

# Theological arguments in modern cosmology

## Introduction

Ever since the ancient times man has been discussing the problem of random or determined orderliness of the world or, in modern language, necessity of physical laws in our universe, as we know it. A similar question (but not completely equivalent) could be: does a universe have a purpose? Theories and ideas that include this universal purpose are often marked as theological ones (good examples are Aristotle's system or the late scholastics and its successors). After the mid age such a view became very unpopular, especially after Copernican revolution and appearance of Descartes' dualism of the spirit and matter. Theological worldview became a subject of harsh dispute mostly in biology and related topics of XIX and XX century.

But with the advancement of physical cosmology of the XX century the question of accidental or determined orderliness of the universe became, at least in principle, available for natural science research method.

Another two important historical developments require our attention: (i) the appearance of quantum mechanics that is – at least according to many (but not all) scientists – extremely subjectivistic (observer related), and its controversy interpretation; and (ii) the formulation of anthropic principle and selection effects.

At this point I have to make a distinction between two mentioned approaches to the problem of world's existence: the theological and the non-theological one. It has to be emphasised that the second one is only *mostly* scientific, but not *entirely*. What is important is that it is non-theological and thus more popular in scientific circles. It is a matter of a very big discussion, but not the topic of this one, although it stands on much more solid grounds. The actual question that I will try to argue would be: is there a God(s)? What are the arguments in favour of such hypothesis, and are there any reasons for us to bring in a divine figure?

Already we come to the first problem – reasonable faith!? At first glance this sounds very contradictory: isn't it *credo quia absurdum* – I believe in the unexplainable? I shall try to make a point that it needn't be so. But let's get one thing clear in the very beginning: from a Christian point of view, *to prove* God's existence is not only impossible, but any attempt of that kind furthers us even more from him. That's why the God science is searching for is not a Christian one (or a God of any other religion), but rather close to pantheistic God of Baruh de Spinoza, who claimed (interpreted that way) that all the complexities of the cosmos are simply the complex thoughts of a divine mind: *Deus sive natura*.

## Cosmology and theology

How best might we relate cosmology and theology? Many today urge that we could take the cosmic beginning as direct support of the creation of the world as described in the Bible. But the Bible and Christianity itself, as I have said, will not be the topic alone. My attention is directed towards reasoning known as cosmological argument<sup>1</sup> that tries to justify belief in God by pointing to the existence of the cosmos, its causal orderliness, and alleged evidence of its being in some sense designed to include life and intelligence.

Some (in fact many) cosmologists believe, however, that the existence and order of the cosmos can be accounted for scientifically. The explanation they offer is based on a very speculative concept of multiple universes, a large theory that I shall not go in now. They should hesitate before concluding that an omnipotent, omniscient, all-creating person had made their surroundings life-permitting.

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<sup>1</sup> Burrill 1967; Craig 1979, 1980; Hepburn 1967

Philosophers, too, have doubted that such a remarkable person would be needed to explain such affairs, or that this person's own existence could be any less in need of explanation (this problem will be discussed later on). They may here conceive God in a way not everybody would accept, what makes interactions between cosmology and theology often depending on which picture of God is preferred. Such interactions include discussions of the nature of time and of the human mind, and of whether intelligent life is widespread in the cosmos.

However, maybe my biggest concern is not the very way science or philosophy give answers to such questions, but how scientific, how any results might be taken as the basis for faith. This concern is fed from a number of sources. First of all the doctrine of creation should not be minimised to a single claim, namely that creation had a beginning. It is fair to search for theological aspects in the context of science, but we mustn't reduce theology to a single scientific argument. Second, but no less important, is the problem I already mentioned – faith does not need a confirmation, on the contrary, it is a reason for itself. So the concept of faith I propose is slightly different: reasonable faith is possible in the same sense as statistical quantum mechanics. When all I know about an outcome of a certain process is (for example) that it has 50% chances to go one way and 50% to go other way, all I can do is to believe that it will choose one of them. The final reasonless belief we find here is the same as "classical" faith. I shall return to this concept of reasonable faith later.

## The anthropic principle and theology

A great deal of attention have recently been given to so-called "Anthropic principle" (AP) – a gold mine for philosophers. Few philosophical matters are so rich in important empirical implications, touch on so many fascinating scientific questions, or contain so many conceptual and methodological confusions.

The subject is so big that it would require a whole book to be presented the proper way, so I shall restrain myself to the Carter's basic definition:

... the *anthropic principle* to the effect that what we can expect to observe must be restricted by the conditions necessary for our presence as observers.<sup>1</sup>

Note that Carter's word "anthropic" was intended as applying to *intelligent beings in general*, not only humans. In the same paper he distinguished two versions of AP, the *weak anthropic principle* and the *strong anthropic principle*, but they are not of a big relevance to this discussion<sup>2</sup>. What is important is that all of the principles say that the universe *has to* have intelligent-life-permitting characteristics. Moreover, the necessity involved was never – not even in the case of the "strong anthropic principle" – a matter of saying that some factor, for instance God, had made our universe *utterly fated* to be intelligent-life-permitting, let alone intelligent-life-*containing*. Anthropic principles can, but do not have to be interpreted theologically. Even more – they are often used to counter theological approach. As such, their biggest value is in pointing out to *observational selection effects*, especially in astronomy and cosmology.

Being aware of possible "anthropic" observational selection effects can encourage one set of expectations, and belief in God another set. If suspecting that Carter's anthropic principle has practical importance, one will be readier to believe (i) that there exist multiple universes and (ii) that their characteristics have been settled randomly, some mechanism such as cosmic inflation ensuring that all was settled in the same fashion throughout the region visible to our telescopes.

For most scientists the answer is simple: given Big Bang and quantum cosmology, there may well be many universes with varying values of the natural constants, and hence the laws of physics. If this is so, the anthropic principle simply says that it is not surprising that we find ourselves in the very one where life is possible. On the other hand, some writers favour a design argument, arguing that ours is the only universe and its fine-tuning must be explained by the appeal to God. They find many-worlds theory to be too speculative and difficult to test empirically. Thus for cosmologist George Ellis

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<sup>1</sup> Carter B. (1974). *Large number coincidences and the anthropic principle in cosmology*; p. 126

<sup>2</sup> for more on the subject see [5] in References

and theologian Nancey Murphy, the fact that creatures capable of moral agency such as us have evolved in the universe is evidence that God designed the universe with the intention to create such creatures.

One of the most popular arguments in favour of a divine creator runs as follows. A physical force strength or elementary particle mass can often seem to have required tuning to such and such a numerical value, plus or minus very little, but in our universe these constants are mutually consistent without an obvious reason why it need be so. Fundamental constants seem to need to be where they are not just for one reason, but for two or three or five... Random variations from universe to universe (or, in other words, applying the anthropic principle) might explain why it took any particular value somewhere or other, yet how could they account for the fact that one and the same value satisfied many different requirements? How come such a consistency is possible? Why does electromagnetism, for example, not need to have one strength to allow atoms to be stable, another strength for stars to burn at a life-encouraging rate, and yet another to permit carbon (quite probably crucial to life) to be produced plentifully? The occasion that all of those demands are fulfilled among the same boundaries is an *inexplicable good fortune* that can be hardly, if at all explained with the anthropic principle. Here a religious physicist could say that of many possible fundamental theories, God selected the very best theory for permitting life's requirements to be fulfilled without contradictions.

But let us make a small retrospective and return to the "ontological argument"<sup>1</sup> which tries to prove God's existence from his mere notion

## Is there a cosmic beginning?

People disagree over whether the sheer existence of the cosmos could gain an explanation and for how long it had and will continue to exist. Some have held that it always would, regardless how long the cosmos had existed; others that it never would; and still others that this would depend on whether the cosmos had existed eternally, or else on the nature of time.

That is the question that requires some further discussion. Basically, there are two main orientations in theology and philosophy on the topic: *creatio continua* (continuing creation) and *creatio ex nihilo* (creation out of nothing).

*Creatio continua* is very close to the doctrine of Christianity only in its primary aspect: God is immanent to the world and acts continuously to create and sustain it. This orientation completely rejects deism (limitation of God's act only to the cosmic beginning) and implies an indeterministic world. Reality is incomplete and the future unpredictable; the world is an open process and totally dependent of God's will. Note that an important aspect of this doctrine is that it does not require a timely limited universe.

Three young rebels from Cambridge: Bondy, Gold and (not yet Sir) Frederic Hoyle were probably the first to introduce the scientific doctrine of *creatio continua* – they postulated a universe that existed eternally in a pre-set Steady State. Since it expanded, Hoyle had to bring in a constant materialisation of new hydrogen atoms in order to keep the average cosmic density the same. A universe like this one is infinitely old, but each galaxy is of a finite age. Although at first offering no explanation for the new atoms, and having many other problems, they thought them much less of a difficulty than the materialisation of everything at once.

Later on, G. Gamow and W.B. Bonnor, after the introduction of the Big Bang model, joined Hoyle trying to avoid cosmic beginning. Gamow favoured a universe that had contracted for infinitely long before it finally collapsed and immediately exploded in a Big Bang, while Bonnor suggested a similar model with a universe that had had infinitely many such contractions and explosions that succeeded one another. This was the basis for the later model of oscillating universe.

*Creatio ex nihilo* brings a radical contingency of all that is – God in this case is transcendent and the sole source of all existence. God's creative act is totally free; matter, space, time and even the laws of nature emerge out of God's unconditional choice. At this point the theory agrees with Christianity. But this implies two important consequences: a universe not created out of anything prior and a total transcendence of God. Here we have a big gap to Christianity - this second actually means

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<sup>1</sup> late scholastics, XI century and R. Descartes XVII century

that world is not any part of God's being, even more, God has no influence to course of events on this world. His act is totally and utterly deistic and the universe he created is deterministic.

A. Friedman, J. Lemetr and G. Gamow made large contributions to something that will be later (and today) called the Big Bang model – the best illustration of *creatio ex nihilo*. But when Hawking suggested that his model “leaves no room for a creator” because a question “What was there before the Big Bang?” had the same value as “How does the earth look north of the North Pole”, theologians harshly protested. Their argument was that God could be taken for a creator even of a world that had existed eternally and still exists. St. Augustine claimed a similar thing – God has created both the world and time at once and is a reason for itself (Descartes). Together they make a very good point: a discussion of creation and causality does not necessary imply temporal priority of creative or causal factors.

As we can see, both *creatio continua* and *creatio ex nihilo* offer incomplete views to the world, mainly because theology considers them to be complementary. Only a combination of these two models can give a good picture. Continual creation was (is) in collision with many fundamental laws of nature, especially the second law of thermodynamics and quantum mechanics. But creation out of nothing has much bigger problems with philosophy an even logic: how can something be created out of nothing and without a reason? That is why Milne greeted the Big Bang as a strong evidence of a divine influence, since the creation of something already extended seemed impossible. But is it so? Although it *seems* impossible, there is no contradiction in it. Even Hume suggested that no reason is necessary for sudden entry of an extended universe in a time that had already been flowing. But at this point I think that Hume overdid it – careful analysis of his works tells us that all of our cognition is strictly governed by some unprovable fundamental principles, like the one that the future will probably be much alike the past. That is pretty much enough to counter appearance of anything without an obvious (empirical) reason.

My conclusion is, as in many cases, a pre-mentioned concept of reasonable faith. Sudden creation of universe at  $t = 0$  by itself really requires a divine figure (at the present moment), while modern cosmology can offer some very good multiple-universes models that give good explanations without a divine influence. Both versions seem very consistent, and it is just a matter of our free choice what we shall believe in.

## God as a physics necessity

### *Causal orderliness*

The first attempt of combining rationalism and empiricism in philosophy was performed by Immanuel Kant, the founder of German classical idealism. I shall limit myself only to the aspects of his philosophy relevant to this discussion – mainly the questions concerning problems of cognition and causality.

Kant says that the whole cognition comes from experience, but it needn't be deduced from experience. The truth is that experience teaches us that something has this or that qualities, but what it does not teach us is that it could not be different. For example, if we say “The Sun comes out every morning”, that means only that we have never seen an exception of the rule in the past. But we can imagine an exception. This actually means that we do not know any pure causal law, and that, furthermore, the world doesn't have to have complete causal orderliness, as far as we can tell. Could it be that our unconscious, but still super-genius minds always take care that the world looks as if it obeyed the laws of nature, although it is not the case. Having this admittedly bizarre thought, we see how important the problem of causal orderliness is.

After a swift development of physics in the late XIX and early XX century, widely spread way of reasoning became that complete interpreting of any causal law – for example that wood floats on water – would require referring to some more fundamental causal law (which is often called *reductionism*). In this case it would be, for instance, Archimed's law of hydrostatics. So the most fundamental laws could never be explained. That is what made Sir Karl Raimund Popper to completely disregard induction as a valid cognition device.

Lately, many scientists and philosophers find this reasoning to be unsatisfying: correct, exact laws of physics must have a necessity of fulfilment independent of experimental confirmation – they should be able to describe even the events which have never actually occurred. Again we come back to almighty Hume, who said the same thing for causal laws generally, long before today's modern laws of nature were even formulated.

What do physics and cosmology have to say about the problem? Let's consider the emission of an  $\alpha$ -particle. Time of emission of this particle cannot be predicted. The only thing we can say is that it will occur, say, once in every 1000 years. So, when we detect an emission of an  $\alpha$ -particle we, in fact, do not search for the event that preceded it from which, by some rule, the emission would follow. Logically it is possible to search for such an event, and we should not be discouraged that none has been found yet. Two different views are possible on the subject. The first is that experience made us sure that the laws of quantum mechanics were true and, if they really were, we know that there is some preceding event that cannot be found. The second is that we know what event preceded the emission, but are not completely sure. If we wanted to know exactly what preceded the emission, because of interaction between the viewer and the system, we would have to know the complete microstructure of the world, what is, of course, impossible. But all of this still leaves us with an unsolved crucial problem: how can causal laws have a necessity that is not only a product of something that actually happened sometime before? Even if they could, how could we know about it?

How come our world ever obeys anything worth the name of a physical law? Or, in other words, why "the unreasonable effectiveness of mathematics in the natural sciences"<sup>1</sup>? Why does our world have the orderliness which made Jeans (1930) talk of a mathematically minded creator? While no logically possible world could violate mathematical principles, it is easy enough to imagine world(s) in which they had little application.

When authors bring in a divine figure as responsible for the existence of the world, sometimes they take causal orderliness presented like this as something that directly points to its existence.

Note that the alleged problem of why there are causal laws is rather different from the alleged problem of why anything ever moves or changes, which is what led Aristotle to propose a divine prime mover.

### *Design and fine tuning*

If we try to analyse the orderliness of the observable universe, indispensably we come to a conclusion that up to several dozen of factors needed to be fine tuned in order to enable the existence of the universe and (intelligent) life in it. What does that actually mean?

First thing a life needs to evolve is a suitable universe in a more or less steady state. In order for it to be so, many fundamental cosmic parameters needed to be fine tuned, such as: intensity of the forces in nature, masses of elementary particles, the rate of expansion and the entropy at an early phase of the Big Bang, etc. For example, having the strong nuclear force slightly stronger (1 or 2%) there would be no protons (and hence no atoms); having it slightly weaker there would be no atoms except hydrogen. If gravity had been either stronger or weaker it would prevent the formation of galaxies, stars and planets. But even gravity is not enough for the existence of stars as we know them – electromagnetism slightly stronger would make most stars red giants; slightly weaker, and main sequence stars would have a very short lifetime. Similar catastrophic consequences bring variations in particle masses and some other factors.

In order to imagine, at least approximately, any kind of life possible, up to several dozens of factors seem to be in need for fine tuning. Due to the size of this list, the potential evidence of the theory of design can survive many doubts. Vividly explained, let's imagine a bullet hitting a housefly surrounded by a large amount of empty space. In order to achieve that, the trajectory of the bullet had to be finely tuned, which points to the fact that it is an act of a professional shooter. Even if the areas in the background were covered in flies so that any bullet would have hit one of them, the crucial thing is that the local area contained only one fly.

Again, it would definitely be wrong to object that the fine tuning does not require explanation because "if the universe had not been tuned in just the appropriate way, there would have been no one to think about it (this)". What would we think of a man who, remaining intact by the bullets of a fifty

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<sup>1</sup> Wigner 1960

men firing squad, failed to suspect that the shooters perhaps missed him deliberately, commenting that in that case he would "not have been alive to think about anything"!

But let's leave the problem of fine tuning in fundamental parameters for a while. Even if there were a suitable universe, the very development of life is also in need for fine tuning: complicated chemistry of life is possible thanks to the very precise tuning of masses of protons, neutrons and electrons; electromagnetism insures that supernovae produce elements heavier than iron, and so on. Incredibly complicated machinery of living organisms, especially humans, apparently provides an immense proof of the divine design. To say: "they just happened to be like that", would be ridiculous – had Darwin said it he would have never formulated his famous theory of evolution. As we know the evolution theory to be true, theological arguments are to be found elsewhere. In that sense, a lot of attention is directed to some improbable, but crucial steps in the evolution of humans. First of all, it is unbelievable how the laws of nature are exactly combined in such manner to make Darwin's evolution possible<sup>1</sup>. Second, we have to be aware of the "remarkable coincidence between time-scale for the past biological evolution on Earth and the future life expectancy of the Sun"<sup>2</sup>. The evolution of life had to proceed through a sequence of improbable steps. Their random variations, for example the structure of the human genome, are too long to be accepted without Darwinism, but there remains the fact that the evolution chose a very convenient time to take place.

The followers of the design theory can draw our attention not only to the general, fore mentioned fact of causality, but also to the favourable or even lucky effects of certain causal principles<sup>3</sup>. Let's take, for example, the laws of the quantum theory. Just like they enable rather dispersed wave energy to concentrate and do something useful, quantum laws also make sure that the atoms come in standardised types, making chemistry as we know it possible, which is a necessary condition for creation of the genetic code. Similar things can be said about the special relativity and numerous laws that govern interactions of elementary particles.

A frequent counter-argument to the faith in fine tuning is a possible existence of some exotic life forms<sup>4</sup>. Instead of being based on chemistry (which basically means on electromagnetism), intelligent organisms can be based on the strong nuclear force so that they could inhabit neutron stars. Alternatively, there could be plasma-beings inside the Sun, entangled clouds of interstellar gas or complex systems of frozen Hydrogen. None of these intelligent beings would even consider (or they would just be extremely speculative, like us in this case) discussing weather chemistry, something possible only with fine tuning, must be a base for intelligent life. However, even if we were to believe in the possibility of such strange beings, it can be justifiably said that a certain amount of tuning is necessary even for the existence of the neutron stars, the Sun, interstellar gasses, or planets covered with frozen Hydrogen. Most probably a universe given with a completely random set of physical characteristics would remain without such objects. It could come to a collapse immediately after a very short and extremely hot life, in the form of a "big crunch" or would expand so rapidly that all of its matter would soon become too thin to form clouds, and there would definitely be neither stars nor planets. It could easily consist just of rays of light and/or black holes.

## God is a logic necessity

It is sometimes protested that God cannot adequately explain the existence and orderliness of the cosmos, for the following reason: that God's own existence, and the orderliness which would have to characterize his mind before he could bring order to anything else, would in turn need explanation. How to reply?

There is a philosophical school called agnosticism that simply says that we cannot be certain of anything, not even of our own existence. Descartes made a remark saying that we can be certain only of our doubt. I would add something Descartes had always used, but forgot to mention – logic. Although being very much capable of imagining many quite bizarre worlds, I cannot make up with

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<sup>1</sup> Handerson, 1913

<sup>2</sup> B. Carter, 1983

<sup>3</sup> J. Leslie, 1989

<sup>4</sup> Feinberg and Shapiro, 1980

one where logical rules would not stand. In that sense logic is not only absolute, but also immanent to the world – its very essence. All the laws of physics and the cosmological models they produce have to obey logic.

On the other hand, a divine figure leads us to a simple contradiction: “If god were omniscient he could create a rock too heavy even for him to lift.” This simple example apparently neglects God’s existence. But not quite – being omniscient, God does not have to obey the rules of logic! Might we point to these matters when trying to account for the existence of God or of the cosmos?

Logic is the curse that leads us to the chain of why-s and how-s – why are we here, how come the universe has this very orderliness, why and how was the universe created. Solving those questions, inevitably we come to a point where we cannot go any further, if we do not want to go into a *circulus vitiosus*, or *regresus ad infinitum*. The whole process is known as reductionism. Let’s take, for instance, the ancient question: What holds the world? Elephants, was the first answer. A tortoise holds the elephants, and itself floats in a world-ocean, etc. We can go infinitely long with new “holders” – the logic makes us do so. From that point of view, the situation is not much better today – every modern cosmological model has its own original why or how. Why did the Bang occur? How and why would anything exist in the Hoyle’s Steady State? And so on.

An independence of logic is what I propose as the ground of a divine person’s reality. Being free of logical rules, God’s existence would not require an explanation as we know it, and search for. As a matter of necessity – necessity which is absolute despite not being provable by logicians – the divine mind’s logic independence is adequate to ensure its eternal existence.

But even without going into some abstract theories like the one I have just mentioned, the fact remains that the very ideal science is searching for – one principle that could explain all – is logically completely equivalent to the idea of a divine figure. So, if such a principle is to be found, it could well be called God.

## Conclusion

Can anything be said as a conclusion drawn from all these contemplation and theories? We could hardly do anything but a comparative review, for besides being only at a speculative level, even if they could be proven, the mentioned theories could never be empirically tested due to the very nature of the problem they are attempting to solve. Maybe that is why they are condemned to forever remain mere philosophical questions of suspicious practical value. Still, though aware of that fact, the human mind has always been intrigued by the problems of birth and existence of the universe, life and consciousness, at the same time incapable of restraining itself from contemplating about all that.

From all this we can draw only one conclusion, just a single thing that remains certain, and that is what I am stressing as most important: at the present moment, the existence of Everything could be explained by theological arguments just as successfully as by scientific ones. Both being empirically unprovable and impossible to be put to a test, they are of the same value and we cannot say which ones are better. We can only do that on the bases of logic, which says that the best system is the one with least postulates. Theological argument postulates only God (whatever it may be). If we bring the cosmological (scientific) argument down to one postulate, we will reach a point when all we can say is: they both have 50% chances of being true. Which of the two is it - we haven’t got a clue.

Still, we should bare in mind the fact that cosmology and antropics (even more) are young disciplines, and that they (probably) have a long way to go until they reach their final forms. Lets take, for instance, the theory of the systems of the world. It has, since the geocentric with circular orbits via the heliocentric one with the Sun in the centre of the universe, reached the form it has today, for which we are rather convinced to be depicting the reality in the most exact manner, even though that was also the case 1000 years ago. In the same way, although “a bit” later, the theory of the cosmic beginning was born, and should, from its infant days with the help of numerous critics and improvements, reach its mature age. So – who knows, maybe in a 1000 years time some new scientists may view today’s systems much in the way we view the one with a turtle and the elephants holding the world.

By the end of the XIX and the beginning of the XX century, physics seemed to be nearly a perfect science, with only a few trifles remaining to be explained. Those “few trifles” gave birth to the

entire quantum mechanics, special and general relativity and nearly entire modern physics. It is intriguing that we have a similar situation today. But exactly because we do not know, or at least we are not sure what will be happening and what new things will get discovered in science, we are obligated to continue with the research and contemplation, for that is the necessary step towards something bigger and better.

In the end, even though the Copernican anthropic principle tells us that our existence as individuals should not be privileged among other intelligent beings, I cannot help thinking about that situation when, after many years of hard work and thousands of pages written in complicated calculations, I finally get the equation that comprehensively explains all existence. Then I shall hear the Big voice from all around me saying: "Very well, you have found me. It is now your turn to hide", to which I shall reply: "OK, but do not expect it to be easy this time."

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