# Book Review

## A Fortunate Universe: Life in a Finely Tuned Cosmos

Geraint F. Lewis and Luke A. Barnes, A Fortunate Universe: Life in a Finely Tuned Cosmos, Cambridge University Press, 2016, 373pp.

> Reviewed by Dr. Marco Kletting Modern Physics, Cosmology and Design Dr. John Bloom October 24, 2021

### 1. Author Information

Both authors of *A Fortunate Universe* are practicing scientist in the fields of astrophysics and cosmology. Geraint F. Lewis is a professor of astrophysics at the Sydney Institute for Astronomy, part of the University of Sydney. He holds a Ph.D. in astrophysics from the world-renowned Institute of Astronomy at the University of Cambridge. Lewis has published in different fields, including gravitational lensing, galactic cannibalism, cosmology and large-scale structure. He also blogs at *cosmic-horizons.blogspot.com.*<sup>1</sup> Luke A. Barnes (PhD at the University of Cambridge) is postdoctoral researcher at Western Sydney University, Australia. He works on cosmology, galaxy formation, and the fine-tuning of the universe for life. Luke Barnes blogs at *letterstonature.wordpress.com.*<sup>2</sup> It is apparent that both authors have the necessary background to write authoritatively about fine-tuning in the universe.

Both scholars agree that the universe is fine-tuned for life but draw different conclusions what follows form that. Here their personal worldview plays an important role. Luke Barnes is a Christian who thinks that the fine-tuning of the universe is a good indication that it has been designed by God. Lewis seems to be an agnostic, who is open to the idea of design but at the end sticks with the multiverse<sup>3</sup>. For both the topic is not just an idle speculation about the cosmos, since the answer to the question why the universe is fine-tuned for life has an impact on their worldview. Christians can derive an argument for Gods existence from fine-tuning of the cosmos. While it is not the only argument for God, it is an important one since fine-tuning is also accepted as a real thing by many skeptical scholars. If an atheist or agnostic (like Lewis) would come to the same conclusion as Barnes this would impact their way of living, because this raises the issue of accountability to a higher power.

#### 2. Summary

As the title suggests the books main thesis is that our universe is finely tuned for the existence of life. Which means in brief that if some of the fundamental properties of the universe would be changed only slightly, life would not be possible. This holds not only for life as we know, but also for life as we can imagine. *A Fortunate Universe* consists of a preface, 8 Chapters on the topic of fine-tuning, which will be summarized in the following, and is concluded by a list of works for further reading.

Chapter 1 - *A Conversation on Fine-Tuning* - starts with an introduction into fine-tuning which is illustrated by an everyday example of backing a cake: if you mess up the recipe, the cake wouldn't taste good. Next, also the term *fine-tuning* itself is defined. "To a physicist, 'fine-tuning' implies that

<sup>2</sup> Ibid., i-ii.

<sup>&</sup>lt;sup>1</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe: Life in a finely tuned cosmos. (Cambridge University Press, 2016), i.

<sup>&</sup>lt;sup>3</sup> Ibid., 353.

there is a sensitivity of an outcome to some input parameters or assumptions."<sup>4</sup> The authors then explain that " 'fine-tuning for life' is a type of physics fine-tuning, where the outcome is life."<sup>5</sup> The term is not used to immediately imply a fine-tuner. Then, a conversion between Luke Barnes and Geraint Lewis follows which serves as a kick-off for the whole book. Next, this chapter includes a discussion on some basics by asking questions:

- Question 1: What is life?<sup>6</sup>
- Question 2: What is the Anthropic Principle?<sup>7</sup>
- Question 3: What is Science?<sup>8</sup>

After providing answers to these questions the authors return to fine-tuning and introduce briefly the concept of natural constants<sup>9</sup> by the example of the gravitational constant.

Chapter 2 - *I'm only Human* - starts with an analysis on what makes up a human body: Cells are the basic bits of the body; cells are made from proteins, which generated by the DNA; both proteins and DNA are complex molecules;<sup>10</sup> molecules consist of atoms;<sup>11</sup> atoms consist of consist of a nucleus (comprised by protons and neutrons) and surrounding electrons; protons and neutrons again consists of up and down quarks. Now, the fundamental level has been reached. The Standard Model of physics list the particles which are believed to be fundamental (e.g., quarks, electron, the Higgs Boson etc.).<sup>12</sup> At the end, the human body consist of up-quarks, down-quarks and electrons. The book then considers different kinds of possible universes which would arise if one altered the properties of the fundamental particles. For example, if the down quark mass is increased by a factor of 70 instead of the proton the delta ++ particle would be the most stable particle and the only element which could arise would be like Helium.<sup>13</sup> Also, the fine-tuning of the Higgs Boson is presented which causes some headache for physicists<sup>14</sup>, since is fine tune to one part in 10<sup>16</sup>.

Chapter 3 - *Can You Feel the Force?* - describes how fine-tuning is involved in the four fundamental forces<sup>15</sup>. First, the four fundamental forces - gravity, strong force, weak force, and electromagnetism - are briefly described. Second, the concepts of Feynman Forces, Feynman couplings and Feynman diagrams are introduced. They allow to get a better insight on how the forces are mediated between particles via force particles. This chapter then considers what happens if the fundamental forces are altered. For example, the impact on chemical interactions is outlined. This subsection includes a nice

- <sup>5</sup> Ibid., 3.
- <sup>6</sup> Ibid., 10-15. <sup>7</sup> Ibid., 15-21.
- <sup>8</sup> Ibid., 21-27.
- <sup>9</sup> Ibid., 29-32.
- 10 Ibid., 33-40.
- <sup>11</sup> Ibid., 40-42 <sup>12</sup> Ibid., 40-43.
- <sup>13</sup> Ibid., 50.
- <sup>14</sup> Ibid., 58-60.

<sup>&</sup>lt;sup>4</sup> Ibid., 3-4.

<sup>&</sup>lt;sup>15</sup> Ibid., 65.

picture<sup>16</sup> showing what results when the values for the strong force constant (representing the strong force) and the fine structure constant (representing the electromagnetic force) are changed. Most of the area spanned by these two parameters is hostile to life (e.g., unstable carbon, unstable protons etc.), and only a tiny area allows a chemistry suitable for life. Also, the impact of changing the forces on Big Bang nucleon synthesis is shown.<sup>17</sup> It is also mentioned that if additional changes are made, life might exist without the weak force.<sup>18</sup> However, the authors also emphasis that without the weak force it would have been difficult to discover the fundamental physics of the remaining forces. So, the weak force in addition to fine-tuning for life also is an instance of fine-tuning for discoverability.

In Chapter 4 - *Energy and Entropy* - the relationship of energy. Energy is required for any form of life to exist. Since entropy can be thought of in terms of useful energy<sup>19</sup> and a low entropy corresponds to high useable energy, life requires a low entropy. Next, the authors explain how the sun, which is the main energy source, provides its energy.<sup>20</sup> Then, they describe how an altering of the pull of gravity would affect the stability of stars. Both weakening and making gravity stronger can quickly lead to unstable stars, which would be detrimental for the existence of life. The authors also show that only certain combinations of the strength of gravity and the electromagnetic force would lead to stable stars. This is beautifully illustrated by a figure depicting the stability of stars as a function of the electromagnetic and gravitational forces.<sup>21</sup> The area leading to stable stars only is one part of 10<sup>35</sup> of the whole area.<sup>22</sup> In the following section they describe the so-called Hoyle resonance which involves fine-tuning of the initial entropy of our universe, which made it possible that stars and galaxies as we observe them can exist.<sup>24</sup> The initial entropy of our universe at the Big Bang needed to be fine-tuned to one part in 10<sup>10<sup>123</sup></sup> to get a universe like ours!<sup>25</sup>

Chapter 5 - *The Universe Is Expanding* - starts with a brief introduction to the basic features of the universe. The authors briefly describe the mathematical framework of cosmology which is based on the (astonishingly simple) *Friedmann–Lemaître–Robertson–Walker* (FLRW) model.<sup>26</sup> Next different possible geometries of the universe are described before the discussion turns to the concept of dark matter and dark energy. Then the authors explain how we know what the Universe is made of. The most important evidence comes from the Cosmic microwave background (CMB). Then they discuss the evolution of the universe<sup>27</sup> and how the universe made its galaxies<sup>28</sup>. Next, they cover some

- <sup>17</sup> Ibid., 75-79.
- <sup>18</sup> Ibid., 91-94.
- <sup>19</sup> Ibid., 97. <sup>20</sup> Ibid., 99-105.
- <sup>21</sup> Ibid., 110.
- <sup>22</sup> Ibid., 111.
- <sup>23</sup> Ibid., 113 ff.
- <sup>24</sup> Ibid., 120 ff.
- <sup>25</sup> Ibid., 126. <sup>26</sup> Ibid., 133.
- <sup>27</sup> Ibid., 143 ff.

<sup>&</sup>lt;sup>16</sup> Ibid., 75.

<sup>&</sup>lt;sup>28</sup> Ibid., 147ff.

"cosmological problems". They first mention the few things know about dark energy. Then they turn to the real problem with dark energy<sup>29</sup>, which is the so called the *cosmological constant problem*: why is the effective cosmological constant so much smaller than each of the vacuum energies? The finetuning involved<sup>30</sup> here is around one part in 10<sup>120</sup>. The next case of fine-tuning mentioned arises from the so-called flatness problem <sup>31</sup> and involves the fine-tuning of the expansion rate of the universe. The expansion rate depends on the critical mass density must be controlled<sup>32</sup> to one part in 10<sup>55</sup> in order to get a universe with galaxies. The next case of finetuning taken up in the section on the "Horizon problem" is the fine-tuning of  $\Omega$ , which describes the "initial lumpiness in the universe."<sup>33</sup> Next, they analyze the attempt to solve the fine-tuning of  $\Omega$  by cosmic inflation<sup>34</sup>, which ends up in requiring another kind of fine-tuning to solve this problem.<sup>35</sup> The book then describes the fine-tuning of the neutrino: in order for life to exist an almost massless neutrino is required.<sup>36</sup> In the final part of this chapter the authors argue that the flatness problem might be solved by inflation.<sup>37</sup> But this does not remove the other cases of fine-tuning.<sup>38</sup>

Chapter 6 - *All Bets Are Off?* - <sup>39</sup> describes what would happen if the laws of nature themselves are changed. It starts with a brief introduction into quantum mechanics (QM).<sup>40</sup> Then the authors turn to fine-tuning in QM and discuss what happens if Planck's constant is changed. They show that Planck's constant has the right magnitude for QM to have influence only where needed – in the very small. Next, they cover why a certain amount of symmetry (however not a too much symmetry) in the universe is important for life to exist.<sup>41</sup> The next case of fine-tuning considered is the fact that at the Big Bang there was slightly more matter than anti-matter.<sup>42</sup> Then, they deliberate on the question if the structure of the Standard Model itself represent a case of fine-tuning. <sup>43</sup> The following section of Chapter 6 deals with the Nature of time<sup>44</sup>: Where does the arrow of time come from? Several candidates are considered. The radiation arrow of time, cosmic time and the quantum arrow of time do not fit the bill. For example, in case of the cosmic time the equations that describe the expansion of the universe would allow us also to consider time running backward.<sup>45</sup> However, thermodynamic time seems according to the authors be the right candidate for the source of the direction of time, which appears to be an effect of the very special initial state of the universe (it's very low initial entropy).<sup>46</sup>

- <sup>29</sup> Ibid., 158 ff.
- <sup>30</sup> Ibid., 161-162. <sup>31</sup> Ibid., 164-167.
- <sup>32</sup> Ibid., 165.
- <sup>33</sup>Ibid., 170.
- 34 Ibid., 170-173.
- <sup>35</sup> Ibid., 173.
- <sup>36</sup> Ibid., 173-177.
- <sup>37</sup> Ibid., 179-180.
   <sup>38</sup> Ibid., 180-181.
- <sup>39</sup> Ibid., 182 ff.
- 40 Ibid., 183-191.
- <sup>41</sup> Ibid., 197-204. <sup>42</sup> Ibid., 204-208.
- <sup>43</sup> Ibid., 208-210.
- <sup>44</sup>Ibid., 210-221.
- <sup>45</sup> Ibid., 215.

<sup>46</sup> Ibid., 220-221.

Next they discuss the importance of having 3 macroscopic dimension and 1 time dimension for the development of complex life.<sup>47</sup> While our universe is both continuous in space and time, mathematicians have investigated discrete universe in the form of cellular automata, which are covered in the following Section. <sup>48</sup> This is also considered in this chapter. It turns out, that in order to get an interesting universe with complex patterns only a specific set of rules are suitable – which is also a form of fine-tuning.<sup>49</sup> The Chapter concludes with an ultimate chaos scenario in which there are no mathematical rules at all, and everything is basically random. In that case there is also no hope for any form of life to arise.<sup>50</sup>

Chapter 7 - *A Dozen (or So) Reactions to Fine-Tuning* - deals with 15 common reactions/objections to fine-tuning<sup>51</sup>, which the authors have collected over the years. To each reaction a short and a longer answer is given. I will mention three examples. First, among the reaction is the claim that low probability events happen all the time<sup>52</sup>, which is misguided since it would also "never be able to reason probabilistically at all."<sup>53</sup> Second, it is sometimes claimed that only one parameter is considered at a time,<sup>54</sup> and that if one let vary more than one parameter at a range of life-permitting universes is possible. However, the authors argue that "Life requires a number of different constants to be related to each other in unusual and precise ways."<sup>55</sup> Third, another famous objection is that there could be other forms of life.<sup>56</sup> However, most of the fine-tuning cases discussed assume very little about life. For example, only a slight increase of the cosmological constant would lead to a universe with no structure whatsoever, and a small decrease (to negative values) leads to no universe whatsoever.<sup>57</sup> The authors note that "These universes are so simple that there is nowhere for alternative life forms to hide."<sup>58</sup>

Finally, Chapter 8 - *A Conversation Continued* - is about a few remaining reactions. I will also interact with some parts of this chapter further below, therefore I will keep the summary of this long chapter brief. The first remaining reaction is, that that the constants of nature will be explained by deeper physics.<sup>59</sup> The second is the multiverse, which basically means that "there is a vast, varied collection of universes out there, in which the right set of constants is bound to turn up somewhere. We must observe a life-permitting universe because those are where all the observers are!" <sup>60</sup> The third remaining reaction is design: "The universe has its properties because it achieves the goals of a

- <sup>48</sup> Ibid., 228-234.
- <sup>49</sup> Ibid., 232-233.
- <sup>50</sup> Ibid., 234-236.
- <sup>51</sup> Ibid., 237 ff. <sup>52</sup> Ibid., 238 ff.
- <sup>53</sup> Ibid., 240.
- <sup>54</sup> Ibid., 254-261.
- <sup>55</sup> Ibid., 255.
- 56 Ibid., 265-273.
- <sup>57</sup> Ibid., 267.
- <sup>58</sup> Ibid., 267. <sup>59</sup> Ibid., 294 ff.

<sup>66</sup> Ibid., 288.

<sup>47</sup> Ibid., 221-226.

<sup>&</sup>lt;sup>60</sup> Ibid., 294 I

universe creator."<sup>61</sup> Also the idea that the universe might be a simulation is considered. These topics are covered in a dialogue between Luke and Geraint. While both authors agree that fine-tuning is real, they draw not the same conclusions from that fact. Luke represents theism and Geraint is a friendly agnostic.

#### 3. Evaluation

### 3.1. Strengths

*A Fortunate Universe* is a remarkable book! It has received endorsements from prominent scientists like cosmologist George Ellis and physics Nobel Laureate Brian Schmidt, from philosopher of physics Tim Mauldin, philosopher, and fine-tuning expert Robin Collins and several more.<sup>62</sup> The book is a wide-ranging treatment of fine-tuning. Robin Collins similarly notes that "'Lewis and Barnes' book is the most up-to-date, accurate, and comprehensive explication of the evidence that the Universe is fine-tuned for life."<sup>63</sup>

The book clearly shows how fine-tuning for the existence of life is required on many levels: from the basic properties of the fundamental particles to the forces of nature, the natural constants, the initial conditions of the universe etc. The authors always give details, why manipulating a specific aspect of nature, results into problems for life to exist. Furthermore, the authors never overstate their case and even mention instances where the fine-tuning might only apparent - for example the fine-tuning of the flatness problem.<sup>64</sup>

The authors have clearly established the main thesis of the book: fine-tuning of the of universe as described by the Standard Model is real - real on many levels. While there are still some scholars like Victor Stenger<sup>65</sup> who are investigating the issue of fine-tuning and claim that there is no real fine-tuning, these scholars are in the minority. If reading this book leaves one cold and unamazed by the fact in what a special universe we live, I doubt any other treatment on the topic would convince. In that case, the opposition to fine-tuning has reasons which have nothing to do with science.

The book also provides a nice introduction into cosmology, Big Band theory and other relevant topics. In doing so the book is quite technical but it remains accessible to any layman who is interested in physics. The book is also sprinkled with humor which makes enjoyable to read. A reviewer from the Wall Street Journal similarly notes: "This requires a gentle stroll through the details of the

<sup>61</sup> Ibid., 288.

<sup>62</sup> Ibid., iii ff.

<sup>&</sup>lt;sup>63</sup> Ibid., iv.

<sup>&</sup>lt;sup>64</sup> Ibid., 179-180.

<sup>65</sup> Ibid., 359.

Standard Model of particle physics, as well as the Standard Model of cosmology, but they lead us with such a light hand, streak of humor and lack of pedantry that the information is easily absorbed. "<sup>66</sup>

In some books covering the topic of fine-tunning, the fine-tunning of a fundamental aspect of nature (e.g., a natural constant) is often just stated as being fine-tuned to one part in **x**, without giving more details. It is not always clear what this means: Does this mean we cannot change it more than 1/x times is current value? Or is that the probability of a natural constant being in the life-permitting range? Or even something else? When arguing for fine-tuning and claiming something is fine-tuned to one part in **x**, we need to precise what we mean by that. Here, usually the life-friendly range of values of a physical quantity is compared with the range of values in which the physical quantity could generally lie. The relative width of the life-friendly area is therefore decisive not the absolute width. One part in **x** is therefore the results when transforming the fraction of *life permitting range/possible range* to 1/x. *A Fortunate Universe* explains the fact regarding the importance of the relative width well with an example of a dart hitting almost the bullseye.<sup>67</sup> "It is the size of the bullseye compared to the size of the wall – not compared to where your dart landed – that makes a bullseye evidence of either your dart-throwing prowess, or your determination (despite your terrible aim) to keep throwing until you hit the bullseye.<sup>68</sup>

The book gives also very nice illustration of what happens when we combine different kinds of finetuning cases. For example, when responding to the objection that "Fine-Tuners Turn Only One Dial at a Time "<sup>69</sup> they provide an example with a combination of the mass of the electron, the up and the down quark. Furthermore, in previous chapters they have already provided examples with a combination of two parameters. One further example is the fine-tuning for the gravitational constant G and the fine structure constant  $\alpha$  in combination (where  $\alpha_0$ , and G<sub>0</sub> are the values in our universe) for the stability of stars,<sup>70</sup>, which has been already mentioned above.

The authors clearly showed in Chapter 7 that a lot of common objections against fine-tuning do not hold water when looked at them closely. Providing first a shorter and then a longer answer was very helpful, since the short answer can more easily be memorized. Moreover, it was a good decision to cover the most common - and in my view most important - reactions to the fine-tuning argument in a separate chapter at the end. This discussion then covered the most important aspects on these final reactions (for my minor criticism see Section 3.2).

In general, the authors authors are also philosophically well informed, which was also noted in a review by philosopher Yann Benétreau-Dupin<sup>71</sup> (for my minor criticism see Section 3.2). This is not

<sup>66</sup> https://www.wsj.com/articles/ours-is-the-best-of-all-possible-worlds-1483053873

<sup>&</sup>lt;sup>67</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 262-263.

<sup>68</sup> Ibid., 262-263.

<sup>69</sup> Ibid., 255.

<sup>&</sup>lt;sup>70</sup> Ibid., 111.

<sup>&</sup>lt;sup>71</sup> Yann Benétreau-Dupin, *Review of Geraint F. Lewis and Luke A. Barnes, A Fortunate Universe: Life in a Finely Tuned Cosmos,* Notre Dame Philosophical Reviews. June 2017. https://ndpr.nd.edu/reviews/a-fortunate-universe-life-in-a-finely-tuned-cosmos/

always the case if scientist publish books which have impact on ultimate questions.<sup>72</sup> Luke Barnes God for example uses philosophical arguments for argues for the existence of God. He employs the *Leibnizian Argument from Contingency*<sup>73</sup>, which if expressed more formally sates<sup>74</sup>:

- 1) Anything that exists has an explanation of its existence, either in the necessity of its own nature or in an external cause.
- 2) If the universe has an explanation of its existence, that explanation is God.
- 3) The universe exists.
- 4) Therefore, the universe has an explanation of its existence (from 1, 3)
- 5) Therefore, the explanation of the existence of the universe is God (from 2, 4).

In addition, Barnes mentions the moral aspects of our being.<sup>75</sup> And he notes that moral notions like good and evil fits better in a theistic universe, than an atheistic one.<sup>76</sup> This is basically the moral argument for God.

## 3.2. Weaknesses/Critique

A Fortunate Universe has no major weaknesses. However, there are some parts I feel some improvement can be made. This will be covered in this Section.

In Chapter 8, Lewis envisions a multiverse based on inflation and on string theory – also known as inflationary string landscape to handle fine-tuning.<sup>77</sup>. In general, the discussion on the pros and cons of a multiverse is good. However, while Barnes notes that the mechanism of inflation is not known and that there "is zero experimental evidence for string theory and even less for the string theory landscape,"<sup>78</sup> the push back could have been stronger. Stephen Meyers argues in his book *Return of the God Hypothesis*<sup>79</sup> that "accepting the multiverse hypothesis requires accepting two distinct types of universe-generating mechanisms to explain two distinct types of fine tuning"<sup>80</sup> First, it requires inflationary cosmology to account for the initial conditions and then it requires the string landscape from string theory to account for different laws and constants of physics. Both must work in combination. <sup>81</sup> Meyer also writes: "Indeed, to explain the fine tuning of both the initial conditions and the laws and constants of physics, the combination of inflationary cosmology and string theory needs

<sup>&</sup>lt;sup>72</sup> See for example Lawrence Krauss is confused about "nothing" in his book A Universe from Nothing: Why There Is Something Rather Than Nothing. New York: Free Press, 2012.

<sup>&</sup>lt;sup>73</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 323ff.

<sup>&</sup>lt;sup>74</sup> Craig, William Lane, *Reasonable Faith (3rd edition): Christian Truth and Apologetics*. (Wheaton: Good News Publishers/Crossway Books, 2009), 106ff.

 <sup>&</sup>lt;sup>75</sup> Ibid., 340.
 <sup>76</sup> Ibid., 346.

<sup>&</sup>lt;sup>77</sup> Stephen C., Meyer, *Return of the God Hypothesis*, 494

<sup>&</sup>lt;sup>78</sup> Ibid., 321.

<sup>&</sup>lt;sup>79</sup> Stephen C., Meyer, Return of the God Hypothesis, 494

<sup>&</sup>lt;sup>80</sup> Stephen C., Meyer, Return of the God Hypothesis, 494-495.

<sup>&</sup>lt;sup>81</sup> Ibid., 498.

to affirm numerous purely hypothetical entities, abstract postulates, and unobservable processes. "<sup>82</sup>. Meyer then lists 10 different postulates which are required for an inflationary string landscape model to work.<sup>83</sup> So, at the end a multiverse may still require some form of fine-tuning.<sup>84</sup> In addition, the universe we live in must be much larger than the observable universe to allow for all the other anthropic coincidences (like the right planet, the right solar system etc. , which not covered in the book since they do not pertain to the fundamental aspects of nature) required for life to arise. That the size of our universe is not known is also started by the authors.<sup>85</sup> Also, the multiverse should be better fine-tuned to prevent the Boltzmann-brain problem. So, to believe that such a kind of hyper-multiverse exists, requires in my opinion more faith than believing in a designer. Furthermore, there is additional fine-tuning for discovery, which is not required for life but for us to acquire knowledge about the universe.<sup>86</sup>

In several places in the book suggest that both authors assume that life has developed by evolutionary processes. For example, they state that "humans are the result of billions of years of evolution, built out of a myriad of complex molecules and structures."<sup>87</sup> However, this assumption can and should be challenged: First, even if all conditions for life are in place it is not clear that there is even the possibility for life to arrange by chance (this is noted also by the authors<sup>88</sup>). Second, no current naturalistic theory accounts for the huge amount of complex specified information (e.g., for the code in the DNA) required for the origin of live (OOL) and its development. Third, we know from general experience the information requires a mind to generate it. Thus, Intelligent Design (ID) argues not from the unknown but from the known: our uniform experience shows that information always arises as the product of mind! <sup>89</sup>

The Boltzmann-brain problem – which is a real problem for multiverse advocates- assumes that consciousness can arise from matter. Moreover, when the authors discuss of what humans are made of, it is not clear to me that they mean that humans are made up of only their bodies. I would disagree that humans are just their body. There are good philosophical arguments that humans also have an immaterial component<sup>90</sup> and there is excellent evidence from Near-Death Experiences that we can be consciousness even with a dead brain and we are more than our bodies<sup>91</sup>. The problem how to get consciousness also affects the simulation hypothesis. How do you get a consciousness out of a simulation?! On idealism you could say the universe is an idea in God's mind! But what Lewis and

<sup>90</sup> See e.g., Moreland, J. P. The Soul: How We Know It's Real and Why It Matters. Kindle ed. Chicago: Moody Publishers, 2014.

<sup>82</sup> Ibid., 498.

<sup>83</sup> Ibid., 498.

<sup>&</sup>lt;sup>84</sup> for a detailed treatment on that issue see: Stephen C., Meyer, Return of the God Hypothesis, Kindle-Version, (HarperOne, 2021).

<sup>&</sup>lt;sup>85</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 12.

<sup>&</sup>lt;sup>86</sup> see e.g., Gonzalez, Guillermo; Richards, Jay W.. The Privileged Planet: How Our Place in the Cosmos Is Designed for Discovery. (Regnery Publishing, 2004), 65 ff.

<sup>&</sup>lt;sup>87</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe,18.

<sup>&</sup>lt;sup>88</sup> Ibid., 12.

<sup>&</sup>lt;sup>89</sup> Stephen C., Meyer, Return of the God Hypothesis, 288.

<sup>&</sup>lt;sup>91</sup> See e.g., J. Steve Miller, Near-Death Experiences as Evidence for the Existence of God and Heaven: A Brief Introduction in Plain Language. Kindle ed. (LLC: Wisdom Creek Press, 2012),138.

Barnes have in mind here is a simulation running on a computer. And it is unfortunate that they not even mention this problem.

While the authors are philosophically informed, I think that the discussion on the nature of time<sup>92</sup> could be improved by adding content on the issue of physical time versus metaphysical time. The authors restrict themselves to physical considerations, and they conclude that the arrow of time arises from thermodynamic.<sup>93</sup> However, philosopher William Lane Craig notes:

"The two arrows of time could be turned 180 degrees without any inconsistency with the facts. Although some scientists try to appeal to the laws of thermodynamics or other physical processes to establish 'the' single arrow of time, philosopher of science Lawrence Sklar points out that all such attempts presuppose a prior choice of direction—for example, that the direction of entropy increase is the 'later than' direction. In the absence of temporal becoming, such a choice is wholly arbitrary. We could have called the direction of entropy increase 'earlier than' if we had wanted to. Thus, 'earlier' and 'later' simply do not have the significance on a static theory of time that they do on a dynamic theory."<sup>94</sup>

The question is if there is (metaphysical) time independent of physical time, as Craig writes elsewhere in the same book:

"For one can easily conceive of a possible world in which God creates a universe lacking any of the typical thermodynamic, cosmological, or other arrows of time, and yet He experiences the successive states of the universe in accord with the lapse of His absolute time. There seems to be no good reason to think of the physical processes as anything more than empirical measures or indicators of the lapse of time, rather than as constitutive of the nature of time itself."<sup>95</sup>

The Big Bang is a hot topic for theists and atheists alike. For theists it gives evidence that the universe has a beginning, atheists obviously try to get around this issue. Here, the authors are in my view too cautious regarding the beginning of the universe. When discussing the special initial low entropy state of the universe, they state "Firstly, we aren't totally sure that the Big Bang was the beginning of the Universe." <sup>96</sup> Further below they write "The Big Bang theory is an extraordinarily successful scientific idea, explaining a broad range of observations. Whether the success of the theory means that the Big Bang points to the beginning of time itself is a different question entirely. The theory describes how the Universe was raised; how it was born – even if it was born – is another matter."<sup>97</sup> While it might be true that the Bing Bang-theory does not explain "How the universe was raised" <sup>98</sup>, it still provides convincing evidence that our universe has a beginning. There is always a

<sup>92</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 210-221.

<sup>93</sup> Ibid., 217 ff.

<sup>&</sup>lt;sup>94</sup> William Lane Craig. *Time and Eternity*. Kindle-Version. (Crossway, 2003), loc 2691.

<sup>&</sup>lt;sup>95</sup> William Lane Craig. *Time and Eternity*. Kindle-Version. (Crossway, 2003), loc 3124.

<sup>96</sup> Ibid., 127.

<sup>97</sup> Ibid., 148.

<sup>98</sup> Ibid., 148.

possibility that things can be otherwise. But this then becomes an epistemic question: a what point can we say that we know something?! If we are 100% certain?! We cannot even be 100% certain about some fundamental things like that the external world is real. Therefore, the Big Bang can be used as scientific evidence for the second premise of the *Kalām Cosmological Argument*, which is an argument for the beginning of the universe and is as follows<sup>99</sup>:

- 1. Whatever begins to exist has a cause.
- 2. The universe began to exist.
- 3. Therefore, the universe has a cause.

Moreover, the second premise is already plausible from philosophical considerations.<sup>100</sup> It just has to be shown additionally why contemporary speculations which try to get around a beginning of the universe are less plausible. It should also be mentioned that some theists also do not like the Big Bang: A review of *A Fortunate Universe* by Dominic Statham from the Young Earth Creationist (YEC) ministry *Creation Ministries International* – who gave an overall positive review –noted that "Unfortunately, and despite its many problems,<sup>2</sup> the authors unquestioningly accept big bang theory as the explanation for the universe. Consequently, the reader must make a conscious effort to distinguish between the fine-tuning needed for life generally, and that required to support the big bang."<sup>101</sup>

## 3.3. Additional Suggestions for what to include in a 2<sup>nd</sup> Edition

In Chapter 7 they also covered the reaction "Whence the Probabilities?"<sup>102</sup> Which states: "… But how are you going to assign probabilities to such an unwieldy mob? You've got more universes than you can poke a stick at. Furthermore, what would such a probability even mean? Are you postulating a universe-generating machine, randomly spitting out universes, laws and constants?" While the response to that reaction is argued well, there has been recent publications which also show how to calculate the probabilities for a certain value of natural constants being in the life permitting range even in the case for an infinite sample space for constants of nature.<sup>103</sup> In a future update of the book the basic ideas of this research could be included or at least referenced.

<sup>&</sup>lt;sup>99</sup> William Lane Craig. *Reasonable Faith (3rd edition): Christian Truth and Apologetics*. (Wheaton: Good News Publishers/Crossway Books, 2009), 111ff.
<sup>100</sup> Ibid., 116ff.

<sup>&</sup>lt;sup>101</sup> Dominic Statham. A naturalist's nightmare - a review of "A Fortunate Universe: Life in a finely tuned cosmos" (Geraint F. Lewis and Luke A. Barnes). Journal of Creation, Volume 32, Issu1, April 2018.

<sup>&</sup>lt;sup>102</sup>Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 282.

<sup>&</sup>lt;sup>103</sup> Daniel Andrés Díaz-Pachón, Ola Hössjer, Robert J. Marks "*Is Cosmological Tuning Fine or Coarse*?" Journal of Cosmology and Astroparticle Physics, July 9, 2021.

Chapter 6 mentions Energy conservation does not hold for the universe as a whole!<sup>104</sup> Since this might even come as a surprise for physicists - let alone for laypeople - this deserves a slightly longer treatment in the main body of the text.

## 4. Theological Implications

Based on fine-tuning of the universe, a Fine-Tuning Argument (FTA) for the existence of a Designer of the universe can be formulated:<sup>105</sup>

- 1. The fine-tuning of the universe is due to physical necessity, chance, or design.
- 2. It is not due to physical necessity or chance.
- 3. Therefore, it is due to design.

If the premises are true, then the conclusion follows necessarily. A good argument is one whose conclusion can be shown to be more plausible than not. Therefore, 100% certainty is not required for and argument to be good! If chance and necessity are ruled out in premise two, then only design remains. Additionally, this argument does not involve any discussion about evolution or even how life could arise on earth, because slightly altering of the fundamental properties of the universe would lead to no life at all. Also, the YEC community can use this argument since some cases of fine-tuning are not depending on the Big Bang or the age of the universe.<sup>106</sup>

Sceptics usually attack premise two of the argument, by postulating some deeper which makes the values of fine-tuning necessary or that our universe is part of a multiverse and that it is therefore not surprising that a universe like ours (with the fine-tuning as observed) could arise by chance among all the other universe in the multiverse, which are mostly hostile to life. Both explanations are discussed in the book. If a deeper theory in form of a Theory of Everything (TOE) is found, then this would not answer the question why this universe governed by these equations exists. As if the equations cause the universe and keep it in existence?! And a deeper theory does not even mean that there couldn't be another deeper theory. Moreover, the fine-tuning of the deeper theory could be in its laws or in its initial conditions. Finally, according to Stephen Hawking a TOE does not even look feasible, since the universe itself to make it work.<sup>107</sup> And as noted ins Section 3.2 invoking the multiverse is also problematic. Furthermore, regarding the Multiverse it is never God *or* the multiverse. God could have also created a multiverse – but then probably without Boltzmann-brains. However, the multiverse is required for atheism to avoid its theistic implications of fine-tuning.

<sup>&</sup>lt;sup>104</sup>Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 194-195.

<sup>&</sup>lt;sup>105</sup> William Lane Craig. *Reasonable Faith (3rd edition): Christian Truth and Apologetics*. (Wheaton: Good News Publishers/Crossway Books, 2009), 161.

<sup>&</sup>lt;sup>106</sup> See also the revie by Dominic Statham: A naturalist's nightmare - a review of "A Fortunate Universe: Life in a finely tuned cosmos" (Geraint F. Lewis and Luke A. Barnes). Journal of Creation, Volume 32, Issu1, April 2018.

<sup>&</sup>lt;sup>107</sup> John Bloom, *Big Bang Lectures*. Biola, University: Modern Physics, Fall 2021.

Therefore, the FTA gives evidence that the universe requires a designer which is outside space and time. This designer must be immensely powerful. This does not immediately lead to the God of the Bible, but it hints to the reality to some form of theism. According to John Bloom "the Anthropic Principle doesn't prove John 3:16 but it does argue strongly for Romans 1:20."<sup>108</sup> The FTA is therefore a powerful argument for Christians to use in evangelism. Since the dawn of humanity, nature already has revealed that there is Creator - even before the fine-tuning of the cosmos was known. This now further strengthened by the incredible fine-tuning of the universe for life. According to Romans 1:20 we are without excuses. Today this holds even more than ever before! We humans are obviously deeply moral creatures and the fine-tuning for having embodied moral agents is even larger than for simpler forms of life. This also gives hints about the character of the Creator. Thus, Romans 2:14-15 comes into mind here, according to which everybody has the law written one's hearts – independent of special revelation. As mentioned in Section 3.1 Barnes also gives a form of the moral argument for God in his discussion with Lewis.<sup>109</sup>

In addition to the FTA, there is also the *Leibnizian Argument from Contingency*, which is advanced by Barnes, and the *Kalām Cosmological Argument* (for which the Big Bang in my view provides ample support) for God. So, there are four powerful arguments for a Creator of the universe which come out of that book. As already mentioned for the FTA this does not lead directly to the God of Christianity, but it paves a way to him. If one considers in addition the historical evidence around Jesus' life, death and resurrection and the claims he made and the often-neglected evidence from miracles in Christian context throughout church history and even today<sup>110</sup>, Christianity comes out (all facts considered) as the most plausible worldview.

If, the FTA would not be successful, this would just remove the argument from FTA, but other arguments and the historical case for Christianity would be still intact. In this case the theological implications would be neutral, since if the universe would not so strongly be fine-tuned, then that would not be an argument against God. There would be just one argument less for God.

<sup>&</sup>lt;sup>108</sup> John Bloom. *The Anthropic Principle Lecture*. Biola, University: Modern Physics, Fall 2021.

<sup>&</sup>lt;sup>109</sup> Geraint F. Lewis; Luke A. Barnes. A Fortunate Universe, 346.

<sup>&</sup>lt;sup>110</sup> See e.g., Craig S. Keener. Miracles: The Credibility of the New Testament. Grand Rapids: Baker Academic, 2011.

### Works Cited

- Benétreau-Dupin, Yann. Review of Geraint F. Lewis and Luke A. Barnes, A Fortunate Universe: Life in a Finely Tuned Cosmos, Notre Dame Philosophical Reviews. June 2017. https://ndpr.nd.edu/reviews/a-fortunate-universe-life-in-a-finely-tuned-cosmos/
- Bloom, John. The Anthropic Principle Lecture. Biola, University: Modern Physics, Fall 2021.
- Bloom, John. Big Bang Lectures. Biola, University: Modern Physics, Fall 2021.
- Craig S. Keener. Miracles: The Credibility of the New Testament. Grand Rapids: Baker Academic, 2011.
- Craig, William Lane, *Reasonable Faith (3rd edition): Christian Truth and Apologetics*. Wheaton: Good News Publishers/Crossway Books, 2009.
- Craig, William Lane. Time and Eternity. Kindle-Version. Crossway, 2003.
- Daniel Andrés Díaz-Pachón, Ola Hössjer, Robert J. Marks "*Is Cosmological Tuning Fine or Coarse*?" Journal of Cosmology and Astroparticle Physics, July 9, 2021.
- Lewis, Geraint F.; Barnes, Luke A. A Fortunate Universe: Life in a Finely Tuned Cosmos. Kindle ed. Cambridge: Cambridge University Press, 2016.

Meyer, Stephen C. Return of the God Hypothesis. Kindle-Version. HarperOne, 2021.

Moreland, J. P. *The Soul: How We Know It's Real and Why It Matters*. Kindle ed. Chicago: Moody Publishers, 2014.

Statham, Dominic. A naturalist's nightmare - a review of "A Fortunate Universe: Life in a finely tuned cosmos" (Geraint F. Lewis and Luke A. Barnes). Journal of Creation, Volume 32, Issu1, April 2018.