

RALF B. BERGMANN

**GOD AND
THE EXPLANATION
OF THE WORLD**

Christian Faith or
Atheistic World View:
Which is More Reasonable?

Ralf B. Bergmann

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Which is more reasonable?

PROFESSOREN
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*"Great are the works of the Lord;
they are pondered by all who delight in them."*

Psalm 111:2

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Foreword to the English edition

I have been asked by several African friends and colleagues to provide a translation of my book “Gott und die Erklärung der Welt” in English. Although there is quite substantial literature available in English on the subject, as you can see at a glance from the literature quoted, some readers are specifically interested in the views of an academic Christian from a western European background and quite a substantial part of the literature quoted may not be easily accessible in Africa.

The readership in the German speaking world and especially in western Europe is quite different from the African world. As far as I had the chance to experience the mindset especially in East-Africa, almost no one from the taxi driver to the government official has doubts about the existence of a God or the possibility of supernatural interventions of whatever cause in the world. The details of this conviction may be different, but committed atheists are certainly a small minority in Africa.

While Germany is the land of the reformation that stressed the relevance of the Bible and its teaching in new clarity, today it’s developing, as most of western Europe, more and more into a stronghold of atheism.¹ The clarity of Christian teaching has been gradually but substantially twisted in such a subtle way that its effects are not realized even by many Christians.

While Christian faith is often vivid and prospering in Africa, the African continent is not isolated, and Christian Africans also should have a concept of how to counter unwarranted claims that come with the authority of a “science” or some theological or simply ideological

¹ See e.g. Stott 2006, Hunter 2010 and Bergmann 2021 (myself, in German)

authority. The ideas and the kind of arguments I present here may be strange to Africans but nevertheless helpful to understand and counter claims of unwarranted authority.

As a physicist, I have the privilege and pleasure to argue from a scientific side about the scope of science and to demonstrate the rationality of the Christian faith so that an atheist can follow the argument without reference to the bible. At a certain point however, the claims of Christian teaching go beyond that point and boil down to a personal choice between Atheism and Christian faith. This decision can only be a free decision of an individual. This book is intended to help to remove alleged intellectual obstacles on the way. Readers looking for some more details are referred to the footnotes.²

² The footnotes refer to further literature or a deeper treatment of the subject under discussion. They can, however, be omitted without losing track of the line of argumentation. Wherever possible, I refer to resources in English, however, this is not always practical, as especially some theological or philosophical sources have their origin in the German speaking world. As this is a popular scientific publication and not a scientific treatise, I also tried to concentrate on easily accessible sources, although again, this is also not always possible or adequate.

Foreword to the German edition

The question of God is one of the most important questions a person can ask. Christianity and atheism naturally give completely contradictory answers. But which of these two answers is more reasonable?

When people with very different world views want to understand each other's perspective, there is an approach that most people recognize: Discussion with reasonable arguments. There are also people who reject this approach. The price for this is admittedly high: you are not taken seriously as a discussion partner.

This book asks for the best explanation in the world. It is about the greatest story of all time. The story that touches on the fundamental questions of humanity: Where do we come from? Where are we going? How can we understand the world? And: What seems to be the most reasonable answer?

This book is not about proving God. I will explain why later. The point is to show that there are good reasons to believe in God. Whether or not these reasons convince someone depends very much on one's own character. Moreover, convictions cannot be enforced, and that's a good thing. I respect if someone has a different conviction. I hope that, despite the sometimes controversial discussion, you can sense this when reading the book.

1 In search of the greatest story of all time

A couple of years ago, I took part in an interdisciplinary symposium on the subject of "Experience and Certainty", in which the relationship between science, knowledge and experience was discussed. There I heard a great story, presented in detail and enthusiastically by Professor Harald Lesch, a physicist known in Germany for his popular science television programs. The shortest version of this story that I know of is shown in the opening credits of the TV series "The Big Bang Theory". Many others also tell this great story and it goes something like this:

An unimaginably long time ago, around 13.8 billion years ago, the universe came into existence out of nothing with the "Big Bang". There is no goal, no intention, only natural laws that drive everything forward and which we physicists have essentially understood. After the Big Bang, in a long, complicated process, stars, galaxies and finally planets were formed on which life could develop. With our planet Earth, we have hit the jackpot - a planet that offers excellent conditions for the development of life. There should be many more of this kind, but we are only just beginning to discover them. On Earth, driven by the above-mentioned laws of nature, the development of complex molecules, cells and finally complex living beings began. Then, almost at the last second in relation to the age of the universe, humans appeared on the world stage with consciousness and intellect, and culture and religion developed as the highest stages of a process that began from nothing and was driven by nothing other than the unbreakable laws of nature that apply everywhere and at all times in our universe. At some point our sun will go out and much later the last sun in the universe will also be

extinguished. All life, wherever it may have originated, will then have disappeared. As far as we know today, the universe will continue to expand, becoming ever colder and more hostile to life. The human guest appearance in this universe is only a short but exciting episode.

This is, in a nutshell, the big story of the world from the perspective of naturalism, a worldview that claims that all phenomena in the world are determined *solely* by natural laws, not only the formation of stars or living beings, but also phenomena such as consciousness, morality or aesthetics. This naturalistic worldview generally excludes the existence of a God or other "transcendent" forces or beings. Naturalism and atheism are therefore often used as synonymous terms. The existence and work of a god are not envisaged in this grand narrative.

But is this great story true? After his enthusiastic lecture, Lesch himself pointed out that there were some "skeletons in the closet" of the story. Is this story as viable as it seems? This book is based on a different story. Its origin is much older and, in my opinion, more viable than the story I have reproduced above. Both have some things in common - after all, they are talking about the same world - but the basic idea is completely different. And the consequences are completely different. I will develop and compare essential elements of both stories in this book and would like to take you on a journey of discovery, during which you will learn about important questions and attempts at answers in the field of tension between Christian faith and atheism.

The topic is not new. However, again and again new protagonists appear. With Richard Dawkins' bestseller "The God Delusion" in 2006, a "new atheism" was promoted by Dawkins and other authors who have once again intensified the debate about the meaningfulness

of belief in God.³ According to Dawkins, this belief should not slowly die out with its last representatives but should be actively driven out! Belief in a god, previously tolerated at best as a matter of personal taste or a harmless cultural accessory, is now presented as a threat to science, freedom and a progressive society!

Many people in the "enlightened West" do not find it difficult to accept the view described above, because many have more or less come to terms with an atheistic "scientific world view" anyway, even if it cannot satisfy questions about meaning and significance for their own lives.

One of the representatives who is not only known in expert circles of the dispute with the "new atheism" is the retired mathematician and Oxford professor John Lennox. In his book of the same name, he addresses the question "Has science buried God?"⁴ and his direct response to the "new atheism" followed with "Gunning for God"⁵

Long before Dawkins, however, a very interesting development took place in the field of philosophy: serious and, in the Anglo-American-speaking world, well-known Christian philosophers not only justified the reasonableness of the Christian faith, but even claimed that the great history of naturalism not only has gaps but is exposed to serious objections!⁶

³ There are of course also atheist authors who argue very carefully, such as J. L. Mackie 1982 in his book "The Miracle of Theism - Arguments for and against the existence of God".

⁴ See Lennox 2009.

⁵ See Lennox 2013.

⁶ Such as Collins 2009, Plantinga 2011, Swinburne 2010 and the compilation of authors in Craig 2002.

While theologians, unless they are also physicists,⁷ tend to shy away from discussions in the triangle of theology, philosophy and science, Christian scientists⁸ seem to find it easier to engage in debate in this environment.

Today there is a wealth of literature available on our subject. But what do interested readers do who have not studied philosophy, theology or natural science if they want to find their way around our topic? The good news is: you are reading the right book!

This relatively compact book fills a gap for those who want to gain an overview of some fundamental issues in the above-mentioned area of tension between world views in a short time without any special prior knowledge.

The thesis I put forward in this book is that *belief in God is reasonable and explains the existence and characteristics of the world better than atheism*. Here I am referring to the God who has revealed himself in the Bible. I will discuss the characteristics of this God in more detail later. To believe reasonably here means to believe based on plausible arguments. I will therefore also discuss the relationship between plausible arguments and evidence later.

You can read this book in two ways: If you want a quick overview, you can skip the footnotes and read through the book in a few hours. If you want to delve deeper, you will find additional explanations in the footnotes, some of which require more prior knowledge. The citations refer to suitable literature⁹ on individual topics and take English-language sources into account wherever possible, but sometimes require more prior knowledge.

⁷ See e.g. McGrath 2023.

⁸ See e.g. Polkinghorne 2003.

⁹ The cited authors are of course solely responsible for the content they provide, be it books, magazines or internet links or further references contained therein. The recommendation of sources does not include an agreement with the statements or contents of these sources.

A further distinction may be helpful: The book is written both for Christians who are looking for answers for themselves or want to sharpen their reasoning skills, as well as for interested atheists or skeptics who are willing to engage with ways of thinking unfamiliar to them.

In Chapter 2, I first deal with a few important preliminary remarks on intellectual stumbling blocks and clarify some fundamental questions about the relationship between science and worldview. In doing so, I refer explicitly to the sciences, Christian faith and atheism in order to have a clear, compact discussion. I then discuss what we can legitimately say about God, and the question of the truth claims of statements, and discuss what we consider credible and why, before finally addressing the peculiarities of scientific models. I recommend not skipping this chapter!

Chapter 3 then discusses the fundamental questions of why there is a world at all, why there can be life at all, whether there are perhaps very many worlds and where the phenomenon of conscious life comes from. Chapter 4 deals with the highly controversial topic of God's activity in the world, which I examine from a theological, physical, philosophical and historical perspective. Chapter 5 finally tells the greatest story of all time and summarizes the main findings of the book. Finally, the epilogue addresses specifically Christians, atheists and skeptics with their respective views on the subject of the book.

I hope you enjoy a few interesting hours of reading that may change your perspective on our world and yourself.

2 What we believe, know and think we know

2.1 Stumbling blocks

Alvin Plantinga, one of the great contemporary Christian philosophers, wrote a paper a few decades ago entitled "Advice to Christian Philosophers", adding to the title "With a special preface for Christians from various disciplines". He writes: "So the Christian philosopher has his own topics and projects to think about; and when he thinks about the topics of current concern in the broader philosophical world, he will think about them in his own way, which may be a *different* way. He may have to reject certain currently fashionable assumptions about the philosophic enterprise - he may have to reject widely accepted assumptions as to what are the proper starting points and procedures for philosophical endeavor. And-and this is crucially important-the Christian philosopher has a perfect right to the point of view and prephilosophical assumptions he brings to philosophic work; the fact that these are not widely shared outside the Christian or theistic community is interesting but fundamentally irrelevant."¹⁰

Plantinga therefore encourages us not to simply adopt other people's assumptions, but to set our own premises without hesitation and to develop our own approaches - with the same right that representatives of other schools of thought claim for themselves. And it is precisely this freedom of thought that I am taking for this book. Because the relevance of a point of view is not determined by how

¹⁰ Plantinga 1984.

many people share it, but by how well it can be justified.

What does this mean for our topic? What intellectual hurdles have to be overcome if you want to move freely in the border area between philosophy, theology and science? First of all, there are a few "stumbling blocks". By this I mean common patterns of argumentation that are logically incorrect or false and manipulative:

Commonplaces: When talking about God, one often hears the objection that God as an explanation for the existence of the world is too simple; a natural explanation for the existence of the world would be much more appropriate to the complexity of the subject. However, the opposite of *simple* is *complicated* and not *right* or *wrong*. Whether an answer is simple or complicated is initially completely irrelevant to the correctness of the answer! Sometimes, however, the accusation of simplicity also means that the answer is "not appropriate to the complexity of the issue". However, this should then also be justified. Time and again, answers are only described as "simple" in order to put the content of the statement in a bad light. Are complicated answers or explanations better or intrinsically more credible? In the natural sciences, we tend to prefer the simpler explanation to the more complicated one. It is a fundamental principle of knowledge that of explanations with the same explanatory content, the simpler explanation is the more likely. This principle is also known as "Occam's razor". An example: After a walk, you realize that you are missing coins in your trouser pocket. You also notice that there is a hole in your pocket. The conclusion that the coins have fallen out is obvious. However, your friend, the psychologist, insists on a different explanation: you gave the missing coins to a beggar on the road out of pity, but you cannot admit your feeling of superiority towards this poor person and have therefore

suppressed giving alms. Which explanation is more plausible?¹¹

Well poisoning: In order to denigrate unwelcome arguments, the position that is being rejected is often portrayed as dubious from the outset. For example: "Anyone who believes in a creator God is a fundamentalist."¹² Who wants to be called that? Some people like to work with vague terms that create a diffuse sense of unease or by which everyone understands something different. A strong assertion is often enough to generate rejection or at least skepticism. This method is therefore very popular and also very effective. However, it is ultimately just a tactic for preventing arguments. The argument must stand for itself!

The authority argument: If you want to make a statement appear credible, you like to use an "authority", often in the form of an expert. The expert vouches for credibility, especially if the audience cannot understand the argument. In our topic, for example, we often come across statements such as: "The brilliant physics professor Stephen Hawking said that the world was created from nothing." Since Hawking has indeed made significant contributions to cosmology, it seems difficult or even presumptuous to doubt such a statement. I will come back to precisely this case in chapter 3. If you take a closer look at some "expert statements", you realize that the

¹¹ A somewhat more detailed justification for this principle can be found, for example, in Swinburne's book "Is there a God?" Swinburne 2010.

¹² A discussion of the term can be found, for example, in the theologian and comparative religion scholar Thomas Schirrmacher, who explains that the accusation of "fundamentalism" is used more as a political battle term or "buzzword" than as a factual positioning, see Schirrmacher 2010. Hardly anyone would speak of "human rights fundamentalism", for example. Moreover, fundamentalists are always "the others". The German sociologist and empirical social researcher Udo Kelle makes a similar point. According to him, the term "fundamentalism" is considered difficult and controversial in comparative religious studies and the sociology of religion. Due to its strongly normative, judgmental connotations, it has rarely been used in academic discussions in these disciplines over the past 20 years, see Kelle 2015.

argumentation is not always as convincing as you would expect from an expert. Perhaps the statement is not based on his research at all.

The argument against the man (or woman): In contrast to the argument from authority presented above, one can also claim that certain arguments are not to be taken seriously because the person making the argument is exceeding their competence, pursuing a particular interest or is not credible for some other reason *per se*. This can be expressed with small but effective linguistic variations. For example, the person who - as described above - represents their own opinion is often presented as an "expert" and the person who represents a different opinion as a "self-proclaimed expert". But what is this statement based on? There may be good reasons for this, but they must be clearly stated.¹³ Or you can claim that the person putting forward an unpopular argument is guided by a particular interest or that their opinion is controversial. But who does not have a "particular" interest and what ideological viewpoint is "uncontroversial"? Much more important is the question of whether the respective interest is disclosed and where exactly the points of contention lie. If this does not happen, you are usually dealing with attempts of manipulation. The same applies here: the argument must stand for itself! So ask how a statement is justified.

Stumbling blocks can eventually even turn into seemingly unsurmountable walls: in our context, I understand this to mean mental fixations that are so deeply rooted that they are no longer questioned. What thoughts do we actually allow? What conscious or unconscious mental assumptions do we bring with us? What mental "sacred cows" stand in our way when it comes to evaluating arguments that are new to us? Here are two examples:

¹³ In fact, someone who has no training in mathematics or physics, for example, will find it difficult to argue adequately in this area.

You can't prove God! Why should I deal with something that cannot be proven? But: What is a proof and what can you "prove" at all? As this question is not as easy to answer as it might seem, I would like to go into this in more detail in section 2.5.

Miracles are unthinkable! If something is presented as unthinkable, impossible or without an alternative, you should be wary. One example that will play a role in chapter 4 is the claim that miracles are simply impossible. Why is that? There must be arguments for this "impossibility"!

The procedure by which arguments can be tested for their logical correctness is highly developed in philosophy and can also be learned by non-philosophers. However, anyone who aims to persuade people to do something that does not correspond to their intentions or beliefs without their knowledge or consent is using the craft of manipulation. This craft - and the way to protect oneself against it - can also be learned.¹⁴ Those who have no or poor arguments will also try to avoid a discussion in the first place. The temptation to take such an approach is of course not limited to representatives of a particular world view. So ask for arguments and let the arguments speak for themselves! And try to find out what (unspoken) assumptions of thought are in the room.

¹⁴ For an examination of the logical validity of arguments and the identification of false conclusions, see, for example, Salmon 1973

2.2 Science and worldviews

The "new atheists" such as Dawkins and a number of other authors see the relationship between science and faith roughly as shown in Figure 2.1: On the one side is science, on the other is faith. Science, naturalism and atheism, i.e. the assumption that there is no God, are closely linked. Dawkins describes this position as follows: "What most atheists do believe is that although there is only one kind of stuff in the universe and it is physical, out of this stuff come minds, beauty, emotions and moral values - in short, the whole gamut of phenomena that gives richness to human life."¹⁵

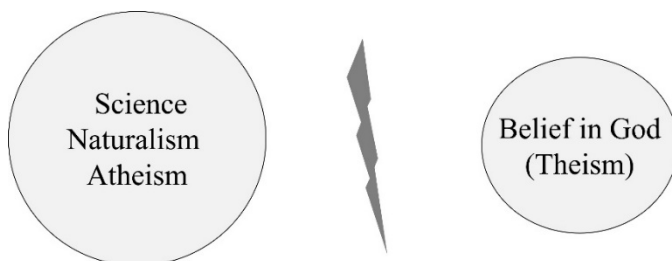


Figure 2.1: In addition to the existing conflict (indicated by the lightning bolt) between naturalism and atheism and belief in God (theism), the "new atheism" also postulates a conflict between science on the one hand and belief in God on the other.

Dawkins is stating here the position of naturalism,¹⁶ which claims to be able to explain *all* phenomena in the world scientifically. In terms of its meaning, atheism initially only means a world view that

¹⁵ See Dawkins 2006, p. 34.

¹⁶ By naturalism I mean exclusively philosophical naturalism, which is to be distinguished from naturalism in literature and art.

rejects the existence of God. Naturalism also refers to an elaborate philosophical system: the naturalist rejects all transcendence. Accordingly, there is nothing that cannot ultimately be traced back to physical laws. No purposes or goals are at work in nature. This does not necessarily mean that we could explain all observable phenomena today, but it does mean that we could - at least in principle - trace all phenomena in the world and ultimately also the actions of humans back to physical laws. The position described by Dawkins is therefore also referred to as "reductionism".

Naturalism has different varieties, the discussion of which goes far beyond the scope of this book.¹⁷ However, an important distinction for the topic of this book concerns so-called ontological and methodological naturalism:

Ontological naturalism makes a statement of being or existence. It claims: "There is *only* the world of experience that can be recognized by science." It is therefore not neutral in terms of worldview, because it makes "metaphysical" assertions, i.e. statements that cannot be substantiated by the results of science alone. Otherwise, one would have to prove that our current understanding of the world is complete, but more on this later in chapter 4.

Methodological naturalism makes no ontological statements - i.e. it says nothing about whether, for example, God exists or not - but demands in its methodological approach that transcendence plays no role in scientific explanations. This assumption seems perfectly reasonable for scientific work, but it also involves the admission that we may only be able to describe part of reality, as it is not clear from the outset whether we can grasp or describe the whole of reality with this principle. Science seeks physical explanations, but it is not

¹⁷ The way in which "traceability" to physical laws - particularly in the area of consciousness - is conceived is the subject of intensive discussion, see section 3.4.

entitled to assume that every event has such an explanation, nor does it need this assumption.

There is often no clear distinction as to which type of naturalism is being advocated. Ontological naturalism is often meant when naturalism is mentioned. The question also arises as to whether the concept of methodological naturalism is not in itself based on an atheistic perspective. Every scientific work begins with assumptions. However, a central and often overlooked basic assumption of scientific work is that the world can be understood at all. This requires that there are regular natural phenomena whose behavior we can understand and (eventually) describe mathematically. Johannes Kepler (1571-1630), the founder of the laws of planetary motion named after him, put it this way: "God, who has ordered everything in the world according to number, has also endowed mankind with a mind that can comprehend these laws [...] These laws are within the reach of the human mind. God wanted us to recognize him by creating us in his image so that we could share his thoughts."¹⁸ From this perspective, it would therefore perhaps be more accurate to say that a "methodological theism" underlies science.

In order to examine the relationship between atheism or naturalism, belief in God and the sciences in more detail, we must first deal with the terms. In the following, I will refer to ontological naturalism and will no longer differentiate between atheism and naturalism. I will specify the concept of belief in God in terms of the Christian faith.

Science deals with the explanation of natural phenomena through the study of nature. It recognizes regularities and formulates laws of nature. In the broadest sense, it deals with the "mechanisms" of physical or material objects and produces reproducible results (as far

¹⁸ From a letter written by Kepler in 1599, quoted in Gil 2014, p. 28.

as this is possible).¹⁹ These results must not be dependent on the person who develops them. And as described above, science cannot say anything about goals, intentions, values or morals. Here is an example: Imagine you are a pharmacist in need of money and have a rich old aunt. What could be more obvious than poisoning her to get your inheritance? A scientific description of the effect of poisons in the human body can help you to find a suitable poison and the right dosage and to understand what happens when you poison your aunt. But it cannot tell you whether it is right or wrong to do it.

A *worldview* is understood to be the fundamental values, theories or points of view or the (overall) interpretation of the world, humanity or society and the role of the individual in the world that are essential to a person or group. A worldview can contain statements about the meaning of life or transcendence but does not necessarily have to.

Christian faith is belief in the God described in the Bible. It includes a broad spectrum of phenomena, such as turning to God in prayer. Christian faith is essentially characterized by a personal relationship with God. This relationship also includes emotional experiences, but faith is not exhausted in vague feelings or incomprehensible speculations. Christian faith also includes *holding* certain statements about God *to be true*, such as the assumption that this God created the world. The next section therefore deals with the characteristics of God.

Figure 2.2 schematically shows the result of our previous discussion on the relationship between science, faith and world-

¹⁹ In cosmology, however, which we will come to later, we must infer the development of the universe from the observations we can *now* make of our universe, without being able to repeat this development.

view:²⁰ Atheism and Christian faith describe different views on values, goals, meaning and human relationships. In the case of Christian faith, this also includes the relationship to God. Science, however, deals with "mechanisms" in the broadest sense. Scientific descriptions should be as free as possible from "subjective" elements such as personal preferences or goals. However, on the one hand, no one can work completely free of their own mental presuppositions and, on the other hand, people working in the natural sciences are naturally also influenced in their way of thinking by the experiences they have in scientific research. As far as possible, however, science should be based on generally comprehensible observations, i.e. "empiricism", and logical conclusions.

These considerations should have made it clear that the diagram shown in Figure 2.1 is a gross misrepresentation. The real conflict is between different worldviews. The appropriation of science for atheism and against the Christian faith suggests a completely false alternative!

²⁰ This illustration is taken from lectures by John Lennox that are not available in book form. I am using this and the previous illustration, which I have adapted to this book, with the kind permission of John Lennox.

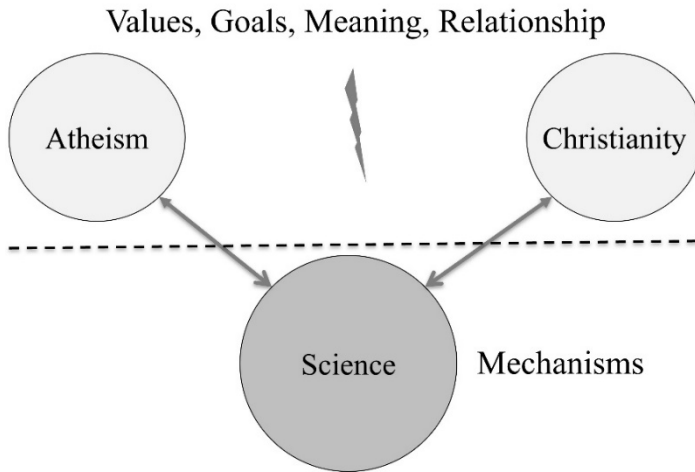


Figure 2.2: *Atheism and Christianity conflict with each other in relation to many of their values and goals, as well as in relation to questions of meaning and the kinds of relationships that arise from them. The relationship between these worldviews and natural science is twofold: on the one hand, natural science can serve both as a source of knowledge about the mechanisms at work in nature; on the other hand, it can happen that researchers introduce worldview presuppositions into scientific work.*

2.3 What we can say about God

The concept of God can not only be described from a theistic point of view, as is the case in Christianity, Judaism or Islam, but one can also, at least to some extent, try to clarify the concept of God philosophically. A distinction must be made between theism and deism: The latter assumes that God created the world, but then no longer has any influence on it. In this case, one also speaks of a "watchmaker God" and a "watchmaker universe", in an obvious analogy to a clockwork that - once wound up - can be left to its own devices. We will come across this concept later.

The following considerations are not concerned with a theistic proof of God, but with the question of what characteristics God, if he exists, should have from a philosophical point of view. This question is discussed in detail in the philosophy of religion.²¹ Table 2.1 shows examples of the main results of this discussion, which I will discuss briefly here.

Table 2.1: Characteristics of God from a philosophical and Christian perspective.²²

	philosophically clarified property	religiously attributed property
1.	uncaused first cause	God is the creator of the world
2.	non-law-bound reason of the laws of nature	God acts freely, out of love, God is a person
3.	planner of the structures of order in the world	God is wise and powerful, is the Lord of natural reality

²¹ See e.g. Moreland 2003 or Craig 2002.

²² According to Löffler 2013, p. 169.

Philosophical statements about the attributes of God can be deduced without the aid of special sources of revelation such as the Bible and therefore also belong to the area of so-called *natural theology*:

1. If there is a God, then he must be uncaused. Otherwise, one could ask in an infinite regress who or what caused God and who or what caused the cause of God and so on. God cannot therefore be regarded as an object of this world that requires a cause for its existence. The God who is seen as the cause of the world can no longer have the features of the world that require explanation. In the language of theology, this view corresponds to the statement that God is the creator of the world and that he is eternal. There are different views on how the attribute "eternal" (if at all) can ultimately be understood.²³

2. Although this God must be the cause of the existence of the world, he himself must not have to obey (e.g. higher) laws, otherwise one could again ask where these laws come from. Theologically speaking, God acts freely and out of love. He is not bound by needs and instincts but can always decide as he deems best. God is also a person - a concept that I will discuss in more detail below.

3. As the non-law-bound ground of the laws of nature, God is also the planner of the structures of order in the world. Of course, he must not be part of a plan himself. Christian theology speaks here of the wise and powerful God who is the Lord of natural reality.

As you can see, fundamental characteristics of God can be derived from elementary philosophical considerations. As I said, this is not a proof of God, but a clarification of the concept of God. However, there are many more characteristics of God to be discussed than those mentioned above, and in the following I will discuss His

²³ Mühling 2007, chapter 3, describes a discussion on the relationship between time and eternity and its understanding.

omnipotence, omniscience and goodness in addition to His personhood.²⁴ However, the last three terms are not unproblematic, especially in their combination, and can easily lead to internal contradictions. Differences in the understanding of these terms also reflect different theological schools of thought within Christianity. In the following presentation, I will follow the view of the British philosopher Richard Swinburne, which I believe provides a consistent description of God's attributes.²⁵

God is a *person*, not an abstract principle or a force. This characteristic of God is fundamental to the further discussion. A person has a will, intentions and goals. A person can act according to his own principles and have the power to achieve goals. Principles and powers are only quantities derived from a more fundamental reality. One can therefore distinguish between two fundamental causes of actions, namely person-like and mechanistic-like. If God were subject to some (natural) mechanism, he could not act freely but would be dependent on this mechanism and the question of his origin would immediately arise again.

God's *omnipotence* also needs to be explained: Can God create a round square? Can God change the past? Or: Can God change the laws of logic? That seems nonsensical. It therefore seems pointless to claim God's omnipotence for statements that are contradictory in themselves. Someone may object that God is above logic. That may be the case, but we are not. And that is why we cannot meaningfully talk about what would happen if that were the case.

A similar problem arises from the *omniscience* of God. Can God know how I will decide in the future if my decision is free? It is precisely the question of the compatibility of predestination by God

²⁴ For further properties, see Winfried Löffler in Schrenk 2017, p. 201f.

²⁵ See also Swinburne 2010.

and human freedom that has driven legions of Christian thinkers and contributed to different denominational manifestations. Here, too, we can at least state the following: God knows everything that is logically possible to know. In the further course of the book, I will present an attempt for a solution to this problem, albeit a controversial one, but one that will hopefully take us further.

God is also *completely free*, which means that he is not restricted in his actions by his own desires or needs, but that he always acts in accordance with his intentions. A free, omniscient person will do what he considers to be best overall. Since God, due to his omniscience, has true convictions about what is best in a given situation, he always does what he considers to be best overall.

The characteristic that God is *perfectly good* is therefore derived from his omnipotence, freedom and omniscience. But couldn't God then have created a world in which there is no suffering? This question has also occupied legions of thinkers and people affected by suffering. I cannot deal with this question in detail in this book, but I would like to give a very brief outline of the answer, as this is probably the biggest emotional and intellectual problem for many people when thinking about God.²⁶

In philosophy, the term "*evil*" is used in this context. The term is more general than "suffering". The problem can be divided into two aspects: 1. man-made evil and 2. natural evil.

The first type, also known as "moral evils", includes evils caused by people when they do something they should not do or fail to do something they should do. This includes, for example, the abuse or neglect of children. The answer to the question of why God allows such evils may be emotionally difficult to cope with, but logically it

²⁶ For a detailed justification, see "Is there a God", Swinburne 2010. Further analyses can be found, for example, from Plantinga 1977.

is relatively simple: if God has given people free will, then they must also can act against his will, otherwise this freedom is just a farce. From a Christian perspective, people therefore have an enormous responsibility to make good use of their freedom.

The second type, "natural evils", includes those that are not caused by human intent or negligence, but for example by disease or natural disasters. Typical examples of this category are epidemics or earthquakes. Here the justification is more difficult, it requires recognizing that there are higher goods than the immediate prevention of harm or suffering in this world. Natural evils indicate that it is worthwhile to work for others and invent things like hospitals or vaccines, for example, and that there is a greater good than earthly life. Natural evil also calls people to take responsibility for other people and for the world.

Christianity goes beyond the attributes of God described above and assumes that God *reveals* himself. The Bible makes statements about God that clearly go beyond the above-mentioned considerations, for example, God reveals himself as Father, Son and Holy Spirit. When reading the Bible, it is noticeable time and again that God is obviously very interested in establishing a personal relationship with people. This becomes particularly clear in the description of Jesus' life. We will come back to this aspect of the Christian faith later.

2.4 Asking for the truth

As different as the views of atheists and Christians are, many representatives of both groups have something in common: they search for truth! Scientists do the same, whether they are atheists or Christians or belong to any other worldview or religion. Most of them are convinced that there is such a thing as truth and that it can be recognized - even if only partially or imperfectly.

In everyday life, we understand a true statement to be a statement that corresponds to "reality". But even that is not so simple. There has been a long, controversial philosophical discussion about this, and different points of view are still held today. This becomes clear from the contrasting basic positions on the concept of reality, which I will briefly outline here:²⁷

- There is a reality that exists independently of us.
- There is no reality independent of us, because we construct reality with our cognitive mechanisms and with our language.

Based on these two points of view, we can now distinguish between different concepts of truth:

The correspondence theory describes sentences as true if they correspond to corresponding facts. *The consensus theory* describes a statement as true if the relevant experts agree in free discussion to accept this statement as true. *Coherence theory* accepts a proposition as true if this proposition is compatible or can be inferred from previously accepted propositions. There are also other theories of truth, such as the *performance theory*, which ascribes truth content to a statement through explicit agreement, or the *pragmatic theory of truth*, which assesses the truth content of a statement according to its usefulness for achieving certain goals.

²⁷ See Detel 2007, p. 33.

While the correspondence theory claims to explain what truth is, the other theories tend to abandon this claim. Truth is ascribed or the search for truth is seen as pointless in itself.

The problem that arises from the latter viewpoints becomes clear in the intensification of "radical constructivism".²⁸ If there is no objective reality, but only thought constructs of my brain, why should my thoughts be relevant for anyone else and why should anyone accept this theory, which is itself only a thought construct?

If you have ever caused damage to a convinced radical constructivist, e.g. bumped into his car while parking, simply try to convince him that the damage is just a construction of his brain.

But the correspondence theory also has its difficulties: As we can only perceive our surroundings through our sensory organs, we have no direct access to things "as they are". People who claim to see things "as they are" are therefore referred to as "naive realists".

Since there is no general consensus on the question of truth - as with so many fundamental questions - we must also decide here which view we want to follow. The following thoughts seem important to me: science is concerned with explaining the mechanisms at work in nature. A scientist is guided by the idea that the phenomena he investigates also exist independently of him, even if, as in quantum mechanics, the way in which an experiment is designed has a major influence on the result. Christians believe in the existence of a God to whom nothing is hidden, who also knows about things that no one has observed and who also knows the hidden thoughts of people.²⁹

²⁸ See the compilation of essays in Schmidt 1987 – a typical German brainchild.

²⁹ See the impressive argumentation of Spaemann 2007 in the chapter "Die Vernünftigkeit des Glaubens an Gott" on the thesis that truth presupposes the existence of God.

The concept of truth is very important in Christianity. In the New Testament, for example, we find the statement "The truth will set you free". Recognizing truth is therefore much more than an academic exercise, it has an existential character.

The search for truth has always inspired scientists. The University of Freiburg, Germany, has even made the above-quoted statement from the Gospel of John its university motto, as can still be seen today on the assembly hall of the University of Freiburg, see Figure 2.3.



Figure 2.3: The Inscription “Die Wahrheit wird Euch frei machen” on the auditorium of the University of Freiburg shows the university motto from the Gospel of John, chapter 8, verse 32: “The truth will set you free.”

For me as a physicist and Christian, both views complement each other and lead me to the standpoint of "critical realism", which recognizes the existence of an objectively existing external world, considering the limitations of human cognitive ability.

2.5 Arguments, evidence and circumstantial evidence

What can we now know for sure or even prove in general terms? Unfortunately, not much in the strict sense, as we will see in a moment. We are used to using arguments to convince others of our statements. An argument consists of one or more statements (premises) that support another statement (the conclusion). There are two mistakes you can make: The premises could be false, or it could be that the premises are not good reasons for the conclusion.³⁰ Let's start with an everyday example: We can support the claim, "It will rain tomorrow!" by saying, "The barometer shows low pressure!" Although this statement makes the assertion more likely, it does not prove it, as we know from everyday experience. However, a proof must offer an argument that makes an assertion incontrovertible!

In the following, I am not concerned with statements that refer to individual situations (so-called particular statements), such as "There is a horse in the stable right now", but with general statements (so-called universal sentences or general propositions), such as "All fish have gills." The good news is: there is proof! The bad news: But only in mathematics and logic. Mathematics offers a strictly formal system with logical rules and definitions. If you accept these basic principles, you can draw conclusions that anyone who can understand these rules will also accept. For example, anyone who wants to and has the mental capacity to do so can understand the proof of Pythagoras' theorem. However, the price for this power of proof is the restriction to a system that only works in its own logically and formally precisely described world.

³⁰ For the formal structure of arguments as well as logically valid and invalid arguments, see for example the book "Logic" Salmon 1973.

In the empirical sciences, e.g. physics, we have to rely on circumstantial evidence. Often enough, we even have to be satisfied with statistical observations. A piece of evidence (or a statistical observation) can make an assertion (very) plausible. This is exactly what we use in everyday life. For example, the gardener's fingerprints can be found on the murder weapon. There are no witnesses, the gardener has a motive and no alibi. It looks bad for the gardener! But does that mean the gardener has to be the murderer?

2.6 Scientific models

The physicist's web³¹ is a simple illustration that makes it clear how such "circumstantial reasoning" works in the natural sciences, what it can - and cannot - achieve. Here is the story in a nutshell: A fish scientist explores marine life with a net, as shown in Figure 2.4. He makes two observations: All fish are larger than 5 cm in diameter and all fish have gills.

These observations are confirmed with every catch, so he calls them the "basic laws of fishology". Now a philosopher comes along, engages him in conversation and questions the validity of his basic laws. He claims that the first basic law only comes about because the net uses meshes of a certain size, so that you can only catch fish that are larger than 5 cm with it. With regard to the second basic law, he remarks that it could still happen that the fish expert catches a fish without gills at some point. The fish expert replies: "What I can't catch isn't a fish, and I've already caught so many fish that I can't see why the gills should suddenly change."

³¹ Originating from the astrophysicist Arthur Eddington, see Eddington 1938.

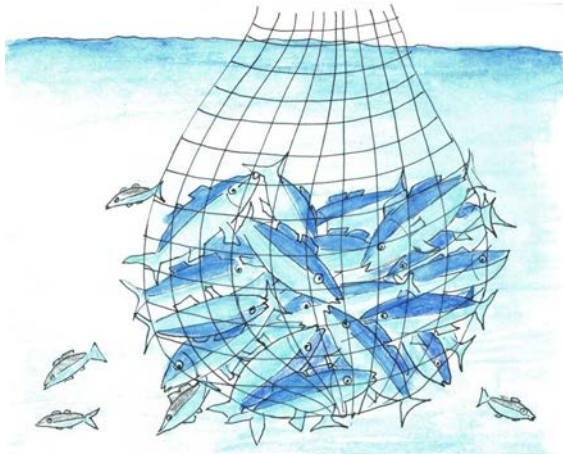


Figure 2.4: *What we catch (and what we don't) depends on how we fish!*

The story hints at how scientists proceed (although hopefully not as naively as the fish scientist). By observing nature, we formulate models of natural processes. From this little story, we can now learn two things about scientific models:

1. Scientific models are created through "trained" observation of nature using specific methods. The choice of the method influences the result of our observation. We therefore do not see nature "in itself" but, depending on our experiments, a kind of "filtered" projection of nature.
2. The laws that we formulate are "inductively underdetermined": We infer a general law from a limited number of observations (we cannot make an infinite number). All models are therefore fundamentally hypothetical. At some point, they could be disproved by a new type of observation or restricted in their scope of validity!

But that's not all! We expect a "law of nature" to have certain properties or fulfill certain requirements. There is also a long discussion about the "nature" of natural laws in the philosophy of

science. Here I follow Richard Swinburne's compact description.³² According to this, natural laws have the following properties:

1. There are many and also many different observable events that are in accordance with this law (and we do not observe any events that contradict this law).
2. The proposed law of nature is simple.
3. It fits in with existing knowledge.
4. We would not expect the events otherwise (i.e. there is no competing law that makes us expect this event and that fulfills criteria 1-3 as well as the proposed one).

One example: Johannes Kepler (1571-1630) studied the movement of the planet Mars in the 16th century. Using the data available to him, he wanted to formulate a law that would allow him to describe the current and future movement of Mars. He was able to draw the positions of Mars from previous observations on a celestial map and connect them with a curve. However, there are now an endless number of curves describing the movement of Mars and therefore many laws that fulfill criterion 1. It could be an ellipse, or a curve that looks like an ellipse but later develops into a spiral orbit, or an ellipse that gets bigger and bigger and eventually widens into a parabola. Or the orbit corresponds to a much more complicated shape, but unfortunately, we can only recognize an elliptical orbit from our point of view. In such a case, according to criterion 2, we will choose the simplest law that is consistent with all available observations - in our case, the law that leads to an elliptical orbit. Any other choice would be arbitrary. For criterion 3, Kepler brought in his knowledge of other planetary orbits. If Mercury, Venus, Jupiter and Saturn move in elliptical orbits, then it is natural to assume that Mars is no exception. If, in addition, there is no competing law that

³² See the chapter "How we explain things" in Swinburne 2010.

better fulfills the motion of Mars according to criteria 1-3, the ellipse appears to be the best choice for the law of motion we are looking for.

Scientific laws generally combine to form scientific theories. Kepler's description of planetary motion, for example, consists of three laws, only the first of which I have discussed above. The entire theory can now be judged according to the criteria mentioned above. However, criterion 3, insertion into existing knowledge, does not come into play if we do not (cannot) have any knowledge about neighboring fields of research. In the example above: If there were no other planets, Kepler would not have been able to compare the behavior of Mars with that of other planets. In addition, the larger the area we study, the less knowledge there will be from comparable areas. So if we want to explain *everything* observable, the criterion of background knowledge is no longer applicable. The central criterion then becomes criterion 2: simplicity!

The philosopher Karl Popper (1902-1994) used the criterion of falsifiability to clarify the question of whether a theory can be recognized as a scientific theory: According to Popper, a scientific theory must (at least in principle) be refutable with experiments or observations! For example, the assertion that there are many other universes besides our own, but that we cannot in principle observe or perceive them, cannot have the status of a scientific theory. However, if it is claimed that one could find evidence for the existence of such universes, it may very well be a scientific theory to be taken seriously.

However, if a theory is abandoned after the first setbacks (and possibly apparent contradictions), there is hardly any chance of developing a new approach into a mature theory. From observing the

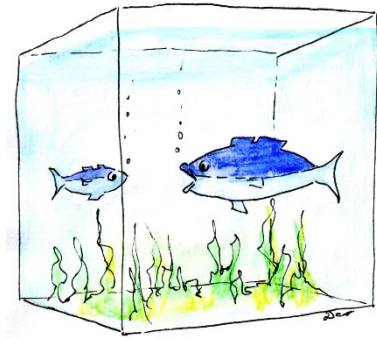
development of scientific theories, the philosopher Thomas Kuhn (1922-1996) therefore worked out the significance of the *paradigm*.³³ A scientific paradigm is a guiding idea or concept for the development of a theory. In an "established" science, a paradigm prevails; it typically forms a monopoly of explanation, outlines the solution path and the type of solution and aims at differentiation.

This already outlines the problematic aspects of a paradigmatic approach. After all, the paradigm no longer aims to test the theory, but to shape it and develops a tendency towards self-immunization, sometimes over generations, see Figure 2.5. Theories are no longer (as with Popper) challenged by (individual) counterexamples. It is therefore difficult to overcome a paradigm. Paradigm shifts are generally triggered by severe crises, caused by protracted and many hard, unresolved problems, and usually only when an attractive alternative appears on the horizon or the protagonists of the "old paradigm" die out.

We would therefore do well to remind ourselves now and again of philosopher Thomas Nagel's warning: "I would be willing to bet that the present right-thinking consensus will come to seem laughable in a generation or two – though of course it may be replaced by a new consensus that is just as invalid."³⁴

³³ See Kuhn 2012.

³⁴ See Nagel 2012, p. 128.



„The world, my son, is nothing but a big box full of water“

Figure 2.5: A paradigm provides orientation, often across generations.

Ultimately, there are also ethical "rules of the game" in science: You can only work cleanly in science if you deal honestly with your own data and results, consistently question and doubt not only other people's results but also your own and conduct research with an open mind. Anyone who absolutely wants or must achieve a certain result, e.g. to meet the expectations of funding bodies or political or social expectations, is biased or even susceptible to blackmail, both of which are very bad conditions for good science! To err is part of science - to deceive is not.

With these preliminary remarks, you should now be able to resist the temptation to regard scientific knowledge as definitive or to confuse it with "reality".

3 To be or not to be - that is the question here

Who has the better explanation for the existence of the world and its properties: atheism or the Christian faith? In this chapter, I address the following questions: Why is there something and not nothing? Why can there be life at all? And finally: Why is there life with consciousness and reason?³⁵

3.1 Why is there something and not nothing?

Our everyday experience tells us that things do not simply arise spontaneously "out of nothing". Is the universe any different? Has it "always" been there or did it have a beginning? And what does this mean for the question of the existence of God? Because of their fundamental importance, these questions have been discussed in philosophy and theology for centuries. In this context, various so-called "cosmological arguments" have been put forward throughout history, two of which I will present below.

The cosmological argument according to the philosopher Gottfried Wilhelm Leibniz (1646-1716)³⁶ assumes an "eternal" universe without a beginning. Leibniz argues as shown in Table 3.1.

³⁵ A detailed philosophical discussion of the topics addressed here can be found in Plantinga 2011.

³⁶ I am essentially following Winfried Löffler's account in his book "Religionsphilosophie" (Philosophy of Religion), Löffler 2013, ch. 3.3. Further accounts can also be found in other authors, a particularly short one can be found in Craig 2010.

Table 3.1: The cosmological argument according to Leibniz.²¹

Argumentation steps
1. Every contingent fact or condition in the world has a sufficient reason.
2. There may be temporally successive chains of sufficient reasons and they may be finite or infinitely long. But that there are any such chains of reasons at all, no matter how long, indeed that there is a world at all, are contingent facts that have a sufficient reason.
3. This sufficient reason cannot be part of the world, because otherwise it would need a sufficient reason of its own (see point 1).
4. So there is a sufficient reason for the existence of the world and the chains of sufficient reasons in it. This reason itself no longer has a sufficient reason and can be equated with what is called "God" in religion.

1. *Contingency* refers to the property of a fact or action of being possible but not necessary. In this context, the latter means that there is no necessity for something to happen or behave in a certain way. For example, it is possible for a lover to give roses to his beloved, but he is not forced to do so by anything (e.g. a law of nature); it is his free decision to do so or not. The "sufficient" reason for his contingent behavior lies in his love for his adored one.

2. It could be that the chain of causal relationships that we can observe is not complete. For example, our universe could also have emerged from an earlier state of a "multiverse" (more on this in section 3.3) and this in turn from a previous "primordial multiverse" and so on. But even if that were the case, there would still have to be a reason for a multiverse, a predecessor of it or anything *at all* to exist.

Now there may be inner-worldly explanations (e.g. laws of nature) for why things behave the way they do. However, this only applies on the condition that a world already exists. The final reason why there is a world *at all* must be of a different kind.

3. The ultimate ground of the world cannot therefore lie in the world itself. The reason for the existence of the world at all, be it finite or infinite, must therefore be of a metaphysical nature, i.e. lie outside physics.

4. The equation of this reason with "God" results from the properties of God that I discussed in section 2.2.

The question of whether the universe has a temporal beginning or not was a controversial one until the second half of the last century. However, a universe with a beginning in time seems to harmonize better with the creation account in Genesis than a universe without a beginning. For this reason, the idea that the universe could have a beginning was initially received with great skepticism by many atheist physicists.³⁷

Nevertheless, the existence of a universe with a beginning has been considered for several centuries. The corresponding Kalam cosmological argument goes back to Islamic scholars of the ninth to eleventh centuries and is still being discussed today. Table 3.2 shows the individual steps of this argument, which I will discuss below.³⁸

³⁷ For example, the Nobel Prize winner Walther Nernst, who worked in the field of physical chemistry, vigorously opposed a thought experiment by Weizsäcker on a universe with a beginning after a lecture by C. F. von Weizsäcker in 1938, see Bussey 2006.

³⁸ There are various presentations and variants of this, see for example Craig 2002 and the chapter "The existence of God" in Schrenk 2017 as well as a more detailed physical discussion in Bussey 2013.

Table 3.2: The Kalam cosmological argument.³⁹

Argumentation steps	
1.	What has a temporal beginning has a cause of its existence.
2.	The universe has a temporal beginning.
3.	So the universe has a cause of its existence (follows from points 1 and 2).
4.	There are two basic patterns of causal explanations: Causes acting by natural law or by causes acting in a person-like manner.
5.	If the universe has a cause of its existence, it must be person-like, beginningless and powerful.
6.	So there is a person-like cause for the existence of the universe (follows from points 4 and 5).

1. The statement that something with a temporal beginning of its existence must have a cause is linked to general experience, it is a so-called "evident" or methodological principle and is related to the "sufficient reason" mentioned above. Something that appears in the world is caused by something else. Both objects in nature and technical objects do not appear spontaneously, but grow, are formed, manufactured, shaped or produced by other natural, human or technical processes.

2. The statement that the universe has a temporal beginning is based primarily on two cosmological observations made in the last century: firstly, the redshift of light from distant stars and secondly, the cosmic background radiation. The basic idea of the so-called "Big Bang" model, which has now become the standard cosmological model, is therefore well established empirically, even if some

³⁹ According to Schrenk 2017.

important questions remain unexplained - but more on this later.

The redshift of light: The observation that the light from stars in distant galaxies is shifted in color towards red (i.e. towards longer wavelengths) the further away the galaxies are, suggests that galaxies move away from us. Measurements of the redshift show that the further away the galaxies are, the faster they move away from us. The observation has a certain analogy in everyday experience, e.g. with the change in pitch of a passing siren: as the siren approaches, the pitch increases; as it moves away, the pitch decreases. The speed of the siren can be deduced from the change in pitch. However, this often-used analogy is not entirely correct. Closer observation reveals that the mechanism of cosmological redshift differs from the everyday experience described above in one crucial respect: It is not the stars themselves that are moving away, but the space in which the stars are located that is expanding. If all galaxies are moving away from us in this way, the universe must have been smaller in the past. This leads to the conclusion that the universe has expanded considerably over the course of time.

The cosmic background radiation: If we also assume that the energy of the entire universe does not change over time, then the early, small and very hot universe should have cooled down more and more due to its expansion after the Big Bang. The "residual temperature" of today's very large universe can be seen in the so-called cosmic background radiation. Remarkably, the wavelength dependence of the intensity of this radiation corresponds very closely to the wavelength dependence that one would expect from the thermal radiation of an object that has a temperature of about -270°C or approx. 3 Kelvin. This temperature is quite close to absolute zero on the temperature scale of -273°C (0 Kelvin). Today's cold universe with its temperature of approx. 3 Kelvin thus confirms the interpretation of the redshift described above as an expansion of the universe.

Based on these and many other observations, physicists have calculated the age of the universe to be around 13.8 billion years, after it emerged from the so-called "Big Bang", i.e. a hot initial state that is usually assumed to be extremely small. According to current research, this is the point in time at which our universe began.⁴⁰ Figure 3.1 summarizes the key stages in the development of the universe according to today's understanding.

3. From the previous two statements it now follows that there is also a cause for the existence of the universe. If you deny this, you have to question one of premises 1 or 2. While premise 2 (the temporal beginning) is generally accepted today, as I have just explained, this does not apply to premise 1 (the necessity of a cause for a temporal beginning). I will come back to this later.

4. There are two possible explanations for a cause: Either there is a natural law cause or a personal cause. However, natural law causes must in turn be attributable to other causes and therefore lead to an infinite regress, i.e. a never-ending search for the cause of the cause. Personal causes, on the other hand, are brought about by a person's decision.

5. The cause of the existence of the universe must not share its limitations, it must therefore be person-like, beginningless and powerful, because with a "mechanistic" cause - as described in the previous point - the question immediately arises as to what cause this mechanism in turn has, so we then find ourselves in an infinite chain of reasons.⁴¹

⁴⁰ See e.g. Hawking 1988 and Weinberg 1997.

⁴¹ I address the objection that our universe could be part of an earlier "multiverse" in section 4.3.

6. With the conclusion that there is a person-like cause for the existence of the universe, the fruits of the previous argument are now harvested. However, the characteristics of this person are precisely the characteristics of God: as already described in chapter 2.2, God himself has no cause for his existence. With this argument, the chain of questions about a sufficient cause of the universe has thus found an answer.

In the sense of section 2.5, this is an argument that makes the existence of God and his creative action at the beginning of the universe appear plausible. It is not a proof of God's existence, but according to Section 2.5, there will be no such proof.

The well-known English physicist Stephen Hawking, who died in 2018, presents a much-noticed alternative to the arguments presented above in his book "The grand design". With regard to the origin of the universe, he asks: "Where did all this come from? Did the universe need a creator?" and then claims: "Traditionally, these are questions for philosophy, but philosophy is dead. Philosophie has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge."⁴² These words express a certain amount of arrogance, which one occasionally encounters (not only) among physicists. I will discuss the mixture of facts and speculation, which is not only found here, especially in the field of cosmology, in section 3.3.

⁴² See Hawking 2010, p. 5.

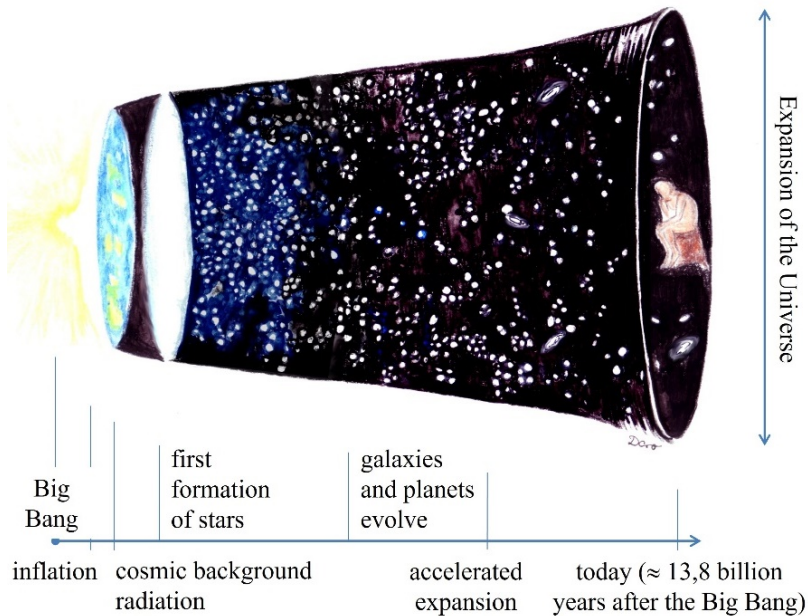


Figure 3.1: Schematic representation of the development of the universe: Immediately after the Big Bang (area shown in yellow), there was an extremely short phase of extremely rapid expansion (inflation). The cosmic background radiation that we measure today was released 380,000 years after the Big Bang (blue-green-yellow area). After 200 to 400 million years, the first stars form, then galaxies and planets, and finally the universe expands at an accelerated rate due to so-called dark energy. Compared to the age of the universe, humans only appear towards the end of the development that can still be observed today. This artistic representation serves only as a rough illustration. In particular, there is no "before" and no "outside" in this model.⁴³

⁴³ Illustration see <https://map.gsfc.nasa.gov/media/060915/index.html>, NASA/WMAP Science Team, last accessed in. Dec. 2017.

An adequate treatment of the underlying physical theories that Hawking describes goes far beyond the scope of a short, generally understandable book.⁴⁴ Fortunately, such a detailed discussion is not necessary, because the inconsistencies in Hawking's argumentation become clear even without detailed knowledge of physics. Towards the end of his book, Hawking summarizes his central assertion as follows: "On the scale of the entire universe, the positive energy of the matter *can* be balanced by the negative gravitational energy, and so there is no restriction on the creation of the whole universe. Because there is a law like gravity, the universe can and will create itself from nothing [...]. Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist. It is not necessary to invoke God to [...] set the universe going."⁴⁵ Although Hawking claims at an earlier stage of the book, that time in the beginning has other properties than today⁴⁶ Hawking claims that because *something* exists (the law of gravity), something else (the universe) is created out of *nothing*! This raises objections:

1. How can natural laws produce something on their own? Natural laws describe possible processes and also changes in existing systems but presuppose the existence of something whose behavior they describe.
2. How can something arise from "nothing"? "Nothing" implies the absence of any properties, objects or relationships between these objects, including not only the absence of space, time, energy and matter but more generally also entities like information, structures, laws of nature etc. Hawking, however, does not distinguish between a physical state of a (certain) vacuum and nothing.

⁴⁴ There are several recommended textbooks for an introduction to cosmology, see e.g. Liddle 2008; Roos 2015.

⁴⁵ See Hawking 2010, p. 180.

⁴⁶ See Hawking 2010, p. 134.

3. Hawking was not able to dispute that nothing comes into being without a sufficient cause. If there is a mechanistic cause such as the law of gravity, as Hawking points out, then we come, in the course of the Kalam cosmological argument, again to the question of the reason for the existence of the law of gravity.

Hawking thus makes very dubious claims, to say the least, for his thesis of God's dispensability regarding the existence of the universe. He takes a very naive approach to the term "nothing" - at least in the book quoted above. Unfortunately, he is not alone in this. The theoretical physicist Lawrence Krauss argues⁴⁷ along the same lines as Hawking. Although he explains his understanding of the concept of nothingness much more thoroughly than Hawking, he ultimately ends up with the same problem as Hawking. He first treats nothingness as an empty space in which there is absolutely nothing, but in which the laws of physics exist. He then argues that we can obtain something from this kind of nothingness, since empty space is associated with non-zero energy, even if there is no matter or radiation, but admits that it would be dishonest to call empty space with energy nothingness. It is only through a somewhat strange property of quantum mechanics, namely the occurrence of so-called quantum fluctuations⁴⁸ that Krauss concludes that under suitable conditions nothing necessarily becomes something; that nothing is therefore unstable and that space itself is forced into existence through the combination of quantum mechanics and general relativity.

Apart from the highly speculative nature of these statements, Krauss does not start with nothing, but with a quantum vacuum in

⁴⁷ See Krauss 2012.

⁴⁸ An effect that states that so-called virtual particles existing in a vacuum "emerge" from the vacuum for a very short time and can become real particles under certain conditions.

which all the essential components for further development are already contained.

Neither Hawking nor Krauss can explain how "something" arises from "nothing". There is an essential difference between assuming a law of gravity that exists for whatever reason and works in whatever way, or a quantum vacuum of whatever kind, and assuming a "nothing" in which there is not only neither space nor time, but also no laws or quantum properties. It is also strange that even among experts, the terms "nothing" and "vacuum" are repeatedly confused or used without distinction. The attempt by Hawking, Krauss and other authors to explain the existence of the universe therefore does not lead to an "ultimate" answer.⁴⁹ Interestingly, Hawking writes in the acknowledgements to his book: "The universe is based on a design and so is this book. But unlike the universe, a book does not appear spontaneously out of nothing. A book needs a creator [...]"⁵⁰ . He was, however, unable to show that the existence of the universe can be explained without a creator!

The physicist Gerd Ganteför, a prolific writer⁵¹ and author of many youtube videos around the topic of the limits of knowledge summarizes: "The big bang theory can explain quite a lot - apart from the big bang."⁵²

⁴⁹ A detailed discussion of Hawking's book can also be found in Lennox 2013.

⁵⁰ See Hawking 2010, p. 187.

⁵¹ See Ganteför 2023.

⁵² Youtube video "Die Reise zum Ende der Welt – Physik und Glaube" (The journey to the end of the world – Physics and Faith) published 3rd of Dec. 2024.

3.2 Why can life exist at all?

This section deals with the question of why life can exist at all. This question is not aimed at the biological evolution of life, but at the question: What must the world be like for life to develop *at all*? Since we normally take the nature of the world - the way it is - for granted, so this question may seem surprising. One might think, for example, that the exact values of the constants of nature are not so important. What does it matter if the earth or we ourselves are a little smaller or bigger, heavier or lighter?

The key assumption for the question of the characteristics of a "life-friendly" world is: A world in which physical, conscious life can exist requires the following characteristics:⁵³

- Stability
- Reproducibility
- Complexity

For example, if there were no long-lasting sun that constantly supplied the earth with the right amount of energy, life could not exist in the long term, as life would sooner or later die either a hot or cold death. If the Earth's orbit were not stable over long periods of time, it would be the same.

We can describe all these relationships using the corresponding laws of nature. If these laws of nature were to change, there would not be sufficiently stable conditions for life. In addition, the same or similar causes must also lead to comparable effects, i.e. natural processes must be sufficiently reproducible. Living organisms cannot adapt to an environment that is constantly changing chaotically. After all, life requires the formation of complex structures. Even the

⁵³ Basic considerations can be found in Tegmark 1998. For a detailed discussion see e.g. Lewis 2016.

simplest living organisms consist of complex carbon compounds, not to mention higher life forms such as humans. Nature must therefore contain suitable "building blocks" and ways of structuring them that make it possible to build complex structures in the first place. A look into a child's room may illustrate this: You can build a stable little house with a building set that contains interlocking blocks and perhaps also suitable connecting elements, but not with a building set that only contains smooth wooden blocks!

One could now argue that this way of looking at things is strongly influenced by our own way of life and that there could perhaps be completely different forms of life. However, if you argue in this way, you should at least give some indication of alternatives if you don't want to get completely lost in the realm of speculation. For example, according to current knowledge, there is too little evidence for the possibility of non-carbon-based life forms.

The realization that even slight changes in the constants of nature lead to a universe that is generally hostile to life has triggered extensive research into how our world must be structured in order to make life possible.⁵⁴ To avoid misunderstandings, I would like to emphasize at this point that this only describes the conditions that make the existence of life possible in the first place, but not the emergence of life itself. In addition, the mere existence of the right conditions for life does not mean that life actually comes into being.

The result of the corresponding investigations is: Stable, reproducible complexity requires

- a world with three spatial and one temporal dimension,
- suitable *laws of nature* that enable the formation of complex structures, and
- a very precise tuning of several fundamental *natural constants*.

⁵⁴ See e.g. Strobel 2004 and Lewis 2016.

The fulfillment of the last of these conditions in particular is called fine tuning. It is not surprising that the laws and constants of nature that we observe are the way we observe them, as this is ultimately the prerequisite for our existence. However, the explanation for the occurrence of fine-tuning itself is anything but clear and its interpretation has been the subject of controversial debate for decades and continues to be so today.⁵⁵ The universe could also be completely different. But then nobody would be able to think about it and this book would not exist either.

The subject of fine tuning has a number of quite complicated facets that quickly lead to a detailed discussion of physics. In the following, I will therefore choose a description that illustrates the problem as clearly as possible without making any claim to completeness or physical depth.

To do this, we must first realize that we can describe the physical behavior of matter with the following four interactions or forces:

Electromagnetic interaction describes phenomena such as electricity, magnetism and optics. The behavior of electromagnetic waves such as radio waves, light or X-rays, for example, follows from this interaction.

Due to its short range, the *weak interaction* only acts within the atomic nucleus and influences certain types of radioactive decay and nuclear fusion, e.g. energy generation in the sun.

The *strong interaction* also only works within the atomic nucleus due to its short range but is, as the name indicates, considerably stronger than the weak interaction. It causes the attraction of protons and neutrons in the atomic nucleus and thus enables stable atoms.

The *gravitational force* determines the attraction of bodies due to their mass and thus their movement, such as the fall of objects due to

⁵⁵ See Lewis 2016.

the Earth's gravitational pull, the Earth's orbit and the movement of cosmic objects such as galaxies.

Each of these interactions is associated with certain constants that determine their respective strength. We can now describe the effect of fine-tuning using the example of changes to various constants.⁵⁶ It turns out that very small changes in some of these constants lead to worlds in which life is not possible for various reasons.

If, for example, the constants of the strong interaction and the electromagnetic force are varied, the world changes dramatically. Depending on the variation, life is then not possible for various reasons: atomic nuclei become unstable, suns become short-lived, the atomic shell of atoms becomes unstable or the carbon atom becomes unstable. Similar catastrophes can be engineered if the strength of the electromagnetic force and the mass ratio of electrons and protons, i.e. elementary building blocks of the atomic nucleus and the atomic shell, were to be changed.

To top it all off, there are two other decisive factors that are important for the possibility of the development of life.

- The state of the universe directly or very shortly after the Big Bang must allow complex structures such as galaxies and stars to form later. However, this state is very unlikely.⁵⁷

⁵⁶ A more detailed discussion of the significance of these constants and the consequences of their change can be found, for example, in Tegmark 1998 and Lewis 2016.

⁵⁷ The universe must have had a very low entropy at the beginning. Entropy is a measure of the probability of finding a physical system in a certain state. Low entropy means that the corresponding state is improbable, while high entropy corresponds to a more probable state. The entropy in a closed system such as the universe as a whole cannot decrease, but either remains constant or tends to increase. A universe with a high initial entropy therefore no longer has sufficient "development possibilities" to form complex structures.

- The way in which the universe expanded in the beginning must have led to only very small initial fluctuations in density so that more complex structures could later emerge in the universe.⁵⁸

Our habitable "island of life" with its actual constants and conditions is therefore extraordinarily small compared to the possibilities that could still have been realized in the universe!

So the fine-tuning is not about the question of whether we would look a little different, but whether we could exist at all! The exact balance between the strength of the elementary forces described above and the right "starting conditions" make our life possible in the first place!

If you should ever meet a "fairy godmother" who would allow you to change the set screws of the constants of nature in order to improve the world, there is only one piece of advice: Hands off!

In line with the above observations, Hawking states: "Most of the fundamental constants in our theories appear to be the result of fine-tuning in that if they were altered by only tiny amounts, the universe would look significantly different and, in many cases, would be unsuitable for the development of life."⁵⁹

But what if precisely these relationships described above were to result from a future, unified theory of the four fundamental forces of nature? The formulation of such a "theory of everything", often called "Theory of Everything" (TOE), is ultimately something like the "Holy Grail" of physics. Then there would still be the question of why the world is exactly the way it is and why it is not based on a

⁵⁸ This is so-called inflation, i.e. an "inflation" that expanded the universe at faster-than-light speed in an extremely short period of time after the Big Bang. (This does not contradict the general theory of relativity because the objects in space do not move at faster-than-light speed). The process is still the subject of controversy, see section 3.3.

⁵⁹ This conclusion is reinforced by a number of other observations, including those described by Hawking 2010, see the chapter "The apparent miracle".

different "Theory of Everything". The idea that the structure of the universe was designed by a Creator so that we can exist in it therefore remains obvious.

3.3 Are there many worlds?

As you would expect, there are also alternative explanations to the conclusion drawn above: there could be many, perhaps even an infinite number of universes.⁶⁰ Our universe with its special properties would then only be a part of a larger "multiverse". Theories about the existence of many universes or multiverses can be roughly divided into five categories, see Table 3.3.

Table 3.3: Concepts for the existence of many universes or multiverses

	Concept	Basic idea
1.	Cyclic universe	Cycles of becoming and passing away of the universe follow one another.
2.	Spatially infinite universe	A spatially infinite universe consisting of non-interacting parts.
3.	Many world theory	New worlds are constantly being created as a result of quantum mechanical processes.
4.	Multiverse with different physics	There is a very large number of universes with different physical laws.
5.	"Mathematical" multiverse	There are an infinite number of universes with all conceivable properties.

The physical ideas behind these concepts are quite sophisticated, but do not need to be discussed in detail here. In the following, I will only discuss the main features of these concepts regarding whether one or more of these approaches can provide a plausible answer to the question of the origin of the world or fine-tuning.

⁶⁰ For a more in-depth discussion of the philosophical questions of cosmology, including multiverses and the explanation of fine-tuning, see Gil 2014.

1. *The cyclical universe*: An infinitely old multiverse contradicts recent physical findings. According to this, even a multiverse does not have an infinite past under reasonable conditions and the starting point of a multiverse cannot be described physically.⁶¹ A cyclical universe, on the other hand, would, as the name suggests, have successive cycles of expansion and contraction. "Our big bang" would then only be the beginning of the "eon" in which we live. Whether there are or have been finitely many or infinitely many such cycles remains an open question.

The idea is appealing but has its pitfalls: Even a cyclical universe can hardly be reconciled with established physics.⁶² Moreover, in an "eternal", in the sense of an infinitely old, cyclical universe, the cycle time - at least on average - must neither become shorter nor longer. If the cycles were to become shorter and shorter, they would have to be infinitely short today, after an infinite number of cycles, which is obviously not the case. If the cycles were getting longer and longer, they would have to be infinitely long today, also after an infinite number of cycles, which contradicts the finite age of our universe.

Aware of the difficulties associated with this approach, the physicist Roger Penrose presented a speculative approach to a cyclical universe⁶³, which, however, did not receive much attention. Even in the unlikely event that all the problems associated with the concept of a cyclical universe could be solved, an infinite past seems implausible. This still leaves the question of the cause of the "first big bang". Moreover, it is not clear why a cyclical universe should

⁶¹ See the overview article Guth 2007 and the other citations there. In addition, an infinitely old universe should have maximum entropy and therefore not support life, see Bussey 2006, among others.

⁶² For a cyclical universe, it would have to be made plausible how entropy can start again at a low value after each cycle.

⁶³ In his book "Cycles of time" Penrose 2010, Penrose attempts to work out a solution to the entropy problem.

provide the right conditions (in terms of fine-tuning) for our life.

2. *The spatially infinite universe:* This scenario assumes a spatially infinite universe, of which we can only observe the part from which light has reached us (to date). We would therefore live in a "sub-domain" of a spatially infinite universe, which we refer to as "our" universe, while all other (infinitely many) areas are referred to as other universes. Here, somewhat conceptually unfortunate, an infinitely large universe is broken down into "individual universes", the totality of which is then referred to as a multiverse. This scenario therefore actually "only" describes a universe that is infinitely large from the outset. As we cannot observe the other parts in principle, this may be the case, but neither the cause of the beginning nor the existence of fine-tuning are plausible.

3. *The many world theory:* Physicist Hugh Everett laid the foundation of this theory in 1957. It is an alternative interpretation of quantum mechanics, according to which new worlds are constantly being created as a result of quantum mechanical processes. In my opinion, this highly speculative and fundamentally unverifiable approach is more an escape from the problem of the measurement process posed by quantum mechanics than a solution to it. ⁶⁴

4. *The multiverse with different physics:* Models of this type understand a multiverse as a collection of (a huge number of) universes in which different physical laws apply. These universes can be understood as "islands" that do not (or almost not) interact with each other.

Some ideas of this kind are based on the "standard model of cosmology" mentioned in section 3.1, others go far beyond this and are highly speculative in nature. The multiverse hypothesis is not only motivated by the problem of fine-tuning, but also by so-called

⁶⁴ See Saunders 2012.

"inflation", i.e. the initially extremely rapid expansion of our universe at a very early stage immediately after the Big Bang. This could be followed by the formation of domains, i.e. areas like that of our universe, which are embedded in a much larger entity, the multiverse.

A number of interesting mathematical-physical concepts, such as string theory, have emerged in the course of the various efforts to find a unified description of gravity and quantum mechanics (i.e. the description of the behavior of very large and very small objects such as the universe on the one hand and atoms or even smaller objects on the other) through to a possible structure of multiverses and the "embedding" of our universe in them.⁶⁵ However, we are no longer in the realm of theories that are well founded experimentally or through observations, but in the realm of mathematical models that *could* describe the world. In addition, there are many different variations of these theories, so in a way you can "choose" which universe you want. Hawking describes what he considers to be the most comprehensive theory, the so-called M-theory.⁶⁶ An interesting aspect of his theory is that it describes a very large number of universes with different laws. Hawking therefore concludes: "Obviously there is a huge landscape of possible universes", the

⁶⁵ String theory introduces new objects, so-called strings (comparable to infinitely thin strings), which can then be used to describe (known and as yet unknown) elementary particles as "vibrational states" of these strings (similar to the overtones of a violin). However, this theory works in an approx. ten-dimensional space-time. This may initially seem somewhat absurd and contradictory to the statements on dimensionality in the previous section, but it is mathematically manageable and initially not an argument against this approach, especially as explanations can also be given as to why we do not "notice" the "surplus" dimensions, see Randall 2006.

⁶⁶ It is not clear what the name means. The theory is an attempt to generalize string theory and also operates in a high-dimensional space.

number of which he gives as 10^{500} .⁶⁷ This number (a 1 with 500 zeros) is now so extraordinarily large that it is difficult to compare it with any other order of magnitude in the universe. So if you can "construct" any universe with this theory, it should come as no surprise if our own is eventually included.

In view of the many very fundamental open questions in cosmology, which I will discuss below, and the lack of experimental confirmation, such and similar statements appear very speculative. Lawrence Krauss, who was already mentioned in the previous chapter, writes about string theory: "[...] in fact, a thorough review [of string theory] is probably not possible, because if one thing has become clear in the past twenty-five years, it is that what was formerly called string theory is clearly something much more elaborate and complicated, and something whose fundamental nature and mode of makeup is still a mystery.

We still have no idea if this remarkable theoretical edifice actually has anything to do with the real world. Nevertheless, perhaps no theoretical picture has ever so successfully permeated the consciousness of the physics community without having yet demonstrated its ability to successfully resolve a single experimental mystery about nature."⁶⁸

The fourth scenario with different physics is therefore very speculative but seems quite appealing. In the theory proposed by Hawking, for example, we have the choice between countless variants of universes with different laws of nature. However, there are characteristics that are the same for all these universes. All these universes have laws of nature with a quantum mechanical character. Therefore, in such a multiverse, universes should also arise that

⁶⁷ See Hawking 2010, p. 119.

⁶⁸ See Krauss 2012, p. 130.

enable life. Figure 3.2 shows an artist's representation of such a "multiverse world".

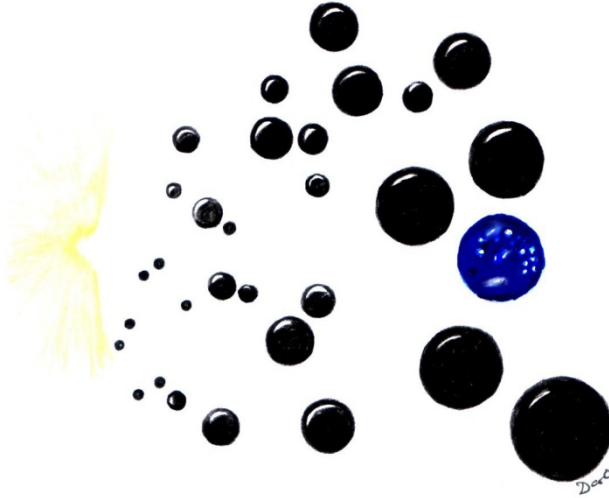


Figure 3.2: *If there were a multiverse in which a huge number of universes could arise, then there could be a certain probability that not only universes would arise that do not enable life (black bubbles) but also one or more universes (blue bubble) among them that could enable complex structures or even life. The question of the first cause for the appearance of this multiverse (indicated as a yellow radiating area) arises again, as does the question of the appropriate properties of the multiverse in order to be able to produce universes that are suitable for life at all. This artistic representation serves only as a rough illustration and as mentioned in Fig. 3.1, cannot be assumed to be to scale in any way (e.g. in terms of time or space).*

However, it is also possible to design multiverses consisting of universes in which the dynamics of matter are determined by a single physical force, or multiverses consisting of universes containing different variations of classical physics in which no stable atoms can exist. Or you can imagine multiverses consisting of very short-lived

universes. There are hardly any limits to the imagination. The number of mathematical structures that can be regarded as laws of a multiverse that do not open up space for life therefore seems to be much greater than the number of mathematical structures that are compatible with the emergence of life. Why does the multiverse have just the right properties to be able to produce universes that make life possible? And how did it come about in the first place?

Apart from the sometimes extremely speculative nature of the theories presented above, the scenarios discussed so far do not really solve the problem of fine-tuning. The problem only shifts from the universe to the multiverse. Furthermore, they do not answer the question from section 3.1 as to why something exists at all and not nothing.

5. *The mathematical multiverse*: The proposal of the "mathematical multiverse" by physicist Max Tegmark goes the furthest, claiming that all mathematically consistent structures also exist physically. This would mean that there are an infinite number of universes or multiverses with all possible laws and conditions that are mathematically consistent.⁶⁹

This proposal of the mathematical multiverse "solves" the problem of fine-tuning, as there must be at least one universe in the infinite number of⁷⁰ possible universes in which all conditions for life fit, simply because, according to Tegmark, everything that is logically consistent is also physically real. But is this idea viable? And - one

⁶⁹ See his detailed description in Tegmark 1998.

⁷⁰ However, one of the questions that arises here is whether mathematical infinities can be physically realized at all. For the interested reader, I recommend the article "Physical Infinities: A Substitute for God?" Bussey 2006. In physics, the appearance of infinities can 1. indicate that the relevant facts are not yet properly understood or 2. that they are idealizations. The "overcoming" of infinities (or singularities) is therefore usually associated with a new insight into the physical facts.

hardly dares to ask the question at this peak of speculation - is this concept somehow "testable"? First of all, there is no compelling reason why everything that is logically conceivable without contradiction must also exist. If you wanted to test your hypothesis, you would ideally have to explore several universes to find out whether you could find evidence for the realization of universes with arbitrary mathematical structures. This does not seem possible and therefore this concept is highly unattractive in terms of a scientific hypothesis.⁷¹

However, Tegmark "solves" the problem of fine-tuning at a high price: if one claims that everything that is conceivable also exists (somehow and somewhere), what kind of explanatory content does science still have in relation to the world in which we live? Moreover, the question of existence rather than non-existence is only "solved" if one assumes that mathematical structures bring something "into existence", an idea whose questionability I already addressed in the discussion of Hawking's approaches in the last section.

Before concluding this section, I would like to briefly point out some substantial unanswered questions that we have in relation to our "own" universe. Despite the great successes of the standard cosmological model, we should not overlook the fact that the following three points in particular are currently in need of clarification with regard to the structure of our universe:⁷²

⁷¹ The above-mentioned philosopher Francisco José Soler Gil argues the implausibility of this approach with a further, albeit somewhat speculative, thought: if we assume the existence of universes that correspond to logically consistent mathematical structures, shouldn't we actually expect to inhabit a much more complicated world? Why don't many more things happen that could happen? Our world seems to be pretty much tailor-made to allow life. The structure of our world seems to contain hardly any elements that are "unnecessary" for life. This seems quite astonishing for a Tegmarkian world, see Gil 2014, pp. 140-146.

⁷² For a description of possible alternative explanations, see Roos 2015 and Gil 2014, pp. 106-107.

- The cause of the first inflation of the universe: the rapid, extreme expansion of the universe immediately after the Big Bang, which is required for the universe to become as homogeneous as it looks today, is not understood. Some scientists hope that this process can be understood with the help of quantum gravity, which has yet to be developed, while others deny that such an inflation took place at all.⁷³
- Dark matter: The mass of visible, known matter contained in the galaxies is not sufficient for the stability of large structures. There must be an unknown type of matter that only interacts through gravity and is otherwise "invisible". The nature of this dark matter is unknown. Its share of the energy density of the universe is currently estimated to be around a quarter of the total energy density of the universe.
- Dark energy: The cause of the accelerated expansion of the universe in recent history is unknown and cannot be described by a mass, as this would lead to a contraction. According to current knowledge, the unknown quantity described by the term "dark energy" corresponds to a bit less than three quarters of the energy density of the universe.

The exploration of our universe continues to be an incredibly exciting, successful and rewarding endeavor in which there are always surprises. However, the mere fact that the stars and radiation in the universe, whose nature we know, only make up around 5% of the energy density of our universe and the rest consists of unknown dark matter and dark energy⁷⁴, makes it very clear that we have by no means "understood" our universe yet! This understanding could therefore look very different after ten or twenty years of further

⁷³ See, for example, the discussion in chapter 2.6 in Penrose 2010.

⁷⁴ See Clegg 2019.

research than it does today. And the questions we will have then may be completely different from the ones we are asking today. The theories about multiverses could also be completely different then - or even extinct.

With regard to cosmology, it must unfortunately be noted from time to time that the distinction between empirically verifiable theories and natural philosophical speculation is blurred in many places. It is not uncommon for overly far-reaching ideological conclusions to be drawn from a preliminary state of unsubstantiated theories or even speculations - see the discussion of Hawking's statements in the previous section. This creates an interpretative sovereignty among the public that is not appropriate to the facts. This becomes clear in popular and occasionally also in popular science publications, not to mention science fiction films in which other universes and alien civilizations are part of the self-evident repertoire. Although such films usually have no scientific claim, they shape the imagination through the power of images.

In my opinion, the various multiverse theories or hypotheses do not clarify the question of the existence of the universe itself, nor the question of fine-tuning. The alternatives to accepting a Creator God are highly speculative and require a great deal of faith in (almost certainly) untestable concepts. How the state of knowledge develops in the course of further research and what conclusions can be drawn from it in detail for the understanding of our universe remains to be seen, of course - as mentioned above. However, on the basis of the above argumentation, it seems very reasonable to me to assume that we will not be able to get rid of the question of God through the multiverse hypothesis.

3.4 Life, consciousness, reason - just coincidence?

Now that I have discussed the conditions under which life could arise in the first place, the question naturally arises as to what happened next. In addition to the formation of galaxies, solar systems and habitable planets (and their discovery - one of the current exciting topics in cosmology), the following questions arise: How did life originate? How did living organisms with consciousness, such as humans, come into being? Where do the diverse, complex phenomena of life such as reason, language, values, morality and religion come from?

The common answer to *all* these questions is: evolution - i.e. natural development! The buzzword evolution not only describes the guiding idea or *the* dominant paradigm of biological research, but is - consciously or unconsciously - often regarded as the basis of a "modern scientific world view". But what does that mean? To clarify, I distinguish between the following terms:

Evolutionary theories are scientific theories that describe the development of living organisms. Such theories arise from evolutionary biological studies of the processes or mechanisms by which the development of biological systems takes place or has taken place. The term *evolutionary biology* is therefore often used. Evolutionary biology is based on empirical observations and studies ranging from fossils to molecular genetics⁷⁵ and is undergoing a dynamic development that goes far beyond Darwin's findings.⁷⁶

⁷⁵ See, for example, the standard textbook Storch 2013.

⁷⁶ See, for example Lange 2012.

Evolutionism, on the other hand, is a naturalistic world view that assumes that evolution provides a complete description of the development of all phenomena in the world as a whole.

There is a great deal of literature on the question of the scope of evolutionary mechanisms and their explanatory power, with very different points of view. The question that interests us in connection with the topic of this book is: Can evolutionary mechanisms (at least in principle) provide a complete answer to the question of how life developed, from the first molecules to the mental abilities of humans? Again, looking at beginnings seems to be particularly interesting. The question how a “first cell” came into existence seems to be unanswered and needs further investigation. As I am a physicist and not a biologist, I leave this discussion to the experts.⁷⁷

The attempted answers range from a creationist view, which sees little potential for evolutionary development, depending on the form it takes, to an evolutionist view, which claims to be able to understand this development exclusively in naturalistic terms.

On the one hand, there is a sometimes very dogmatic "short-term creationism", which describes the creation in seven literal days⁷⁸ and the history of the cosmos in a period of typically less than 10,000 years and has thus caused a great loss of credibility for the Christian faith. On the other hand, there is the sometimes equally dogmatic stance that any deviation from a purely naturalistic pattern of explanation is to be condemned as unscientific and downright anti-progressive and dangerous.

While proponents of the first view quickly become entangled in insurmountable conflicts with well-established physical descriptions

⁷⁷ See e.g. Meyer 2009 and Lynch 2024.

⁷⁸ For a discussion of the understanding of the seven days of creation in Genesis, see Lennox 2011. For an introduction to the problems of understanding prehistory, see Keller 2018.

of our world, the second view can refer to many scientific successes, but develops ideological traits in its extrapolation (i.e. drawing conclusions that go beyond the proven or provable range) and its absolutization. How far the explanatory content of evolutionary theories extends can ultimately only be proven by careful, laborious and lengthy research work. And anyone who works in research knows that research has a way of bringing unexpected results to light time and again.

Interestingly, the Bible's account of creation itself provides clues to a behavior of nature that would probably be described as "evolutionary" today. It says in Genesis 1:24: "And God said, 'Let the land produce living creatures according to their kinds: the livestock, the creatures that move along the ground, and the wild animals, each according to its kind.' And it was so." Without wishing to impute too much of a scientific coloring to the text here, it is interesting to note that an interplay between God's creative will through his word and the development potential of "the land", i.e. God's creation, is apparently indicated here. How far this development potential extends is a question of research. However, based on the description I will give in the next chapter, it is quite conceivable that God intervenes in this process or directs this process.

Renowned Christian authors, such as the philosopher Alvin Plantinga mentioned in section 2.1, have therefore also referred to the frequently invoked conflict between evolution and Christian faith as a "supposed conflict". Plantinga concludes his investigations with the conclusion: "The scientific theory of evolution as such is not incompatible with Christian belief; what is incompatible is the idea that evolution, natural selection, is *unguided*. But that idea isn't part of evolutionary theory as such; it's instead a metaphysical or

theological addition."⁷⁹

And this brings us from evolution in the sense of an object of research or a scientific paradigm (see section 2.6) to its ideological form, evolutionism. Evolutionism is deeply rooted in the general consciousness as an ideological or axiomatic premise based on unprovable assumptions. Interestingly, there is not only criticism from the "Christian-religious" camp. The previously quoted philosopher Thomas Nagel, for example, who rejects theism and therefore Christianity, argues: "[...] the coming into existence of the genetic code – an arbitrary mapping of nucleotide sequences into amino acids, together with mechanisms that can read the code and carry out its instructions – seems particularly resistant to being revealed as probable given physical laws alone." and explains: "Whatever one may think about the possibility of a designer the prevailing doctrine – that the appearance of life from dead matter and its evolution through accidental mutation and natural selection to its present forms has involved nothing but the operation of physical laws - cannot be regarded as unassailable. It is an assumption governing the scientific project rather than a well-confirmed scientific hypothesis."⁸⁰

The absolutization of paradigms promotes a narrowing of perspective, in this case along the lines of: Since there can only be an evolutionary explanation anyway, every phenomenon that brings with it some kind of advantage for survival must also have arisen evolutionarily! However, this is a false conclusion that is based on rejecting other alternatives from the outset as implausible or even impossible. However, if you want to claim that something has arisen in a certain way, you must also be able to specify (at least in

⁷⁹ See Plantinga 2011 p. 83.

⁸⁰ See Nagel 2012, p. 10 and 11.

principle) mechanisms that make the emergence of the observed property plausible! At this point, however, the principle of hope often reigns, after it is concluded on the basis of past successes that "the remaining gaps" will close.

The claim of Nagel can be summarized as follows "The modern materialist approach to life has conspicuously failed to explain such central mind related features of our world as consciousness, intentionality, meaning and value."⁸¹ He thus formulates a counter-thesis to Dawkins, who - as I quoted at the beginning of the book - claims that phenomena such as the mind, consciousness and morality can ultimately be derived from the laws of physics. Nagel places the question in a larger context by demanding that a theory that describes the relationship between the mind, brain and behavior of animal organisms and humans cannot be seen in isolation from the sciences.

Interestingly, Nagel also complains that reductionism, i.e. the attribution of all phenomena exclusively to physical principles, represents an "orthodox view, and any resistance to it is regarded as not only scientifically but politically incorrect." According to Nagel, this also has concrete negative effects on the development of science: "I find the confidence among the scientific establishment that the whole scenario will yield to a purely chemical explanation hard to understand, except as a manifestation of an axiomatic⁸² commitment to reductive materialism."⁸³

But let's assume that we could one day explain all the difficulties of the origin of life with a naturalistic theory. Can we then also explain the emergence of so-called "mental phenomena" such as our consciousness, which includes our ego perspective, in naturalistic

⁸¹ As found in the blurb of Nagel 2012

⁸² "Axiomatic" means based on basic assumptions that cannot be proven.

⁸³ See Nagel 2012, p. 3, 49.

terms? With this question, we are now in the difficult area of the "philosophy of mind".⁸⁴

The philosopher Holm Tetens argues that naturalistic answers to explain ego consciousness all suffer from the same difficulty:⁸⁵ "They cannot really make it understandable why, in a purely material world of experience, self-reflective ego subjects capable of experience have one day entered the stage with their specific ego perspective." He supports this thesis with four arguments, the first of which I reproduce below, which also corresponds to Nagel's argumentation: "If reality can be completely described and explained by the empirical sciences, it should be completely describable from the objective observer's perspective. Let the reader imagine himself confronted with such a description. According to the claim, it would also say everything about him that could be said about him. Or would something be missing? For each of us, even the most important thing would be missing from this supposedly complete description. Each of us would have to recognize: 'By the way, the person who is mentioned in such detail under the name N.N. is me. And this statement [...] would not occur in the experiential-scientific description, because there we have to talk about people intersubjectively⁸⁶ [...]"

The first-person perspective does not appear to be naturalistically comprehensible. What is important here is that it does not seem to be about gaps in the current state of knowledge, but about a fundamental incompatibility of naturalism with phenomena of the observable

⁸⁴ For a detailed overview of the philosophy of mind from a naturalistic perspective, see Beckermann 2008. For a detailed account from a theistic perspective, see Swinburne 2013. Also of interest in this context is Ellis 2016.

⁸⁵ From "Thinking God - An attempt at rational theology" (Quote and title translated) in chapter I.4 "The stagnation of materialism", p. 21f in Tetens 2015.

⁸⁶ "Intersubjective" means that a fact must be equally observable or comprehensible for several observers.

world. It is not a question of whether natural science describes natural phenomena in the world well (that seems obvious), it is a question of whether *there are only* phenomena that can be described by natural science.⁸⁷

On closer inspection, the existence of consciousness does not appear to be a marginal problem, but rather a fundamental challenge to a mechanistic view of the world.⁸⁸ It is precisely the rejection of consciousness, values and goals that has proven to be extraordinarily successful in physics. The fact that we now want to reintegrate the very phenomena into the theory into which they did not fit does not seem very promising. It is to Nagel's credit that he has pointed out this problem. This gives us the opportunity to expand the framework of thought and allow for new explanatory approaches, even if it is still far from clear what they consist of. However, if you realize that you are at a dead end, there is no point in going further. You have to allow alternatives, perhaps only to find new insights for a further change of direction in another dead end! Nagel proposes three alternatives to get out of the dead end described above:

- Matter and its laws form the fundamental level of explanation. The mind is a consequence of these physical laws.
- The mind, not physical laws, is the fundamental level of explanation from which the laws of physics ultimately arise.
- God is the fundamental explanation both for the material development of the universe and for the existence of the (human) spirit.

I have explained the problems of the first position. The second argues that the mind is not to be understood as divine - however one

⁸⁷ Peter Bieri provides an introduction to the question of how the workings of the human mind, or more generally "mental phenomena", can be understood and what difficulties arise from this in his "Trilemma" Bieri 1993, p. 5.

⁸⁸ See also the chapter "Deep conflict" in Plantinga 2011.

then understands it - and is nevertheless a fundamental explanatory principle from which the laws of physics also arise. But if the mind is inner-worldly, we are faced with the same problem as in section 3.1: Why is there anything at all and not nothing? If it is not, we are very close to theism. The problem is solved with the third position if we allow for an action of God that produces phenomena such as spirit, ego-consciousness, mind, intentions and beliefs in humans.

4 Work of God and laws of nature - a contradiction?

After the explanations in the last chapter, the question arises: Is it conceivable to assume that God is at work in the world, or is our world a self-contained entity that - like clockwork - simply runs its course without external influence? We have seen in sections 3.1 and 3.3 that it seems reasonable to regard God as the author of the universe. But did God only have a hand in the beginning of the universe? A well-known atheist philosopher once said to me: "If you admit God at the beginning, then you don't know where else he will appear." In this chapter, I therefore address the question of whether God can or does intervene in the world in history or even today.

God's intervention in the world can be imagined in various ways. According to the Bible, it manifests itself in many different ways, for example in the form of dreams, visions and prophecies through to natural or healing miracles. One of the biggest intellectual problems with the credibility of the Bible and therefore also the Christian faith, especially among Westerners, is probably its descriptions of miracles.⁸⁹ The accounts of the resurrection of Jesus in the New Testament in particular have repeatedly led to highly controversial discussions.

⁸⁹ C.S. Lewis (1898-1963) provides a beautiful, concise and generally understandable introduction to the subject in his classic "Miracles: Possible - Probable, Unthinkable", C. S. Lewis 1947 (often reprinted, here in its original version).

4.1 God at work – theologians at worry

The authors of the New Testament repeatedly report on miracles, giving the impression that they are reporting on factual events. For example, the apostle Paul writes in a well-known passage in his first letter to the Corinthians: "[...] that Christ died for our sins according to the Scriptures, that he was buried, that he was raised on the third day according to the Scriptures, and that he appeared to Cephas [Peter] and then to the Twelve [apostles]. After that, he appeared to more than five hundred of the brothers and sisters at the same time, most of whom are still living, [...]." A few verses later he adds: "And if Christ has not been raised, our preaching is useless and so is your faith."⁹⁰ Other passages in the New Testament also make it clear that the writers had something other than legend-making in mind, for example when the apostle Peter writes: "For we did not follow cleverly devised stories when we told you about the coming of our Lord Jesus Christ in power, but we were eyewitnesses of his majesty."⁹¹

While the representatives of the old Christian churches and, for example, the reformer Martin Luther (1483-1546) assumed that Jesus actually died and rose from the dead, this situation has since changed significantly.

The following quote from the German Protestant theologian Friedrich Schleiermacher (1768-1834) from 1799 clearly demonstrates the move away from a factual understanding of miracles: "Miracle is only the religious name for an event; any event, even the most natural and ordinary, as soon as it is suitable for the religious view of it to be the prevailing one, is a miracle [...]. The more

⁹⁰ Quoted from 1 Corinthians 15:3b-6; 14.

⁹¹ Quoted from 2 Peter 1:16

religious you were, the more miracles you would see everywhere."⁹² Schleiermacher obviously gives the term "miracle" a new meaning: according to him, it is not about the tangible actions of God, but about events that are in a religious context of some kind.

The German philosopher Ludwig Feuerbach (1804-1872), well known for his criticism of religion, wrote in 1841, somewhat later than Schleiermacher: "For reason, the miracle is senseless, unthinkable, as unthinkable as a wooden iron, a circle without a periphery. Before discussing the possibility of whether a miracle can happen, show the possibility of whether the miracle, i.e. the unthinkable, is thinkable."⁹³ Feuerbach, however, does not provide a real argument, but makes the a priori assertion⁹⁴ that a miracle is senseless and unthinkable from the outset.

In order to understand this development and its consequences, I will discuss the position of the German Protestant theologian Rudolf Bultmann (1884-1976). Although his name is today almost only known by theologians, his ideas have shaped generations of students of protestant theology and are deeply carved into the mind not only of most theologians but also non-theologians still today and far beyond Germany. I would, however, like to emphasize that his position and that of his students was never uncontroversial in theology and the discussions about the understanding of God's actions in the world have not died down in recent decades.⁹⁵

In 1941, in his essay "Neues Testament und Mythologie" (New Testament and Mythology), Bultmann was much clearer than Schleiermacher in his view that the miracle reports of the New Testament can no longer be taken seriously today as reports of

⁹² Thus Schleiermacher 1969, p. 79 (translated from German).

⁹³ So in Feuerbach 2016, p. 125.

⁹⁴ "A priori" assertions are claims that are taken for granted from the beginning.

⁹⁵ For a current critique of the historical-critical method, see e.g. Wilckens 2017.

factual miracles.⁹⁶ He claims: "World experience and world usurpation have developed so far in science and technology that no one can and does seriously hold on to the New Testament world view." He claims that the knowledge of the forces and laws of nature had put an end to the belief in spirits and demons and ultimately "the miracles of the New Testament as miracles". Interestingly, however, he goes one step further by writing: "But this is not at all about the criticism that emanates from the scientific world view, but just as much, indeed basically even more, about the criticism that arises from the self-understanding of modern man." Bultmann then comes to the decisive conclusion in our context: "And the only relevant question for theology is how the decision in favor of a consistently biological worldview can be justified [...] This is firstly the worldview formed by natural science and secondly man's self-understanding, according to which he sees himself as a closed inner unity that is not open to the access of supernatural powers."⁹⁶ However, Bultmann's assertion that a "scientific world view" and God's intervention in the world are incompatible is just as unfounded as the "self-understanding" that man is not accessible to God's intervention.

With regard to the resurrection of Jesus, Bultmann explains against this background: "[...] what kind of historical fact could it be whose reality is connected with the resurrection of the dead [...]. The resurrection of Jesus cannot be an authenticating miracle in response to which the questioner can now believe in Christ with certainty. Not only because it is unbelievable as a mythical event [...]; not only because the resurrection cannot be established as an objective fact, no matter how many witnesses there are [...]. Rather, the resurrection itself is an object of faith [...]." This argument is extraordinarily

⁹⁶ See Bultmann 1960, pp. 15-48 (translated from the German origin).

remarkable: Bultmann says here nothing other than that the credibility of the resurrection cannot be proven at all because (in his opinion) it is inherently implausible.

Bultmann thus redefines the concept of resurrection. The fact that this reinterpretation of the term is still not made explicitly clear in the majority of (especially) Protestant pulpits today significantly contributes to the confusion about the content of the Christian faith, as does Schleiermacher's reinterpretation of the concept of miracles, and reinforces the impression that it is basically a nebulous, intangible sentimentalism. On the crucifixion of Jesus, Bultmann states that the cross of Christ is "the tragic end of a noble man" and shortly afterwards: "Christ the crucified and risen one encounters us in the word of proclamation, nowhere else. It is precisely faith in this word that is in truth Easter faith."

In the final section of his essay, he finally writes of the paradox "[...] that God's eschatological⁹⁷ messenger is a concrete historical person, that God's eschatological action takes place in a human destiny, [...]"

The "program of demythologization" described very briefly above and the associated "historical criticism" of the New Testament have since occupied legions of mainly Protestant theologians and for a long time were hardly questionable figures in Protestant university theology.⁹⁸

I will now summarize the statements that characterize the program of demythologization and that are essential for our context according to Bultmann:

1. The miracle reports of the New Testament are myths that express

⁹⁷ In theology, eschatology is the "doctrine of the last things", i.e. the end of the world or the beginning of a new world or a new age.

⁹⁸ For a discussion of the historical-critical method, I refer to Maier 1974; Berger 2007; Maier 2016; Wilckens 2017.

underlying truths but do not describe historical events.

2. Man is a closed entity, i.e. he is not open to the access of supranatural powers. This means in particular that God cannot act on humans.

3 God acts through the human Jesus.

However, there is obviously a problem here: either humans are closed entities with regard to the work of transcendent powers according to point 2, in which case God cannot act on humans, i.e. not on Jesus either, contrary to point 3. Or, contrary to point 2, God can act on humans, i.e. also on Jesus according to point 3, but then there is certainly the possibility of miracles, which means, contrary to point 1, that the miracle reports of the New Testament do not necessarily have to be myths but could also describe historical events. The program of demythologization is therefore inherently inconsistent!

It is worth making this conclusion a little more general: If a theological concept (such as the one discussed above) commits itself to a naturalistic worldview, then this means that God *cannot* act in any way in nature or on human beings. This then also includes influencing human thoughts! So not only could God not effect healings or raise the dead, he could also not produce dreams or prophecies, not even ideas (about him) in people. For how could God be in a position to influence the neuronal processes in the human brain if the human being has no possibility of doing so, or (as Bultmann puts it) is not even open to it? The program of demythologization reduces God to a theoretically thinkable but otherwise ineffective entity in the philosophy of religion, and theology ultimately to the philosophy of religion. Any element of revelation is thus excluded, and one should consider carefully, especially as a theologian, whether one is prepared to draw this conclusion!

In order to examine the possibility of God's work in the world

independently of ideological predeterminations, I will now discuss the two following questions:

1. Are there arguments for or against the possibility of God intervening in the world from a physical point of view?
2. Are there indications that speak for an actual intervention of God in the world?

4.2 Is the material world self-contained?

Many people have an image of the processes in nature that roughly corresponds to the "clockmaker's universe", the basic idea of which is symbolized in Figure 4.1: Towards the end of the 18th and the beginning of the 19th century, the idea was widespread that the processes in the world correspond to those in a perfect clockwork mechanism: The development of the world is completely determined or "determinate" and therefore - at least in principle - also predictable. If you know all the forces at work and the state of this world at a certain point in time, then you can calculate both the past and the future exactly in every detail.



Figure 4.1: *The world according to the "watchmaker's universe", an idea from the 18th/19th century, is completely predictable. All processes interlock like the teeth of a mechanical clockwork. If you know the state of affairs at one point in time, you can calculate all future and past states exactly in advance or backwards. Nothing is unexpected, nothing happens by chance.*

An imaginary being that had such knowledge and the ability to calculate ahead was called the "Laplacian demon". For this being, there would be no surprises. The world, like clockwork, follows its predictable course! If we then assume that no "transcendental" powers such as God, angels, souls or similar (if they exist) can intervene in this course, we arrive at the idea that the world is "causally closed".

Figure 4.2 shows a simple cause-and-effect diagram to illustrate this: The movement or state of an object (circle) is changed by some effects (squares) at different points in time. The motion sequence or the change in the state of the object can be understood if you know the initial state and the respective causes acting on the object, see subfigures (a) and (b). So far, this is only a variant of the representation of the watchmaker's universe. However, there is already an essential feature at the starting point, see partial figure (c): Every physical description requires a starting point from which the further course can be calculated. The first beginning, or the so-called "first cause" (the bright square at the left end of the chain) cannot be explained physically. As discussed in detail in section 3.1, there is no mechanism that turns "nothing" into "something"!

In the real world, however, many processes take place simultaneously, which can also influence each other. Figure 4.3 schematically shows such a network of causes and effects. Many parallel processes exert multiple effects on each other (dark squares). This network was set in motion at some point in the past by an initial cause (light square) and then proceeds in Figure 4.3.a in a strictly deterministic manner. Except for the "missing" beginning, we are therefore still in the picture of the clockmaker's universe.

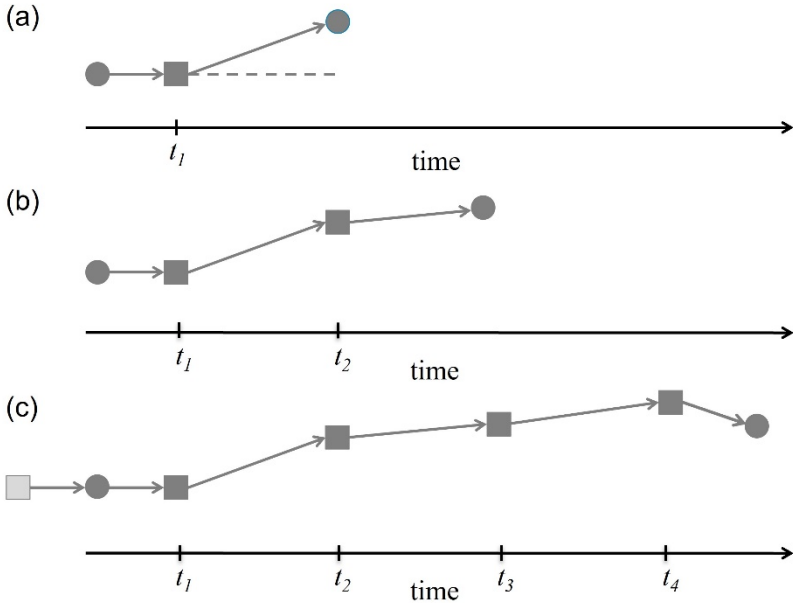


Figure 4.2: An object, e.g. a billiard ball (circle), moves along the time axis from left to right. a) At time t_1 there is a cause (square) that steers the object in a different direction. b) At time t_2 another cause causes a further change in direction. c) At further points in time t_3 , t_4 etc., there are further causes for changes in direction. However, as already discussed in section 3.1, the first cause (light square on the left) lies outside the physical description, as physics always assumes an existing initial state.

In addition to the strictly deterministic processes described above, Figure 4.3b also takes into account processes indicated by cubes that involve a random component. In principle, there are two sources for this:

1. The behavior of very small objects such as atoms, electrons, photons and other objects (somewhat casually) referred to as elementary particles is no longer correctly described by classical (deterministic) physics. The adequate quantum mechanical theory describes the probability character of quantum events. *Quantum*

mechanical chance plays a decisive role here and, in many cases, only allows a statement to be made about how probable a possible result of a process is, but not which of many possible results will be realized.⁹⁹

2. *Deterministic chaos* is a phenomenon in which tiny changes in the initial state of a system produce large changes in the behavior of the system. The effects of this phenomenon are known from weather forecasting. The longer the time period to which the forecast refers, the greater the uncertainty of the forecast. This problem cannot be solved even with the most powerful computers, as the weather shows a dependency, which is also known as the "butterfly effect": very small changes in the system, such as the flap of a butterfly's wing, can grow into very large changes.¹⁰⁰

This brings us to the very important interim conclusion that, with these two phenomena, we must leave the idea of the watchmaker's universe behind us: There can be no "Laplace's demon" that can reliably calculate the (further) future from complete knowledge of the universe at a given point in time!

⁹⁹ This does not mean that "everything is indeterminate" in quantum mechanics. Rather, quantum mechanics (in the formulation of so-called quantum electrodynamics (QED) is the most precise theory in the history of mankind. In our context, however, chance is the decisive component. This coincidence cannot be traced back to hidden physical "parameters", as Einstein once assumed, but is rather a fundamental property of quantum theory. For a description of the complex and often counter-intuitive phenomena of quantum mechanics, I must refer to the literature, for laypersons for example to Feynman 1985, who manages to explain quantum mechanics without formulas.

¹⁰⁰ Chaos phenomena are diverse and complex. An introduction for the non-expert is given by Smith 2007.

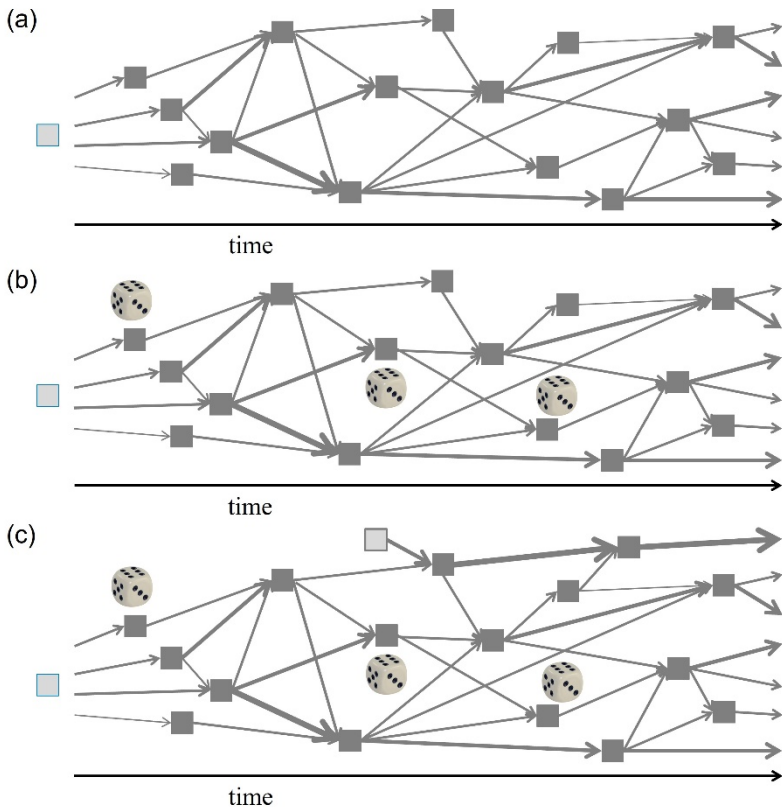


Figure 4.3: In the real world, many mutually influencing processes take place simultaneously. (Here, contrary to Fig. 4.2, without influenced objects for simplification.) a) Watchmaker's universe: Dark squares show a network of strictly deterministic interdependent processes. Light square: First cause. b) Dices indicate causes with random components. c) Light square top center: Transcendent intervention changes or expands the network of cause and effect through additional effects.

Finally, Figure 4.3c symbolizes the last step of the considerations: The upper, light-colored square indicates that transcendent intervention influences or expands the existing network by changing existing causes or inserting new ones.

Does transcendental intervention contradict the existence of natural laws? Doesn't a certain event of type A *always* have to be followed by an event of type B?¹⁰¹ Let us consider the field of classical mechanics. Just think of a game of billiards: Can a billiard ball do anything other than move in the way that the approaching bouncing ball dictates? Aren't all movements of bodies determined by the laws of classical mechanics?¹⁰² The answer is perhaps surprising at first glance: Natural laws alone do not determine any specific movement of bodies, only the circumstances determine the specific movement! Natural laws do not exist "solo", you always have to consider the environment. It's like in everyday life: Every event can change the situation, especially in the interplay of many other events - and chance often plays a major role in this.

But let's leave chance aside for the moment; I'll come back to it below. To illustrate this, let's first look at a simple example of how natural processes can be influenced by a human being: If you drop an apple from a certain height, you can calculate how it moves towards the ground and at what speed it arrives at the ground. The first step is to calculate the so-called equation of motion, which the movement of the apple follows. It results from Newton's law, which describes the

¹⁰¹ In this context, see the often cited "Of Miracles", the tenth section of "An Enquiry Concerning Human Understanding" (1748) by the Scottish philosopher David Hume (1711-1776). He argues that the evidence for miracles is never sufficient for rational belief, see Hume 1985.

¹⁰² If the bodies are not too small or too heavy or too fast, so that quantum mechanics or the theory of relativity come into play. These limitations also show how difficult it is to say how fundamental laws must be in order to be considered "laws of nature".

dynamics of motion, and the so-called initial conditions, e.g. that the apple was previously at rest - and in other cases also from other so-called boundary conditions. If you do not simply drop the apple, but throw it upwards, its trajectory will be different and it will also reach the ground at a different speed than before.¹⁰³ The way in which the apple moves in a specific situation therefore depends, as mentioned above, not only on the laws of nature, but also on the specific conditions under which this movement takes place. By influencing natural processes, therefore, no laws of nature are "broken", only the equations of motion derived from the laws of nature and the concrete results obtained from these equations of motion change.

The principle of energy conservation is also not violated when intervening in natural processes. The energy required for the intervention must be provided by the "originator".¹⁰⁴ Who or what intervenes in a process is irrelevant for the affected object. Nature simply follows the equations of motion resulting from the laws of nature and the initial and boundary conditions.

¹⁰³ In this case, Newton's law $F = m \cdot a$ with the mass m , the acceleration a and the acting force $F = -m \cdot g$ and the acceleration due to gravity $g = 9.81 \text{ ms}^{-2}$ results in the equation of motion $a = -g$ that corresponds to $d^2 x(t)/dt^2 = -g$ with the solution $x(t) = h - \frac{1}{2} \cdot g \cdot t^2$ until the apple reaches the ground. Here $x(t)$ describes the height of the apple above the ground as a function of time t depending on the height h from which the apple falls and the acceleration due to gravity g . The speed at which the apple reaches the ground at $x = 0$ is $v = -\sqrt{2 g h}$. (The minus sign comes from the direction of the velocity). If the apple is not simply dropped, but thrown upwards at the speed v_0 , the solution to the equation of motion is $x(t) = h - \frac{1}{2} \cdot g \cdot t^2 + v_0 \cdot t$. If you like, you can insert numbers and calculate the fate of an apple that is dropped from a certain height or thrown upwards. A more in-depth discussion can be found in Bergmann 2019.

¹⁰⁴ Conservation of energy can be defined in various ways. In a closed system, the sum of all forms of energy remains constant. However, if something acts on a system from outside, it is by definition no longer closed. A more general formulation can be used here: The change in the total energy of a system results from the difference between the energies entering the system and those leaving the system. A detailed discussion of the question of energy conservation and divine intervention can be found in Larmer 2009 and Bergmann 2019.

In this light, the statement that divine intervention is "unthinkable" appears to be a philosophical assumption (or metaphysical principle), not a scientific necessity. The unease that may creep up on some when considering this is probably due to the fact that we only see "one side of the coin", namely the consequences of God's actions in our visible world and not what happens in the invisible world. This is especially true when we are not only dealing with simple mechanical processes - as in the example below - but also with the creative power of God, which produces quite unimaginable effects in the world. The actual creative act of God's work remains hidden from us and is not accessible to a scientific description. Once this act has taken place, everything else falls into place in the "natural course of things".¹⁰⁵

A well-known New Testament account will serve as an example of transcendent intervention: In the Gospel of Matthew, following the account of the crucifixion of Jesus, it says: "After the Sabbath, at dawn on the first day of the week, Mary Magdalene and the other Mary went to look at the tomb. There was a violent earthquake, for an angel of the Lord came down from heaven and, going to the tomb, rolled back the stone and sat on it."¹⁰⁶

The women had previously wondered who would roll the heavy stone away from the tomb so that they could anoint the body¹⁰⁷ and were astonished to discover that the stone had already been removed, see Figure 4.4. The result of this intervention, which in the biblical

¹⁰⁵ Two examples may illustrate this: We know nothing about how a virgin birth could take place (Mary was not so naïve that she did not know the natural conditions, see Luke 1, 26 - 35.) or how raising the dead could "work" (see, for example, the raising of the young man of Nain, Luke 7, 11 - 15 or the raising of Lazarus four days after his death, John 11, 32 - 44). How much we can find out about such events remains open. If you take the question seriously, there is a lot of research potential!

¹⁰⁶ Matthew 28, 1-2.

¹⁰⁷ Mark 16, 3

account is attributed to the intervention of an angel, is the discovery that the tomb is empty.

My point here is not a theological discussion of this account, the point is rather this: if we assume that transcendent interventions follow the same pattern as those described above, then the stone simply responds to the force exerted on it by moving according to the laws of classical mechanics.

Where the power comes from is completely irrelevant for the stone! When God or angels intervene in the world by allowing forces to take effect or bringing about certain changes in conditions, this does not break any laws of nature. However, events are brought about that would not have come about without such intervention.

Let us now return to chance. The picture of cause and effect developed so far has major consequences for determining the possible causes of observations. In a strictly deterministic world, Laplace's demon described above should be able to unambiguously calculate not only every later but also every earlier state that has led to a result that can now be observed. However, this is not the case in the real world, as can easily be shown with a simple example: Suppose you are only given the information about a particular game state of a game of Ludo. Then you cannot clearly reconstruct the course of the game in all its moves up to this point. Many game sequences could have led to the score shown in Figure 4.5, for example.



Figure 4.4: The illustration shows an ancient tomb with a heavy rolling stone, which normally closes the entrance to the tomb. In the New Testament, the Gospel of Matthew, chapter 28, 2, reports how an angel rolls the stone from Jesus' tomb. This reveals the empty tomb.



Figure 4.5: The process that led to the state of the game of Ludo shown here cannot be uniquely reconstructed. Many combinations of dice moves can lead to the game state shown here.

However, the sequence of events in which random events play a role is - as one might think - not always completely open! The interplay of rules and random components can lead to very specific results: If you just have the patience to play Ludo long enough, you will always end up with the result shown in Figure 4.6.!

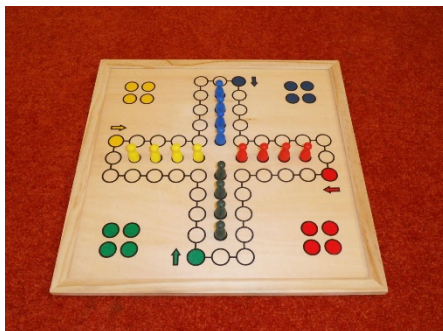


Figure 4.6: If four players play a game of Ludo long enough, they will eventually end up in the state shown here. The combination of rules and random events can therefore lead to a clearly defined final state.

At this point, it is time to address a misunderstanding: One occasionally hears the opinion that chance opens up a "loophole", so to speak, for God to be able to work (as unnoticed as possible) in the world while observing the rules he has created. It is then often claimed that only quantum mechanics opens up the possibility for God to work. According to the considerations outlined above, however, God does not "need" this at all.

However, according to the examples I discuss in the next section, the range of God's work is very broad and extends, for example, from inspiration to raising the dead. This raises the question of whether and under what conditions the effects of coincidence and transcendental intervention can be distinguished. At this point, the

complexity of the network of cause and effect and random processes based on quantum mechanics or deterministic chaos actually have an important consequence.

To understand this, the example of the game of Ludo helps us again: Imagine you believe in God and the effect of prayer and have (foolishly) bet a lot of money on winning. Your opponent is an atheist and therefore only believes in the workings of blind chance. You desperately pray that throwing the dice results in a “one”, which would allow you to reach the saving goal and victorious end of the game, and you actually roll a “one”. You now claim that God has intervened in your favor. Your opponent, however, claims that chance produced the result. Can you argue who is right?

A situation in which a dead person was resurrected as a result of your prayer would be judged very differently. Here you would find it difficult to accept the argument of chance! It is therefore possible to imagine situations in which God's intervention could be a very reasonable assumption and situations in which such an intervention seems plausible for you personally but could also be due to a (fortunate for you) interplay of coincidences due to the circumstances.

Let us now summarize the key findings from the previous discussion:

1. Scientific description does not provide a first cause or "final explanation".
2. Due to the complexity of the network of cause and effect and the existence of random phenomena, it is often impossible to clearly reconstruct the causes that led to a certain state.
3. The exclusion of the possibility of transcendental interventions is a metaphysical postulate; it cannot be derived from physics itself. If one admits the possibility of such interventions, i.e. if one does not regard the world as causally closed, one cannot rule out transcendental intervention by invoking physical laws.

4. A clear distinction between the effect of transcendental intervention and the effect of mere coincidence is not possible in many cases.

Now that I have discussed the question of whether God's activity in the world can be ruled out from a physical point of view, I will now discuss the question of whether there are indications that speak in favor of God's actual intervention in the world.

4.3 The resurrection of Jesus and miracles today

This section deals with the question of the evidence for God's work in the world, both in relation to the resurrection of Jesus and in relation to miracles in history up to the present day. Methods of historical science are essentially required here.

I will first concentrate on the resurrection of Jesus, as this event marks the central miracle with which the spread of Christianity begins in the New Testament. If God not only had his "fingers in the pie" at the origin of the world, but also later on, then it is also worth looking for further traces of God's work. This section thus completes the arc of the search for traces of God's work from the beginning of the world to the present day.

Today, many people who have grown up in a Western culture shaped by Christianity have hardly any knowledge of biblical stories or even larger biblical contexts. Many people have no clue about the reliability of the Gospels describing the life of Jesus. Albeit all discussions, the evidence for the trustworthiness of the gospels is remarkable as has been convincingly laid out e.g. by the British theologian Peter J. Williams.¹⁰⁸ Questions about the person of Jesus focus more on his miracles and his resurrection.¹⁰⁹

There are a number of indications of the credibility of Jesus' resurrection that must be investigated if the accounts of Jesus' resurrection are not to be rejected from the outset on the basis of ideological presuppositions. These are the following:

¹⁰⁸ See e.g. Williams 2018 for the description of extrabiblical sources, the accuracy of the biblical description of the cultural context of the time of Jesus and the tradition of the biblical texts through the centuries. A more extensive volume on the reliability of the New and Old Testament is presented by McDowell 2017.

¹⁰⁹ See, for example, the corresponding explanations in Lennox 2013.

1. The empty grave,
2. the appearances of Jesus after the crucifixion,
3. the changed lives of the disciples after the resurrection.

As with all historical events, in contrast to scientific questions, it is only possible to examine the quality, consistency and credibility of the sources.

The empty tomb: The fact of Jesus' crucifixion and burial are documented by several passages in the New Testament.¹¹⁰ These texts were not written down hundreds of years after the events, but in some cases well before 100 AD¹¹¹ and mainly refer to eyewitness accounts. The objectivity and remarkable details of these reports speak for their credibility: Joseph of Arimathea, a member of the Jewish Sanhedrin, a kind of high Jewish court, takes care of the body of Jesus with the approval of the Roman governor Pilate.¹¹² After Jesus' burial, the same Pilate orders the tomb to be guarded in order to prevent the theft of the body and thus possible rumors of Jesus' resurrection.¹¹³ The accounts of the circumstances of the crucifixion and burial are followed by the accounts of the empty tomb. The fact that the tomb was empty is even confirmed by the testimony of the

¹¹⁰ See, for example, 1 Corinthians 15:3-5; Acts 13:28-35; Mark 15:37-16:7.

¹¹¹ Different, more recent Bible commentaries give dates of composition for the Gospels of approx. 45 to 100 AD. The dating depends, among other things, on whether prophetic statements are considered possible, e.g. whether Jesus could actually have predicted the destruction of the temple in 70 AD in great detail. This argument is discussed, for example, by the German theologian Klaus Berger (born 1940) in his "Commentary on the New Testament", see Berger 2011, p. 210. According to Berger, the following years of origin result for the texts of particular interest in our context: Gospel of Matthew between 50 and 60 A.D., Gospel of Mark no later than 45 A.D., Gospel of Luke before 68 A.D., Gospel of John around 68/69 A.D., Acts of the Apostles around the same time as Luke and 1 and 2 Corinthians around 50 A.D. The majority of researchers consider Mark as the first Gospel to have been written around 70 A.D., for Matthew 70-80 A.D., Luke 80-90 A.D. and John 90-100 A.D., for example in Wilckens 2015.

¹¹² Matthew 27, 57-60; Mark 15, 42-47; Luke 23, 50-54; John 19, 38-39.

¹¹³ Matthew 27, 62-66

Roman soldiers, whereupon the rumor was spread that his disciples had stolen the body while the guards were asleep.¹¹⁴

The appearances of Jesus after the crucifixion: After Jesus had died and the tomb was found empty on the third day, Jesus appears to various people and groups of people.¹¹⁵ For the most part, these were people who were still alive when the texts were written and who could be questioned about the accuracy of the reports.¹¹⁶ Not only the diversity of the people and situations, but also the physical character of Jesus' appearances emphasized in the reports speaks against the frequently put forward view that these are hallucinations or similar phenomena.¹¹⁷ For example, Jesus allows himself to be touched after the resurrection, eats fish and distributes bread and fish to the disciples.¹¹⁸ Jesus' encounters with his disciples extend over 40 days, i.e. just under six weeks.¹¹⁹

The changed lives of the disciples after the resurrection: It seems extraordinarily implausible to assume that Jesus' disciples stole his body and made up their encounters with the risen Christ, although several hundred eyewitnesses still alive at the time could have testified to the contrary. For the rest of their lives, the disciples would then have worked to spread an "invented" Christian faith and, with the exception of the disciple John, who ended up in exile on the island of Patmos, would all have been executed for it. And all this in view of the Jewish expectation at the time that the "Messiah" would defeat the Romans and make Israel "great" again. It seems plausible,

¹¹⁴ Matthew 28, 11-15

¹¹⁵ 1 Corinthians 15, 3-8

¹¹⁶ For further reports, see Matthew 28, 9-10 and 16-20; Mark 16; Luke 24, 13-34; John 20, 11-31 and John 21.

¹¹⁷ A detailed description of the arguments and counterarguments on the resurrection of Jesus are given by Habermas 2004.

¹¹⁸ Matthew 28, 9; Luke 24, 30; Luke 24, 42-43; John 21, 13

¹¹⁹ Acts 1, 3

however, that the event of the resurrection showed the disciples that a completely different power was at work here, one that was completely beyond their expectations and imagination. Unless one rejects the possibility of divine intervention from the outset!

I would like to close the discussion on the resurrection of Jesus with the following quote from the booklet "The Resurrection of Jesus - Fiction or Reality. An argument". In it, the German theologian Gerd Lüdemann, who speaks out against the credibility of the resurrection, concludes in his closing words with regard to those of his colleagues who also do not believe in the resurrection of Jesus: "Is this not self-deception if one believes that Jesus was not physically resurrected at all, and a deception of the public, which naturally assumes that the clergy believe what they profess every Sunday in the Apostolicon (i.e. in the Creed - author's note)?"¹²⁰

In the following, I will briefly present the results of the study by New Testament scholar Craig S. Keener on miracles in history up to the present day. In his two-volume standard work "Miracles", Keener presents a systematic presentation of a detailed investigation.¹²¹ In his first volume, he examines miracles in antiquity, including Christian miracle reports and finally miracle reports worldwide and up to the present day. The second volume then deals in detail with attempts to explain or criticize miracle reports, such as the question of non-supernatural explanations as well as confirming or opposing biases to the reports.

After dealing with the question of the evidence for the resurrection of Jesus, he compares miracle reports from early Christianity with those from outside the Christian context. He comes to the conclusion that paranormal phenomena outside the Christian context cannot be

¹²⁰ See Thiede 2001, p. 132.

¹²¹ See his two-volume work "Miracles" Keener 2011.

ruled out, but that the miracle reports of the first Christians are of a clearly different quality. In the following, he discusses the possibility of miracles and criticizes the influence of a dogmatic-radical Enlightenment paradigm, i.e. the fundamental rejection of the possibility of miracles. Keener deals extensively with miracle reports in the period after the time of the first Christians in a worldwide perspective up to contemporary healing reports and concludes: "Many healings concern blindness, inability to walk, and even raisings from death; others claims involve sudden changes in nature after prayer. Despite some debatable incidents, some other cases are very clearly extraordinary. It seems to me that to dispute that such phenomena have sometimes occurred is not really possible for open-minded people"¹²²

The American journalist Eric Metaxas presents another source of contemporary miracle reports in his book "Miracles - Discoveries of a Skeptic".¹²³ He describes, for example, the healing of a man from AIDS, the healing of a woman from severe, life-threatening allergies and the healing of a man from a cerebral hemorrhage. Metaxas is obviously not interested in "showmanship" in his descriptions; rather, in each case he emphasizes the encounter of the people concerned with God and the consequences for their later lives. In his book, it becomes very clear that in all attempts to systematically analyze miracles, one should be aware that these are not unintentional, mechanistic processes, but rather individual encounters between people and God in each individual case.

At the end of these brief remarks on the subject of miracles, two comments are important to me as a scientist:

1) I hope it is unnecessary to emphasize that accepting the possibility

¹²² See Keener 2011, p. 599.

¹²³ See Metaxas 2014.

of miracles in principle should not lead to accepting every miracle report uncritically, but to examining the evidence as closely as possible in each individual case. Is there (self-)deception or even fraud? Are the sources or witnesses credible? Are there alternative explanations?

2. Observations must be taken seriously, even if there is currently no explanation for them or if they contradict prevailing paradigms.

In my opinion, a fundamental rejection of the possibility of miracles is anti-scientific. It prevents new findings, the development of new methods or approaches to unusual observations and the cross-fertilization of scientific disciplines that could benefit from them.

4.4 A plea for an open world

In chapter 3, I showed that it is reasonable to assume that both the existence of the world in general and its constitution are due to the will of a Creator. In this chapter 4, I have shown that there are also good reasons to assume that God can intervene in the world and has done and continues to do so. To this end, I have discussed the following points:

1. The internal inconsistency and bias of the program of demythologization,
2. the openness of our world to divine intervention,
3. the arguments for the credibility of Jesus' resurrection and
4. the existence of historical and contemporary miracles.

This view of the world has nothing to do with ancient or medieval mythology and in no way hinders scientific work; on the contrary, it protects it from ideological narrow-mindedness. It results from the observation of the world, its characteristics and historical and contemporary reports.

How exactly God's intervention in the world "works" is ultimately beyond our knowledge. I have tried to make it clear that he does it and that he has various visible or hidden ways of doing so.

5 The greatest story of all time

In this book I have gathered together some elements of the greatest story of all time, and here it is, in as short a version as the one I told at the beginning of the book: ¹²⁴

An unimaginably long time ago, the universe came into being through an act of God's creation. In his creativity, God endowed this universe with natural laws that gave the universe enough stability and development opportunities to form structures whose beauty and complexity still allow us to recognize the greatness and majesty of God today. We can still only guess at the way he acted in his creation and towards us humans. Every human being is wanted and loved by

¹²⁴ This story follows the biblical story on the basis of the following verses, which are intended to provide a few pointers for what has been said and to encourage you to follow this story yourself using the Bible. In the order of the text, these are: On the act of creation: "In the beginning, God created the heavens and the earth." Genesis 1:1 On the development potential of creation: "And God said, 'Let the land produce living creatures [...]' And it was so." Genesis 1: 24. On recognizing the greatness of God: " For since the creation of the world God's invisible qualities – his eternal power and divine nature – have been clearly seen." Romans 1:20a. Concerning the way he works in creation and in man: " I praise you because I am fearfully and wonderfully made; your works are wonderful, [...]." Psalm 139:14a On God's love: " For God so loved the world that he gave his one and only Son, that whoever believes in him shall not perish but have eternal life." John 3:16 On God's revelation: "In the past God spoke to our ancestors through the prophets at many times and in various ways, but in these last days he has spoken to us by his Son, whom he appointed heir of all things, and through whom also he made the universe." Hebrews 1:1-2. On the abuse of freedom: "[...] the punishment that brought us peace was on him, and by his wounds we are healed." Isaiah 53, 5b. On eternal life: "[...] But Christ has indeed been raised from the dead, the firstfruits of those who have fallen asleep For since death came through a man, the resurrection of the dead comes also through a man. [...] For as in Adam all die, so in Christ all will be made alive.." 1 Corinthians 15:20-22. On the end of this creation: "Then I saw 'a new heaven and a new earth,' for the first heaven and the first earth had passed away, [...]." Revelation 21:1a On creation through God's Word (Christ): "In the beginning was the Word, and the Word was with God, and the Word was God. He was with God in the beginning. Through him all things were made; without him nothing was made that has been made." John 1:1-3.

God and equipped by him with will and understanding. In order for people to recognize God, he has revealed himself and shown himself in many different ways. We therefore also have the opportunity to understand God's intentions to a certain extent. However, as humans abused their freedom and act against God's intentions, God himself became man in Jesus and died to repair the damage caused by turning away from God. With the resurrection of Jesus, God finally showed that he had conquered death and that there is something much greater beyond life in this universe, namely eternal life in communion with God. God will at some point put an end to this creation as we know it. How and when this will happen, we do not know. This world is not at the mercy of a blind fate, but is heading towards a goal, namely God, through whose word all things were made in the beginning!

In very short words, this is the greatest story of all time, as the Bible tells it in much greater detail. This story answers the fundamental questions of human existence: the question of where from, the meaning of life, justice, forgiveness, security and where to! In other words, much more than I have been able to show in this book. For many people in modern western culture, however, this story has become alien or strange and is no longer easy to understand. In this book, I have tried to use some central themes to show that the Christian faith offers a higher level of explanation than atheism and that it is reasonable to believe in the God behind this story.

Atheism has a fundamental problem, which the philosopher Holm Tetens summarizes very clearly: "Man, both as an individual and as a species, is a random, marginal and temporary episode in a meaningless, immeasurable, vast and almost everywhere extremely hostile universe. This universe is completely indifferent to human happiness

and morality."¹²⁵ The atheist physicist and Nobel Prize winner Steven Weinberg expressed this as follows: "The more comprehensible the universe becomes to us, the more meaningless it also appears. But if the fruits of our research give us no consolation, at least we find some encouragement in the research itself. [...] The quest to understand the universe elevates human life a little beyond a farce and gives it a touch of tragic dignity."¹²⁵ A small consolation - and only one for natural scientists. From a naturalistic point of view, life as a whole can only be a product of chance. But this means that personal life is also just a product of chance. Atheism can only fall back on the blind, unintentional mechanisms of a world that exists for some reason that can never be clarified to the end, and which for some abstruse, improbable reason is such that we can live in it.

The Christian faith, on the other hand, offers a completely different perspective: in the beginning there is not matter, energy or some principle or purposeless mechanism, but a person! Christians assume that human life is willed by God, not only in general, but also that of each individual person and therefore also yours.

¹²⁵ See Tetens 2015, p. 55.

Epilogue

With this book, I hope to have given many interested people who are not experts in the triangle of physics, philosophy and theology a little help with regard to the question of whether it is reasonable to believe in God, and I will conclude by addressing three groups of readers:

Even if you are an atheist, I hope that I have explained to you that there are good reasons to believe in God. If I have not been able to convince you on this point, I hope that you can at least agree with me that atheism or naturalism is not the only possible world view, but that it, like the Christian faith, must face up to critical discussion. If I have been able to convince you, I would ask you to draw conclusions and follow this trail! Many points must remain unaddressed in such a short presentation as this book. Topics such as "the church" or "church history" and many others would go far beyond the scope of this book, so I will content myself with a brief reference to the positive consequences of Christianity: for example, the Indian social reformer Vishal Mangalwadi points out for Europeans¹²⁶ how deeply European culture and values are anchored in the Bible.

The sociologist Alvin Schmidt describes¹²⁷ the positive influence of the Christian faith on the dignity of women, charity and mercy, freedom and justice, the abolition of slavery, education, the promotion of art and culture, for example through architecture, music and literature, as well as the creation of institutions such as hospitals and healthcare and the promotion of science through the founding of universities. We take most of the positive effects of Christianity so

¹²⁶ See Mangalwadi 2014.

¹²⁷ See Schmidt 2004.

much for granted that we no longer even recognize their origin.¹²⁸

For you skeptics, this book should be a "door opener". However, many questions will certainly remain unanswered. I encourage you to continue working on the issues that concern you until you have found answers that satisfy you. You can do this by talking to Christians in your area or by reading further literature. In addition to the indispensable classic, the Bible itself, you will find some suggestions in the bibliography.¹²⁹

With this book, I would like to provide *Christians* with argumentation aids for justifying the Christian faith. I would like to encourage you to strengthen and expand your personal basis of argumentation and conviction. I would also like to combine this with an appeal: A Christian faith that is not lived, discussed and justified in public, or only appears in a twisted, secular form, will become an increasingly bizarre or even obscure niche phenomenon. However, a "religion-free" public space is not ideologically neutral but atheistic. But there is no sensible reason for this - quite the opposite!

¹²⁸ Of course, the negative effects of the abuse of power by Christian institutions in history should not be trivialized. However, the view of this is often one-sidedly exaggerated. Lütz 2018 offers an easy-to-read overview of the history of Christianity that is appropriate to the historical reappraisal, based, among other things, on the thorough historical review of the violence perpetrated by Christianity in Angenendt 2008 (unfortunately both only available in German).

¹²⁹ In addition to the references quoted so far, the books of Nicky Gumble on "Questions of Life" or "Searching Issues" both from 2018, give a good starting point.

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Author names in **bold** print refer to sources in German (with an English translation of the title).

About the author

Prof. Dr. Ralf. B. Bergmann, born in 1962, is married and has three grown-up children and four grandchildren. He completed his studies in Heidelberg and Freiburg in 1988 with a degree in physics and received his doctorate in physics from the University of Stuttgart in 1991. He worked at various research institutions in Germany and abroad, including in Sydney, Australia, and completed his habilitation at the University of Freiburg in 1998. After further research work at the University of Stuttgart, he worked in industrial research and industrial quality assurance from 2001 to mid-2008. In mid-2008, he obtained a professorship at the University of Bremen. He is a member of several national and international professional organizations and the author or co-author of hundreds of scientific publications.



Prof. Bergmann is committed to the discussion of ideological and socially relevant issues beyond his own discipline, especially in the "border triangle" between physics, philosophy and theology. This book is a revised version of the preceding German version of this book which again resulted from lectures on the subject of "Faith and Reason". It is important to him to present complex world-view-related issues in a way that readers with no prior special training can get an idea of the essential questions and attempted answers.