain an atmosphere.
- Surface gravity and temperature are also critical to within a few percent for the earth to have a life-sustaining atmosphere – retaining the right mix of gases necessary for life.
- Earth must rotate at the right speed: too slow and temperature differences between day and night would be too extreme, too fast and wind speeds would be disastrous.
- The earth's gravity, axial tilt, rotation period, magnetic field, crust thickness, oxygen/nitrogen ratio, carbon dioxide, water vapor and ozone levels have to be just right.

A rough but conservative calculation that the chance of one such planet existing in the universe is about 1 in 10^{30}.

The *Most* Extreme Example of Fine Tuning

According to standard cosmology model, the initial state of the space-time, and thus gravity, of the early universe had very low entropy[1]. The 'mass-energy' of the initial universe had to be precise to get galaxies, planets, and for us to exist. The most extreme example of fine-tuning has to do with the distribution of mass-energy at that time.

Just how precise?

The odds of a low-entropy state to exist by chance alone are one out of $10^{10^{\wedge}123}$ - the Penrose number. Let us try to get an idea of what type of a number are we talking about? You don't have enough particles in the universe (that we know of) to write down all the zeroes! This number is so large, that if every zero were 10 point type, it will fill up a large portion of our universe! That is why we will explain it with three illustrations:

First, balancing a billion pencils all simultaneously positioned upright on their sharpened points on a smooth glass surface with no vertical supports does not even come close to describing an accuracy of one part in 10^{60}.

Second, this is much more precision than would be required to toss a dart and hit a penny across the universe!

Third, cover America with coins in a column reaching to the moon (380,000 km or 236,000 miles away), then do the same for a billion other continents of the same size. Paint one coin red and put it somewhere in one billion of the piles. Blindfold a friend and ask her to pick the coin. The odds of her picking it are 1 in 10^{37}.

All these numbers are extremely *small* when compared to the precise fine-tuning of the Penrose number, the *most extreme* example of fine-tuning that we know of.

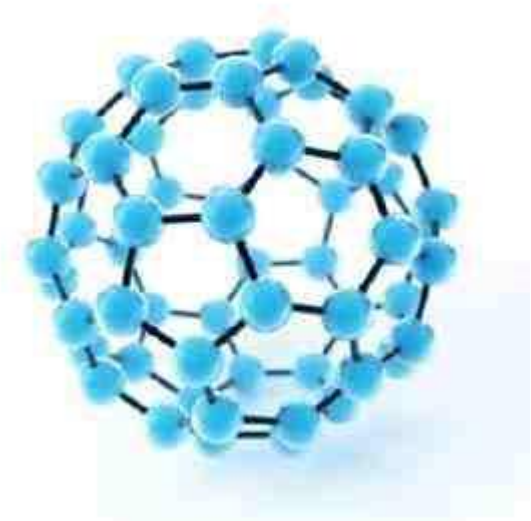
In summary, the fine-tuning of many constants of physics must fall into an exceedingly narrow range of values for life to exist. If they had slightly different values, no complex material systems could exist. This is a widely recognized fact.

Footnotes:

[1] Entropy is a measure of disorder.

(part 2 of 2)

Does fine-tuning need an explanation?



Someone might say, 'the universe just is, why is an explanation needed for fine-tuning?'

Imagine a universe-creating machine, like a giant safe with two types of dials. There are dials that fix the settings for laws of physics, the constants, and the initial conditions, like gravity, electromagnetism, and the nuclear forces. Initially, all dials have been set and fixed at particular numbers. These numbers are the constants of nature and they produce the universe we live in.

Let us say that you can change the dials of this universe generating machine. There is also a screen which shows you what would happen if you were to change the dials even by a little bit.

You change the dials and hit the preview button to see what might happen. You weaken the force of electromagnetism and the force of gravity just a little. Then you touch the preview button and see the results on a screen. Suddenly, stars, galaxies, and planets start falling apart! Then you increase the dial of the electromagnetic force and suddenly, the planets are not the right size. They are too big for life. Also, stars burn up quickly.

What will you infer about the origin of these finely tuned dial settings? Could it be there by chance or did someone set it up by design for a purpose?

What is the most *reasonable* explanation of fine-tuning?

To many people, fine-tuning implies design, but the two are separate ideas. Therefore, we will discuss all *possible* explanations for fine-tuning and see that divine creation is the only *reasonable* choice:

Universe is Self-Explanatory

Some say the universe is its own explanation, i.e. it is self-explanatory.

Don't worry if you don't understand what it means because the idea contradicts itself. It is logically impossible for a cause to bring about an effect without being in existence.

Necessity

'Necessity' means that the constants and quantities *must* have the values they do. But, why does the universe has to permit life? Why do the constants and initial conditions have to be what they are?

There are no good answers to these questions, therefore, physical necessity is implausible since there is *no* evidence that life-permitting universes are necessary.

Universe Was Either Created by Physical Laws or Was Self-Generated

If a cake cannot generate itself, how can a universe generate itself? It is hard to believe, but some atheists suggest that the universe was brought into existence by a theory, or laws of physics, or mathematics.

First, ascribing intelligence to mathematical laws and believing they could be intelligent is non-sense.

Second, explanations of physical phenomenon like the rising of the sun from the East with laws of physics are descriptive and predictive, but not creative. Who created these laws? Replace the universe with a jet engine. Laws of physics can explain how a jet engine works, but not how it came about in the first place.

Chance or Brute Force?

Could the fine-tuning be due to chance? Could it be an accident that all constants and initial conditions just fell into the range that allows life? The problem is that the chances of a life-permitting universe to exist are so *remote*that this alternative becomes unreasonable. No respectable physicist (including atheists), believes that fine-tuning can be explained by pure chance.

Let us say you are dragged in front of a firing squad of 100 trained shooters standing at point-blank. You hear 'Ready! Aim! Fire!' You then hear the sound of guns, but, amazingly, you are still alive! Did all the 100 shooters miss? What conclusion will you reach?

Would you say, 'guess I shouldn't be surprised they all missed! After all, had they not missed, I would not be here! There is nothing more to explain!'

No person in their right mind will accept this explanation. In light of the enormous improbability that *all* shooters missed, a *reasonable* conclusion will be they all missed on *purpose*.

What about Multiverse Hypothesis?

First, it is important to know what is naturalism. Naturalism is the *belief* that only natural explanations (as opposed to *super*natural ones) should be considered. Because a designer/Creator is *super*natural and beyond nature, naturalism rules out this explanation, *regardless* of evidence.

Therefore, due to the fact that *no* natural explanation has been found for fine-tuning, some physicists make recourse to a multiverse (multiple universes) - a naturalistic explanation.

According to this idea, there are an enormous number of universes with different initial conditions, values of constants, and even laws of physics. Our universe is just one member of this 'multiverse' out of an infinite random universes. If all these other worlds really exist, then, by chance, life-permitting universes will have observers in them and they will observe their world to be finely tuned. Therefore, there is no need to say our universe was fine tuned for life, simply by chance, some universe will have

the ‘winning combination’ for life. It is just like you produce lottery tickets. Even if it is 1 in a 10 million chance, the winning ticket will eventually come up. According to this idea, human beings are winners of a ‘cosmic lottery.’ When it comes up, humans evolve and look back and say, ‘we were lucky!’

First consideration: There is no shred of evidence to prove the existence of these multiple universes. As a matter of principle, we *cannot* even observe them. That is why the idea has been severely criticized by leading scientists.

Second consideration: it violates the principle of Ockham’s Razor which states that the most plausible explanation is one with the least number of assumptions and conditions.

Third consideration: All known multiverse *theories* actually have significant fine-tuning requirements. Consequently, the fine-tuning of a “multiverse” will *need* an explanation.

Forth consideration: Since, a multiverse cannot be observed, how can anyone know that the other worlds are less ordered and more chaotic and fruitless than ours?

Fifth consideration: Even though at the present time there is *no* scientific evidence that a multiverse exists, there does not seem a need to deny it’s possibility. Interestingly, there is actually an important theorem which states that even if a multiverse that generated our universe existed, it *must* have a beginning! Consequently, it will best be explained by the design of a powerful Creator, not chance.

To sum it up, multiverse hypothesis is purely speculative. Even if it turns out to have any scientific merit, it is fully compatible with belief in God.

Conclusion

After exhausting all *possible* mutually exhaustive causative explanations, fine-tuning of our universe is *best* explained to be the “design” of an immensely knowledgeable and powerful Creator. Divine creation, *not* chance, is the *most compelling* and *reasonable* explanation for the fine-tuning of the universe.

Universe or multiverse, fine-tuning wins. Heads or tails, Creator wins.