

# Possible Explanations for Fine-Tuning

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Robert Marks:

Greetings and welcome to the Mind Matters News podcast. I'm your buoyant host, Robert J. Marks. Buoyant, because all of these conversations where I learn stuff makes me feel good. We've been talking about fine-tuning in the universe that allows life. There is no doubt the universe is fine-tuned to allow life, to allow you and me to exist.

Robert Marks:

Everybody agrees. The scientists, the biologists, and the chemists. Today, we talk about the cause of fine-tuning. Again, there's no controversy. But why is the universe finely tuned? We have two guests with expertise in fine-tuning to talk with us today. Dr. Ola Hössjer is a professor of mathematical statistics at Stockholm University in Sweden. Ola, welcome.

Ola Hössjer:

Thanks a lot, Bob, for being part of this and for inviting me.

Robert Marks:

Okay. It's a lot of fun. I'm really enjoying our chat, and I'm learning a lot. Our second guest is Dr. Daniel Diaz. He's a research assistant professor of biostatistics at the University of Miami. Daniel, welcome to you too.

Daniel Díaz:

Thank you, Bob.

Robert Marks:

There are various theories of the cause of fine-tuning of the universe. Many are prompted by one's ideology. Let's go down the list of the ones that I have. And I think I've done a good exhaustive search of the theories for fine-tuning. And the first one, Daniel, I'd like you to talk about is Panspermia. We're fine-tuned because of Panspermia.

Daniel Díaz:

Panspermia is the idea that life was seeded on earth from the outer space. That's basically the idea. And then, there is a particularization of that idea that is called directed panspermia. It was, if I'm not mistaken, proposed by Crick.

Robert Marks:

Yes. Francis Crick.

Daniel Díaz:

Yes. Francis Crick. The discoverer of the structure of the DNA molecule.

Robert Marks:

A winner of a Nobel prize, so he was no dummy.

Daniel Díaz:

Exactly. He proposed this idea of directed panspermia in order to explain how life started here on earth. That is basically the idea. Panspermia is just the idea that life was seeded on air from the other space. And then, directed panspermia, as Francis Crick proposed it, it was the idea that it was seeded on earth by an extraterrestrial civilization.

Robert Marks:

That's really strange. What's the difference between directed and regular panspermia? I think one was done on purpose. The other was accidental. Is that right?

Daniel Díaz:

Yeah. Basically, there was an extraterrestrial agent in directed panspermia seeding life here on earth. On the other side, it could be simply accidental that life was seeded on earth, because it was coming, for instance, from an asteroid. And the little unicellular form of life started to develop until we come to this point.

Robert Marks:

Another person that was into and believed about panspermia was Fred Hoyle, who we've quoted. Fred Hoyle definitely believed in a fine-tuned universe. I think there's very little controversy that the universe is fine-tuned. There's always controversy, but I think that the consensus is that the universe was fine-tuned.

Robert Marks:

Isn't the idea of panspermia just kicking the can down the road? Are you familiar with that colloquialism? It's just kind of displacing the problem of where we came from to, "Where did this incredible civilization come from?" The planet life here on earth.

Daniel Díaz:

Let me just ... Recently, there was a debate, a conversation between Sabine Hossenfelder, I think is the way to pronounce her last name. She's a very famous physicist with well-known channel on YouTube, and Luke Barnes, who has done extensive research on fine-tuning. They were having this debate.

Daniel Díaz:

And it is very interesting that they coincide that explaining why there is fine-tuning is actually not a scientific question. So Luke Barnes said that basically science ends saying that there is fine-tuning. On explaining why there is fine-tuning, there might be different approaches. Of course, different world views are going to produce different explanations for that fine-tuning that we are observing in nature.

Robert Marks:

Interesting. Okay. Panspermia, I don't know. I think it just, again, kicks the can down the road. It leads the question as to the origin of this master race or the master people that came here and planted life on earth. It's just strange.

Robert Marks:

One of the other theories of the origin of life on earth is something I only heard recently. Maybe about five or six years ago. And it's called the Sims theory of fine-tuning. Daniel, could you talk about the Sims theory of fine-tuning?

Daniel Díaz:

We talked about it also before, in one of the previous podcasts. I don't remember at this point, which one, but the idea of the simulation theory is that we are all part of a simulation. The way to think about it is that ... Well, the guy who developed this theory is Nick Bostrom. He's a philosopher at Oxford University in England.

Daniel Díaz:

When he came with this theory, he proposed that it is possible that we are living in a simulation. So this has to be thought just as in any computer program, then there is an algorithm. And there was a super advance civilization in the future that finally made a computer simulation, and we are all part of that simulation. I'm not saying that I agree with that position, but it is there. And it has generated a lot of controversy.

Daniel Díaz:

I know that, for instance, Elon Musk is convinced of that theory and he says that we all live in a simulation. But it also has received a lot of pushback for many well-known physicists. And so, it's a very interesting development. Anyhow, the point with that simulation, if it is an algorithm whose outcome is that we are here ... Then, again, it could be looked as fine-tuning.

Daniel Díaz:

In which there is this algorithm, whose target is the civilization as we know it inside the simulation. In that sense, then that target, it needs to be finely tuned. So fine-tuning has been studied, in that sense in the simulation hypothesis, more looked at from the perspective of the anthropic principle.

Robert Marks:

This also kind of kicks the can down the road, in my opinion. We have to ask ourselves again, where did this super race come from? Certainly, their ability to write simulations about us must come from some sort of fine-tuning. The other objection I have is there's many things that people do that are non-algorithmic.

Robert Marks:

In fact, this is one of the fundamental postures of the Bradley Center. That we are not algorithmic, that we have things which we do that you can't write a computer program to simulate. These include things like qualia, understanding consciousness, creativity. And if we are indeed simulations, then whoever did this programming must know how to program non-algorithmic things into our being.

Robert Marks:

And I just ... Man, I don't see how that can happen. At least from what I know. Because all computers are limited and all simulations are limited to the algorithmic. Have you heard Elon Musk has hired some people to go around and look for some flaws in our simulation?

Daniel Díaz:

Yeah. Some people look at those things. But let me just mention that I also do agree with your comments, what you're saying right now. But in just playing as devil's advocate here, in terms of the simulation hypothesis.

Daniel Díaz:

Well, the argument as it goes is that a post-human civilization is so technologically advanced that it is capable of simulating all that we are doing. Even if it doesn't look algorithmic in some sense. That's the hypothesis. It has many, as I said, people who are detractors and many people who do not agree with the position. Well, that's how the argument goes. Anyhow.

Robert Marks:

It seems kind of silly to me, if we talk about the Sims from an advanced simulation that does simulations of us. There's a couple of movies that I'm reminded of with the Sims theory. One, of course, is The Matrix.

Daniel Díaz:

That's the default.

Robert Marks:

Yeah. That's the default. That's where everybody goes to where ... Gosh, Keanu Reeves?

Daniel Díaz:

Yeah. Keanu Reeves.

Robert Marks:

Anyway, he wakes up in a big vat of primordial soup, in which he has been basking and his entire life has been simulated. That's one example of the Sims, I guess. And Elon Musk looking around for little flaws in Sims really is strange. It reminds me of another movie called The Truman Show.

Daniel Díaz:

Oh, yeah.

Robert Marks:

Starring Jim Carey, where he came out one time and all of his life, all of his existence was programmed in order to make it seem like he was living in a real world. And then, all of a sudden this big lighting unit goes, "Ka-thunk!" Right in front of his house. And it came from the top, where there was a simulation of a sky.

Robert Marks:

All of a sudden, Jim Carey had this idea that maybe the reality that he perceived wasn't true. This reminds me of Elon Musk's hiring of these people to go out and look for flaws in the Sims theory, and see if he can find any evidence for it. Anyway, it's an interesting theory, I suppose.

Robert Marks:

Well, let's move on to another theory. We've covered panspermia, the Sims theory. Another theory of the reason that we are here is the anthropic principle. Ola, could you educate us about the anthropic principle?

Ola Hössjer:

The word, "anthropic," that has to do with humans. The meaning of the word. And it comes in two versions. The weak and strong anthropic principle. The strong anthropic principle was proposed by John Barrow and Frank Tipler in the late eighties. And it holds that the universe is constructed for life to exist and for humans to live and thrive within the universe.

Ola Hössjer:

In that sense, the strong anthropic principle is closely related to that our universe is fine-tuned for life to exist, and for humans to live with it. But it also adds an interpretation of it. It's also almost like a purpose. But the other version, the weak anthropic principle, it also deals with the fact that the universe is fine-tuned for life to exist.

Ola Hössjer:

But it says that, as humans, we are sort of biased, because we live in a universe that harbors life. For this reason, we are biased. It's also called selection bias. So it's sort of a criticism of the strong anthropic principle, saying that, "Yes, if there was another universe without life, we would not be able to live in that universe and tell that it existed."

Ola Hössjer:

According to the weak anthropic principle, we should not be surprised to live in a universe that harbors life. These are two different kinds of interpretation of fine-tuning of the universe or fine-tuning of the universe for life to exist.

Ola Hössjer:

But I should add that, in our paper that we published recently and which we talked about during episodes one, two, and three ... The paper is Cosmological Tuning Fine or Coarse? That was published in the Journal of Cosmology and Astroparticle Physics.

Ola Hössjer:

There we compute or give an upper bound for the probability of a randomly generated universe to have a certain constant of nature, ending up within its life-permitting interval. And then, we actually take the weak anthropic principle into account, and still we come up with small probabilities for certain constant of natures or certain ratios or constants of nature.

Ola Hössjer:

So I think that is interesting. Even though this weak anthropic principle in a sense criticizes a strong anthropic principle, we are able to come up with a small probability of ending up within the life-permitting interval, and still not violating the weak anthropic principle.

Robert Marks:

One of the best counter examples of the anthropic principle I heard from William Lane Craig. I don't think he was the originator of the idea, but it's very clear from the work that we've been talking about, that the probability of our universe permitting life is very, very small.

Robert Marks:

Craig gives the example of a man dressed and ready for a firing squad. He goes out, his hands are bound. His eyes are covered, so he doesn't have to look at the firing squad. But in the firing squad, there are people which hate him. There are marksmen. There is one guy with a bazooka. And they're all ready to take him out in this firing squad. A big explosion happens, and there is a lot of smoke. But when the smoke clears, the guy was still standing there.

Robert Marks:

His blindfold was gone, his hands weren't tied behind his back. Everything was okay. He didn't have a scratch on him. The anthropic principle would correspond to the guy that was in front of the firing squad, shrugging his shoulders and saying, "You know what? It happened. I don't know why, but it did happen. I don't have to worry about that, because I'm here. And that's proof that it happened."

Robert Marks:

Whereas, I think in reality, if we had a small probability event like this ... If I was the guy in front of the firing squad, I might dedicate maybe a portion of my life to finding out why the heck I wasn't shot. Why did this low-probability event happen?

Robert Marks:

I think it's intellectually bankrupt. The anthropic principal is intellectually bankrupt. And I see that this is shared by a number of physicists, that they see this as an explanation that fits their ideology. But they're really not wild about the anthropic principle at all.

Ola Hössjer:

And I totally agree with you. If we apply ... I think that example with the firing squad is a very nice one. I think if we apply the weak anthropic principle to everyday life, we should not be surprised by anything.

Ola Hössjer:

Because we simply say, "Well, given that it's happened, it sort of happened. And I cannot sort of say anything about the probability for it to happen or anything." And I think that, as philosophy of life, that is difficult to adhere to for anyone.

Robert Marks:

Could we talk about the difference between the weak and strong anthropic principles? We were talking about movies. There's one of the first X-Men movies, where Dr. Xavier who heads the school for special mutants gives a homework assignment.

Robert Marks:

And he says, "Your homework assignment is to go home and write an essay about the weak and strong anthropic principle." So the weak and strong anthropic principle has made it into the movies. What's the differentiation between the two? What makes the anthropic principle weak? What makes it strong?

Ola Hössjer:

I think that if we start with the strong anthropic principle, then it's really saying that it's almost like the universe was constructed for a purpose. For humans to exist and thrive within it, because the probability for it happening by chance is so small.

Ola Hössjer:

And then, the weak anthropic principle tries to weaken or explain away that first explanation. By saying, "Yes. But given that we exist here, we cannot say anything about any other possibilities." We are bound to simply accept that we live here. And it's like we are not going to think about the reason for this happening at all.

Daniel Díaz:

Let me add one thing about it. And it is related also to your previous questions about how did we measure the probability in our paper. Basically, the idea was ... That was the idea behind taking the maximum of the probabilities over the restrictions we were considering. We are not considering only our universe, but we are considering all the possible universes that could have existed under the restrictions that were assumed.

Daniel Díaz:

And then, once we are doing that, we remove the possibility of the weak anthropic principle to appear in our measurement. Because we are not just looking at our universe, again. We are looking over ... We are taking a general overlook over all of the possibilities. And then, once we are doing that, we select the maximum. That's why I mentioned before that we were going conservative in our approach.

Daniel Díaz:

And then, in that way, we avoid the weak anthropic principle. And it has some strength in terms of the measurements, because we don't want to fall in the category of the selection bias measurement. Again, that is pretty common in scientific developments. The way to avoid it then was just to consider all the possibilities, and then taking the maximum probability. That's how we approach it in our paper.

Robert Marks:

Okay. Well, Daniel, continue about another theory of why there is fine-tuning. We've talked about panspermia, the Sims theory, the weak and strong anthropic principle. And the one I'm hoping you will comment on, Daniel, is the multiverse. That's another explanation for why we are experiencing fine-tuning.

Daniel Díaz:

Okay. The multiverse is this idea that there is not only one single universe, but that there are multiple universes. The theory, again, is highly controversial, because nobody can measure what is happening outside our universe.

Robert Marks:

That's a good question. I don't think, and correct me if I'm wrong, that there's any evidence at all for the existence of a multiverse.

Daniel Díaz:

No, it is only some theoretical developments that are based on the assumption. It's basically assuming that there has to be other universes, so we have to multiverse that produces that outcome. And it is an assumption. What I mean, in the end, is that it is an assumption that is done and it is not a conclusion of science. It is not a conclusion of physics.

Daniel Díaz:

And it is very interesting, because most of the talk about multiverses started to appear once it was realized that there was fine-tuning in nature. Of course, as a metaphysical possibility ... Well, it is a possibility. But it is highly biased by the assumptions that people are making with respect to what is the cause of the fine-tuning that we are observing.

Daniel Díaz:

The problem, if you think about it, as I was saying before, is that we cannot know that there are external universes beyond ours. We cannot even look at our whole universe. We can only see our universe to the point where light hasn't traveled yet. And in our universe, that is what is called in physics, the observable universe.

Daniel Díaz:

There is theoretically a portion of our universe that we cannot observe. My point is that we cannot even look at our whole universe, let alone looking outside the universe. There's no way to do that. We could even know how to measure that thing.

Robert Marks:

Excellent. I have to brag about one of my publications. One of my pieces of analysis about the universe. A lot of people say ... Concerning the multiverse, I'm sorry. I said universe. Some people say regarding the multiverse that in some parallel universe, this podcast would end right now. And in another universe, it would say that Daniel was in Miami as opposed to Columbia.

Robert Marks:

They use the multiverse to say that anything can happen. Now, there's different versions of the multiverse. One is from quantum theory, which says every time there's a quantum collapse, that the universe is split. That's a weird interpretation. I'm kind of a Copenhagen man, myself. But there's also the ones where ... There are other theories where these multiverses literally exist. And I visualize them as being side by side.

Robert Marks:

The theories for multiverses are many, but one of the most common one has about  $10^{10}$  to the thousandth universes in the multiverse. And that sounds like a lot. It does sound like there might be some place that this podcast ends right now. And there might be one where it doesn't end right now. But if you look at the simple math behind it, it can't happen.



Robert Marks:

Following on that, there's a universe where I am bald. I still am not totally bald. It's getting thin up there, but I'm not totally bald. How many universes would it require for me to be bald in one and not bald in the other? It would take two universes, right? Now, we talk about Ola. No offense, Ola, but in some universe you might be bald too.

Ola Hössjer:

Yes, certainly.

Robert Marks:

And so, what happens? How many universes do we need for that? We need four. Right?

Ola Hössjer:

Yes.

Robert Marks:

We need bald, bald. Bald, not bald. Not bald, bald. And then, the fourth one. We have four. Now, let's put Daniel, who has a rich crop of beautiful hair. But in some universe, Daniel, you're bald. How many universes would we need then?

Daniel Díaz:

Eight.

Robert Marks:

We would need eight. Every time that we add a different contingency, we double the number of universes that are required.

Daniel Díaz:

At least.

Robert Marks:

At least. Yes. We're only using binary counter distinctions here also. We could have one where you're bald, not bald, and then maybe partially bald. We could do three or four or five. We would multiply it, instead of by two, we would multiply it by five. But let's just stick with two. You take each added counter distinction, and it doubles the number of universes.

Robert Marks:

You can work backwards by taking ... If you're a nerd, you take the log base two of the number of universes to get the number of counter distinctions. Anyway, if you go up to 10 to the thousandth, which is a common model ... One of the models for the existence of the multiverse is that we have 10 to the 100th, 10 to the 500th, 10 to the 1000th.

Robert Marks:

I'm taking the worst case conditions. How many counter distinctions can you have? Well, if you take the log base two of that, you find out less than 4,000. There can only be 4,000 different things in these universes. Even though 10 to the 1000th sounds like a heck of a lot, there's not a lot of things you can do with only 10 to the thousandth parallel universes.

Ola Hössjer:

Mm-hmm (affirmative).

Robert Marks:

And then, there's people that say, "Well, maybe we have an infinite number of universes?" That is pure speculative metaphysics. There's nothing in our universe that is infinite. Everything is finite. Everything.

Daniel Díaz:

Your point is that, as we are adding contingencies, the number of multiverses is exponentially increasing?

Robert Marks:

Exactly. It increases exponentially, and 10 to the thousandth isn't enough to do anything. We've been covering different theories of the multiverse. And I think multiverse, in terms of probability, has been added for those that don't want to look to a creator as saying, "Well, if we have a multiverse. Then, anything could happen."

Robert Marks:

And I think that just careful analysis says that isn't true. Also, the fact that there is no evidence that there exists parallel universes. Absolutely zero. Let's continue. We've been talking about the reasons for fine-tuning. Panspermia, the Sims theory, the anthropic principle.

Robert Marks:

We've just covered the multiverse. And so, let's now go to the deist, creator interpretation, which I would say is embraced by Christianity, Judaism, Muslim, and many other religions. What is the deist, creator interpretation of the fine-tuning of the universe?

Ola Hössjer:

I think ... Previously, we have defined that something is fine-tuned if it's unlikely to occur by chance, and if it has an independent characterization. And in terms of the universe, that is that the universe harbors life. If not, it's very unlikely that, for instance, such a universe came to existence by chance.

Ola Hössjer:

Then, it's sort of very natural to think about other courses of the universe. Since we also have now, for something to be fine-tuned, it has to have an independent specification or characterization ... Often it's the case that this characterization brings us, or it comes to us to think about creative mind. Because in terms of the universe, it's that this universe should harbor life.

Ola Hössjer:

When we talked about biology, it's that a protein should function. Or when we talked about molecular machines, it was the same thing. It should function. All this independent characterization that is part of the fine-tuning brings us, or tells us that probably there is a creative mind behind. Or that's a very good hypothesis.

Ola Hössjer:

It's like when we look at a painting and see features that we can recognize. Just as we ... When we look at life and see all the features of life, it's things that sort of brings our thoughts towards the creative mind. For that reason, I would say that fine-tuning naturally leads to a theistic interpretation.

Ola Hössjer:

Earlier during this episode, we talked about fine-tuning is something we observe, and that's quite uncontroversial when it comes to cosmology. But now, we talk about the interpretation of fine-tuning. And the theistic interpretation is quite natural, because of the way we define fine-tuning.

Robert Marks:

So the creator of this is a creative mind. And so, I think a lot of people would say, "Okay. You're talking about God," which I think we are. Right?

Ola Hössjer:

Yes, certainly. Yes.

Robert Marks:

It's very interesting about how the fine-tuning of the universe has brought people to a belief in God. One of them, which is kind of a poster boy, is Antony Flew, who wrote in 1976, *The Presumption of Atheism*. Gosh, who was it? I think it was Walter Bradley was telling me.

Robert Marks:

Boy, he sure wishes that Antony Flew had become a deist before he became a deist. That would save him from reading a lot of Antony Flew's defense of atheism, but it didn't happen. He had to read a lot of Antony Flew's work on the defense of atheism.

Robert Marks:

I want to get now to the last topic that I want to talk about. I think panspermia is silly. I think Sims theory is silly. But for every one of these that I think is silly, there are people out there that would argue and debate me and say that they're not silly.

Robert Marks:

Many times this comes down to a personal belief that everybody has. And so, we're going to put aside the physics and talk about what our personal beliefs are. Let's go ahead and start with Daniel. What do you think is the cause of all this fine-tuning that we see in the universe?

Daniel Díaz:

Okay. Just trying to go a little technical in the philosophy here. Just let me make a differentiation between deist and theist.

Robert Marks:

Yes. Okay.

Daniel Díaz:

It's an important point to make, because actually the deist believes that there is a God, but that the world is created in such a way that God is not interacting with it in any way.

Robert Marks:

Really? I always thought that the theist was a subset of deist, but I'm being corrected here. Is that right?

Daniel Díaz:

The theist or theism is the position that there is a God and he interacts with the universe he created. So there is kind of a differentiation between the two. Deism was actually championed by Baruch de Spinoza, and it influenced Einstein's thinking a lot. Actually-

Robert Marks:

Who was it influenced by?

Daniel Díaz:

... Baruch de Spinoza. He was a very famous philosopher in Europe in ... I think it was the 1800s, but I might be mistaken in the date. But the point is that he defended a universe ... This is very interesting. The guy was a believer in God. Of course, that's why he proposed that there was a God, but he did not interact.

Daniel Díaz:

But he created ... He thought that God had created a world that was so perfect that it did not need any intervention. So it is a very, very mechanistic way of thinking of the world. And that was something that Einstein observed a lot. That is the reason for Einstein to reject quantum physics with its Copenhagen interpretation. That's where the famous sentence of Einstein came about, "God does not play dice."

Robert Marks:

Yes.

Daniel Díaz:

Because he was thinking that if God were playing dice, then he would be interacting with nature, with the world that God created. For Einstein, that was unthinkable. Anyhow, that's the deist position. The theist position is to believe that there is a God, and that he interacts with the universe that he created.

Daniel Díaz:

So I am a Christian. And that's basically the position, I suppose. That's what I think happened. That's according to my worldview, the best explanation for fine-tuning. I think that there was a God. That there is a God, actually, who created the world, and that we can see evidence of that in fine-tuning.

Robert Marks:

Okay. Ola? What do you think?

Ola Hössjer:

Yes. I totally agree with Daniel, and I'm also Christian. Therefore, for me, it's natural to associate or explain a fine-tuned structure, such as the universe existing with life within it, to interpret that as the universe was created by God. And that also he had a purpose for creating that universe. And that purpose was for humans to live in the universe, and thrive within it and have a relationship with God.

Ola Hössjer:

So I connect to this interpretation with reading the Bible. And so, the Bible also says that we as humans, we have a big responsibility in taking care of our planet. The earth. That naturally leads us to the anthropic principle, the strong anthropic principle. That God created the world, the universe, and our planet in a way that is optimized for us humans.

Ola Hössjer:

And that's simply because ... In my interpretation, that's because of his love for us. And I think that his love is most strongly revealed in his sending his only son Jesus Christ to die for our sins, so that anyone who believes in Jesus and commits his life to Jesus will have eternal life.

Ola Hössjer:

Personally, I gave my life to Jesus when I was 22, 23 years old. And that has been the best decision of my life. And that is my interpretation of fine-tuning. It's really, God is the creator of everything. For the purpose that he loves us, and he wants to have a relationship with us. He wants also to be surrounded by a nature and a cosmos that is functioning well and that is also aesthetically pleasing.

Robert Marks:

Excellent. Thank you, Ola. I am with you. I am also a follower of Christ. I would say even more fundamental. I'm kind of a John 3:16 kind of Christian. And I became a Christian about the same age that you did, Ola. I was 22 years old, as a junior in college and nothing made sense ... Nothing made sense, and then I came to Christ and all of a sudden everything made sense. And it was just a beautiful, beautiful experience that's difficult to communicate to people.

Robert Marks:

Yep. I'm with you. One of the things that happens is I think that people become Christians by their faith. But one of the things, especially people like us, we are intellectually gifted. That's been gifts that God has given to us. We are all three, if you'll excuse the expression, kind of nerds, if you will. And the beautiful part about being a Christian is that all of these things that we look at are intellectually stimulating and provide evidence for the faith.

Robert Marks:

And I have always find that just to be wonderful. I've always looked at the Christian version, which talks about God's creation and the purpose of God's creation and our existence. And this is Romans 1:20. It says, "Since the creation of the world, God's invisible qualities of eternal power and divine nature have been clearly seen. Being understood from what has been made, so that people are without excuse."

Robert Marks:

Louis Pasteur famously said, "You know, the more I look into the science, the more I see God." That certainly is true with all of this fine-tuning stuff that we've talked about. The more I look into it, the deeper I understand it, the more I see God's hand in it. And it's just been wonderfully, intellectually satisfying in our times and our discussions together. Great. Any final words?

Daniel Díaz:

Yeah. I just want to mention another thing, Bob. And it is that all the other quotation, "competing explanations," to the theist interpretation that God is the source of the fine-tuning are actually not totally opposed to it. For instance, in the simulation hypothesis, it is perfectly possible to think that the programmer was God.

Robert Marks:

Yeah. I've thought about that too. I've thought about that too. He kind of wrote us and created us with his word and we're simulations of God in some sense. Is that what you're saying?

Daniel Díaz:

Exactly. I'm not saying that's my interpretation, but then that is a possibility if we are considering the simulation hypothesis. On the other side, for instance, with the weak anthropic principle, the fact that the observation is biased does not mean necessarily that it is incorrect.

Daniel Díaz:

That happens with the weak anthropic principle. With the strong anthropic principle, that actually adds the interpretation and says that the universe was made so that it could host life. Well, it's basically going into a deistic at least, or even a theistic interpretation.

Daniel Díaz:

None of those things in the end are necessarily opposed. It's just a particular version of those points that would be opposing to the theistic version or the theistic argument as the source of the fine-tuning. That's very interesting. Because not even the arguments that have been placed in order to counter it necessarily counter the theistic interpretation of the fine-tuning.

Robert Marks:

One of the things ... Stephen Hawking wonderfully said that nothing has proven in physics, that you only accumulate evidence. I think an accumulation of evidence is also important for these interpretations of fine-tuning.

Robert Marks:

There is no evidence for panspermia, directed or otherwise. There's no evidence for Sims theory. Although, we've heard stories. I don't know if they're urban myths, but we have heard stories about Elon Musk looking for holes in the theory of fine-tuning.

Robert Marks:

There is no evidence of the strong and weak anthropic principle. It is totally philosophical. There is no evidence about the universe, but there is evidence accumulating that maybe God almighty was the

creator of the universe. With abductive reasoning, that kind of leads me to the biblical account of creation as the correct one.

Daniel Díaz:

Yes.

Robert Marks:

It's the only one to me that makes sense.

Daniel Díaz:

Yeah. In the end, to me, it's the same thing.

Robert Marks:

Okay. This has been great. Look, we've been talking about fine-tuning in our universe. Not only in our universe, but in biology with Dr. Daniel Diaz from the University of Miami and Dr. Ola Hössjer from Stockholm university. It has been a great chat. We've covered a lot of material and I've learned a lot. So I hope you've enjoyed it too. Until next time, be of good cheer.

Announcer:

This has been Mind Matters News with your host, Robert J. Marks. Explore more at [mindmatters.ai](http://mindmatters.ai). That's [mindmatters.ai](http://mindmatters.ai). Mind Matters News is directed and edited by Austin Egbert.

Announcer:

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