THE QURAN AND THE CONSTRUCTION OF THE SCIENTIFIC MIND

Caner Taslaman and Enis Doko

To our beloved Grandmothers

Müyesser Taslaman

and

Hatiye Hayredin

PREFACE

There is a variety of views on the relationship between religion and science. Some people hold that these two fields are in *conflict* with each other, whereas others claim they are in *harmony* and yet others claims they are completely *independent*, having no connection at all. As academics working on science-philosophy-religion interrelations, we maintain the harmony view. However, it is immediately crucial to clarify "Which religion and which science?". There are many different interpretations both of religion in general and within each particular religion and also both of science in general and within science; clarifying "science" and "religion" is vital for a meaningful discussion of science-philosophy-religion relations.

In this book, we will examine the science-religion relationship within the framework of the Quran, the fundamental scripture of Islam. Determining the nature of the relations that the Quran maintains for scientific activity is the main goal in this book. We will present these relations by comparing the theistic perspective of the Quran to the naturalist-atheist perspective commonly encountered in the modern academic world. For Muslims, the fundamental religious resource is the Quran, which aims to construct a mindset for its followers through its message. The Quran offers intellectual or cognitive presuppositions and provides motivation for appropriate actions. Scientific activities are also make certain presuppositions, and like every other activity, require motivation. In this book, we intend to demonstrate that the content of the Quran both constructs a view of the scientific mind with the necessary presuppositions and motivates scientific activities. To the best of our knowledge, the relation of the Quran to such presuppositions and motivations has not been studied previously, which suggests the novelty of this work.

Our thesis concerning the Quran's content does not imply that all Muslims are or have been in accord with its teachings on science. Muslims have historically had both successful and unsuccessful epochs in the scientific realm (the reasons for these successes and failures, and the influence of the Quran on them, are subjects of other studies). The views presented in this book can, of course, shed light on such subjects; but our argument is exclusively related to the content of the Quran, setting aside these historical and sociological issues.

For other works by the authors, and for comments and critics about this book, please visit our web pages www.canertaslaman.com and www.enisdoko.com. We are thankful to our readers and especially to Kelly James Clark, the Templeton Foundation, Kalam Research & Media and Fatih Fidan for their generous support during preparation of this book.

INTRODUCTION

We will utilize a philosophical perspective in our discussion of the science-religion relationship in Islam. We will limit our investigation to the Quran, the holy book and foundational text of Islam. Although the Quran is the primary religious reference for Muslims, historical events, interpretations of different sects, the hadiths (later accounts of things said or done by Muhammad), political movements, and Sufi schools of thought, etc. have influenced Muslim understandings of science. Thus, a study that focuses only on the Quran precludes a host of Islamic views on its relation with science. However, given the authority of the Quran, it should function first and foremost in Islamic understandings of the issues related to science is evident.

The phrase "science – Quran relationship" is often associated with the evaluation of the Quran's content or validations of its authority through scientific theories (this is called *ijaz*). For example, some hold that the Big Bang Theory or the Theory of Evolution can be evaluated with respect to Quranic texts. Others argue that the Quran affirms the expansion of the universe and the descriptions of the stages of the embryo in mother's womb in ways remarkably consonant with recent scientific discoveries. The expression also hearkens back to the era when Muslims established the most sophisticated civilization of science and philosophy during 9^{th} - 13^{th} centuries. While all of these aspects of Islam-science relationship are important, none will be our main focus. Instead, we will focus on the Quran and its claims for scientific activities.

According to the Islamic faith, the Quran was revealed by God to the Prophet Muhammad for the salvation of humankind. The Quran's message contains a God-centered ontology, explanations of what will happen in the afterlife, statements that this message is the final ring in a historical chain of prophetic messages, anecdotes about how societies lived in the past, moral commands, rituals to be performed and actions that should be avoided. The Quran is primarily concerned with *what should be believed in* and second with *what should and should not be done* in life. Likewise, the scientific endeavor includes both rightly held beliefs and rightly ordered practices. In our discussion of the relationship between the Quran and science, we will focus on these two aspects—belief and practice. The first part of the book is devoted to the former and the second to the latter.

In the first part, we will investigate the relationship between the scientific endeavor and. Our thesis: *the mental structure developed in the Quran supports the presuppositions of science.* We are not aware of any other work on this topic; we believe that the content of our book is novel particularly in this regard and that part of the book deserves special attention.[1]

The term "presupposition," it should be noted, is sometimes associated with prejudice; science, on the other hand, seeks objectivity and universality. However, we use "presupposition" only to mean the beliefs assumed in scientific activities. Our usage will become clear as we proceed. Presuppositions can also evolve; they are not dogmatic beliefs (even though some people treat them as so). Nonetheless, they form previously accepted knowledge and since we are unable to constantly revise our existing knowledge, they stay behind our mindset whether we realize it or not. Correct presuppositions support correct evaluations and wrong ones can trigger chain of falsehoods. No system of thought can exist without presuppositions since it is impossible to resort to first principles infinitely many times. All disciplines are found on certain fundamental presuppositions. Logic, arithmetic and geometry, considered the most reliable disciplines, are built upon presuppositions called "axioms". All proofs within these disciplines are made via those axioms

The analysis we will perform here is about an *ideal mind* isolated from society and psychological factors; how this mind can acquire presuppositions within the paradigm the Quran offers; and how it is motivated by the Quran. In other words, we aim to present the presuppositions of an ideally rational mind, when it is properly shaped by the Quran with all non-rational influences excluded. Through this methodology, we intend to comprehend the relation of the content of the Quran with scientific activities.

[1]The accord between the ontological conceptions presented by the Quran and the presuppositions needed for scientific activities does not necessitate all believers of the Quran to adopt these presuppositions. A believer of the Quran might be unable to establish the relation between these presuppositions and content of the Quran, or unable to realize that science requires these presuppositions. Likewise, he/she might also be totally uninterested in science. Here, we claim that the logical ground for accepting the correctness of the Quran complies with the adoption of mental presuppositions behind scientific activities. To what degree this mentality is adopted by Muslims, is not of our concern.

The mind of an individual who accepts the message of the Quran[2] is shaped by a theistic (we use theism synonymously with "monotheism") ontology. According to this ontology, God is One, Rational, Mighty and Merciful. He is the creator and sustainer of all beings. Judaism and Christianity likewise adopt a theistic ontology and in this respect they are on par with the Quran. We will describe the differences between a theistic ontology and naturalism (atheism, materialism)[3]. As we will show below a theistic ontology, but not a naturalistic ontology, supports many presuppositions required for practicing science. It should also be noticed that the Quran has certain aspects that are not present in other theistic beliefs along with other aspects that are comparatively more emphasized.

We will concentrate on seven presuppositions to show that the mental structure shaped by the Quran supports the presuppositions of science. The first presupposition we will consider is that *the universe has a rational and comprehensible structure*. If scientists had not assumed that the universe has a rational (suitable for the mind to comprehend) structure, it would have been meaningless for them to study it. The second one is that *the human mind is capable of acquiring true knowledge about the universe*. Scientific work would be meaningless if the mind were unable to reach the truth. According to the third presupposition, *the universe (object of scientific activity) is discoverable*. As above, science loses meaning if discovery is considered impossible. According to the fourth, *the laws discovered by scientific activities are universal*. If the laws are different at different places and times, then it would be worthless to work towards their discovery. Fifth is that the study of the universe, *the matter and the living (all subjects of science) is a valuable pursuit*. If an activity is not worth the effort, it would hardly ever start. Sixth: *observation is essential in the acquisition of knowledge about the universe*. Science cannot be practiced solely through armchair thinking because observation is the ground of

[2] One's belief in the message of the Quran may or may not be a result of search and scrutiny. Although faith based on search and scrutiny is more valuable, religious believers often cling to their faiths without going through such processes.

[3] "Atheism" is the philosophical thought rejecting the existence of God. "Naturalism" is the philosophical thought rejecting the existence of anything other than the nature, namely matter, energy and space-time. As a consequence, naturalists reject God, as he is not a physical being. All naturalists are atheists, but not all atheists are necessarily naturalists, since they might believe in other non-natural beings such as mind (or soul), and moral or aesthetic truths. In reality, however, most atheists are also naturalists. "Materialism" is the philosophical thought that matter is the fundamental building block of everything in the universe, including mental processes and consciousness. In this regard, materialism is closely related to naturalism, and yet, even though nearly all materialists are also atheists, materialism does not necessitate atheism. One can believe in God and still hold the view that all the processes in the universe are materialistic. Since God is not a material being, this later thought is rarely adopted and nearly all materialists define themselves as atheists. Despite these nuances, the terms atheism, naturalism and materialism are often used interchangeably. Likewise, almost all well-known atheists in the history can be attributed to these adjectives. Thus, throughout this book, whenever we use the term naturalism, the reader can consider it synonymous to atheism and materialism.

scientific thinking. (This presupposition is closed related to the Quran's invitation to observation, and it is important to remark that not every theist belief has this aspect). Finally, *mathematics is essential for the comprehension of the universe*. The failure to use mathematics prevents one from penetrating sufficiently into the universe, and makes precise predictions of past and future impossible. While many naturalists practice science with these presuppositions in mind, the theist has rational grounds for adapting them. The aim of this book is to present the Quranic foundation of this rationality. Although our purpose is to evaluate the relationship between the Quran and science, since the Quran preaches a theistic ontology, many of the arguments we offer are relevant to the theism-science relationship in general.

In the second part of the book, we will show that the Quran also provides motivation for scientific pursuits. No other major religious scripture encourages its believers to observe, contemplate and reflect upon nature and natural phenomena to the extent of the Quran. In other words, the Quran is quite different from the other religions' texts regarding science. There is good theological motivation for pursuing the sciences. In Islam, knowing God is humanity's most valuable goal in Islam and scientific activity can serve this goal. Activities dedicated to comprehending the universe also help us to understand the Power and Beauty of God. In other words, knowing the universe is a path towards knowing God. One of the best astronomers and mathematicians of his time, Al-Battani (858-929), stated his motivation as:

"By focusing attention, observation, and extensive thought on astronomical phenomena, one is able to prove the unity of God and to recognize the extent of the Creator's Might as well as His wide wisdom and delicate design."[4]

The Quran is not the only source of motivation for scientific pursuits. Reputation, money, charisma, social status etc. can also motivate people to do science. The psychological appeal of these other motivation sources is apparent. However, since knowing God and fulfilling God's commands far surpass any other motivating factor, they constitute a superior source of motivation for a Muslim.

[4]Al-Battani, Az-Zij as-Sabi, p.6.

PART I

THE QURAN AND PRESUPPOSITIONS OF SCIENCE

1- THE UNIVERSE HAS A COMPREHENSIBLE, RATIONAL STRUCTURE

Science aims to discover nature's law and theories by following empirical and experimental procedures. Scientists thus assume that the universe has a comprehensible rational structure. For the universe to be comprehensible it has to have regularities that can be comprehended by human mind; in other words, it has to have laws. If the universe were disordered or chaotic or if the regularities of the universe exceeded human comprehension, science would not have been possible. Although widely assumed, the "rationality and comprehensibility of the universe" is a profound mystery. According to Albert Einstein:

"The eternal mystery of the world is that it is comprehensible.... The fact that it is comprehensible is a miracle."[5]

What Einstein declares a miracle most other scientists take for granted. While all of their work assumes that nature has a comprehensible structure, most scientists are not aware of their assumption. They have conducted and will continue to conduct their studies without noticing such intriguing questions as "Why is nature based on laws and not on chaos?" and "How is it possible that the universe is rational and comprehensible?" Whether aware of this presupposition or not, when scientists study the universe they must assume that the universe

5Calaprice, Alice, 1996, The Quotable Einstein. Princeton, NJ: Princeton University Press. p. 197

has a rational and comprehensible structure. If they were to reject this presupposition, it would be meaningless for them to attempt to understand the universe. How could you comprehend the universe if it were incomprehensible?

The Quran grounds the nature of the universe in the nature of the God who created it. According to the Quran, God who is rational and Mighty has created the universe. The divine attributes of Omniscience (*alim*) and Wisdom (*hakim*), scattered throughout the Quran, entail that God is a rational being. Although disputes on some issues have arisen between the various sects of Islam, there has been no disputing God's rationality. The Quranic worldview maintains that the universe is comprehensible because it was created by a rational God. The idea of a rational universe makes possible observations and experiments with the aim of comprehending the structure of the universe. If the universe is created by a rational God, we should expect to find rational beings who can comprehend that universe as well.

In the 17th century Descartes, one of the founders of modern science and modern philosophy, deliberately borrowed the term "law" for the natural regularities he and others were discovering from the medieval legal use; both sorts of laws, he argued, were decrees of God.[6] In order to avoid appeal to the divine, some naturalist philosophers reject the use of the word "law."[7] There is no reason from a naturalist perspective that the universe should have a rational and comprehensible structure. On the assumption of naturalism, the universe is as or is more likely to be entirely devoid of order as it is to be ordered. Since naturalism implies nothing about the structure of the universe, the naturalist's belief in the rational structure of the universe is ungrounded.

Naturalistic perspectives on the laws of nature can be grouped under two headings. The first is the regularity account of natural laws. David Lewis[8], Stuart Mill[9], Frank Ramsey[10] and John Earman[11] are representatives of this account. According to this view, what we call the laws of

[6]John Hedley Brooke, **Science and Religion: Some Historical Perspectives**, Cambridge University Press, Cambridge, 1991, s. 139.

[7] B. Van Fraassen, "Armstrong, Cartwright and Earman on Laws and Symmetry", Philosophy and Phenomenological Research, 2, (1993) s. 431-444.
8 Lewis, David, 1973, Counterfactuals, Cambridge: Harvard University Press.
9 Mill, John Stuart, 1947, A System of Logic, London: Longmans, Green and Co.
10 Ramsey, Frank, 1978, Foundations, London:Routledge and Kegan Paul.
11 Earman, John, 1984, "Laws of Nature:The Empricist Challenge", in D.M. Armstrong, R. Bogdan (ed.),Dordrecht:D. Reidel Publishing Company.

nature are just descriptions of the regularities in the universe.[12] Laws are the descriptions of those regularities, rather than the cause of them. According to this view, we can talk about the law "electrons have negative charge" because all observed electrons have negative electric charge. This law is then only the description of the regularity that all the electrons in the universe are negatively charged, and no explanation is needed why the electrons are negatively charged. It has been claimed that regularity account is the most reasonable description of laws of nature within naturalism, because the theory only refers to those regularities that do not go beyond physical universe. What is the explanation of the regularities in the universe? Why is the universe full of regularities? There is no answer for these according to the advocates of regularity account. This viewpoint offers no deep explanation for these regularities, but rather only replies that nature is this way and that is it. However, it is intellectually unsatisfying to explain the incredible regularities of the laws of nature in the universe by simply pointing at coincidence. According to David Armstrong, a person who believes that the regularities in nature are all coincidences can actually believe in anything.[13] Philosopher Norman Swartz who supports the regularity account of laws is also aware of the cosmic coincidence problem and defines the problem as follows:

There are probably more than 10^{60} electrons in the universe, and all of them, we may suppose, have precisely the same electrical charge. Now although I am prepared to allow that five red cars in a row might be dismissed as a coincidence, can I allow that 10^{60} items with precisely the same electrical charge is likewise a coincidence?

. . .One thing we might do is swallow deeply and say . . . "nothing, nothing at all accounts for this fact." Faced with the prospect of having to say this, many persons find the sheer contingency of the actual world utterly fantastic: If it wasn't God (a super Henry Ford) who designed all this and saw to it that all these countless particles are qualitatively identical, then something has to account for it. That 10^{60} things should all be alike in their properties cannot rationally be deemed just a coincidence."[14]

12 Of course, the theist can also accept a similar approach regarding the laws of nature. But unlike naturalists, theists will not claim that the laws of nature do not have any explanations. In our analysis, we will evaluate this approach from a naturalist perspective.

13 Armstrong ,David, "Reply to Van Fraassen", Australasian Journal of Philosophy, Vol. 66, No.2 (June 1988):229.

[14]Swartz, Norman, 1985, The Concept of Physical Law, New York: Cambridge University Press, p. 203-204

By stretching his view a naturalist may claim that the laws of nature are the necessary relations between the universals.[15] David Armstrong[16], Fred Dreske[17], and Michael Tooley[18] advocate this approach. As an example of this account, the reason for the regularity "all the irons are conductive" is the necessary relation between the universal of metallicity and the universal of conductivity. Since iron has the property of being metal and since the universal of metallicity is necessarily connected to the universal of conductivity, iron is necessarily conductive. But, one may reasonably ask, why are these universals related to each other? Consider laws of physics like Newton's law of motion (F=ma) and ideal gas law (PV=nRT), which are expressed by simple mathematical formulas. According to this second naturalist approach, these mathematical relationships are expressions of the necessary relations among corresponding universals. For example; the second law of Newton describes relations between force, acceleration and mass. Why are these relations expressed by simple mathematical expressions rather than in other complicated ways? There are no answers to these within naturalism. This is, according to naturalism, a cosmic coincidence. As a result, according to both naturalistic approaches to the laws of nature, the rational structure of the universe is a cosmic coincidence. But is not a satisfactory explanation to claim that universals are expressed via simple mathematical formulas, by sheer coincidence.

As a result, within the naturalist ontology, for both approaches of naturalism, it is a cosmic coincidence that the universe has a rational, comprehensible structure (with regularities that are comprehensible). While naturalism gives no reason to expect for a universe with a comprehensible structure, theism does. Belief in creation by a rational God leads one to expect a comprehensible universe.

Moreover, the Quranic claim that this world is a trial place for human beings likewise requires a rational structure for the universe. This trial process includes people's having free will to choose between good and evil. One of the most important claims the Quran makes is that people are responsible for their actions. The verse below is an example where this issue is mentioned:

[15] Of course, this approach can also be defended from a theist point of view. But we will consider this view from the naturalist perspective.
[16] Armstrong, David, 1983, What is the Law of Nature?, Cambridge University Press.
[17] Dretske, Fred, 1977, "Laws of Natue", Philosophy of Science, 44:248-268.
[18] Tooley, Michael, 1977, "The Nature of Laws", Canadian Journal of Philosophy, 7:667-698.

He is the one who created death and life in order to try you to see who of you are best of deed. He is Mighty, Forgiving.[19]

The trial place perspective not only answers existential questions, but also inspires feelings of responsibility and shapes believers' actions. It may seem, at first glance, hard to understand the relation between morality and existential questions, on the one hand, and the universe having a rational structure, on the other. But only laws of nature can provide a rational structure, which serve to assess the consequences of our actions; only within such an arena, with predictable consequences, can we assume responsibility for our actions. For example, if someone pushes a person over a cliff, we can easily decide that the pusher has committed a wrong action. But in a world without laws of nature, people who are pushed over a cliff sometimes blow back or fly upward; sometimes they feel more refreshed or sometimes get pleasure from the fall with no harm done to their bodies. In such an environment, the pusher would not be responsible for his behavior since he could not have predicted the result.

Let us qualify: the moral necessity of the laws of nature does not mean that these laws must be deterministic. The laws of nature can have a probabilistic structure but this probabilistic structure should not preclude good but not infallible predictions of the outcomes of our actions. The probabilities sufficiently correlate events and causes to make good predictions possible. A universe that includes such probabilities is still rational and comprehensible.

The Quran, then, rationally grounds one's belief in rational and comprehensible structure of the universe because first, the Creator of the universe is a rational being, and second, our understanding of the outcomes of our actions in this trial world is possible only in such a universe. Thus, the Quran supports the presupposition that "the universe has a comprehensible, rational structure,"which is a prerequisite for scientific endeavors. The naturalist, on the other hand, has no rational ground to support this presupposition.

[19] Surah Al-Mulk, 67-2.

2- THE HUMAN MIND CAN ACQUIRE KNOWLEDGE of THE UNIVERSE

Three conditions are needed for the universe to be comprehended by human rationality: First, the universe must have a rational structure, second we require the necessary mental capacity, and third, the harmony between the human mind and the universe has to be ensured. In the previous chapter, we argued that the Quran grounds belief in the rational structure of the universe. In this chapter, we will discuss the fact that mind must also have the necessary requirements and there must be a harmony between mind and the universe. No matter how ingenious the mind is, the universe must have a rational structure if the mind is to comprehend it. On the other hand, even though the structure of the universe is rational, the mind must also have the necessary capacities if it is to comprehend the universe. Moreover, the rationality of the universe has to accord with the capacities of the mind. If the universe had a rational structure that surpassed the capabilities of the mind, humans again would be unable to understand it. If it were sufficient for the universe to have a rational structure or it were sufficient to have a small mental capacity to comprehend it; then talented animals such as parrots, dolphins or owls could also have carried out scientific activities.

The practice of science assumes that our minds are capable of grasping the world, whether we are aware of it or not. How could we acquire knowledge if this were not possible? Although scientific activity requires such a presupposition, many people believe in it without any reasonable ground. Philosophers, however, are concerned bout which worldviews can rationally ground this presupposition. Within the theism, there is a rational ground for this presupposition: since God is the Creator of both the universe and the mind, it is reasonable to think of both the universe as rational, and of the mind as capable of grasping the world, mind and world are both created in harmony with each other. That is, the theist has rational grounds for the belief that the "mind can acquire knowledge of the universe," which is vital to the pursuit of scientific truth.

Galileo, a prominent figure in scientific revolution of 17th century, viewed the capacity of the human mind to comprehend the universe as evidence that human mind is created

by God.[20] Johannes Kepler, a famous Christian astronomer, emphasized that a theist has rational grounds for trusting the mind in the process of accumulating knowledge about the universe*: "God, who founded everything in the world according to the norm of quantity, also has endowed man with a mind which can comprehend these norms".*[21]

Of course, not every theistic tradition stresses the importance of reason and encourages people to comprehend the universe. Moreover, in many theistic traditions (even in certain Islamic schools of thoughts), granting importance to reason is considered a weakness of faith. In such traditions, reason is demeaned and faith is elevated. However, the Quran both provides a rational ground for this presupposition and encourages believers to ponder the phenomena of the universe (thus motivating Muslims to practice science). But in addition to this, these verses also support the presupposition that the human mind can acquire knowledge related to the universe. If our minds were unable to acquire knowledge, then wouldn't it be meaningless for us to even attempt to comprehend the phenomena in the universe? In short, the Quran supports the presupposition that the mind has the capacity to acquire knowledge while practicing scientific knowledge. The following verse is one example of the many verses related to this in the Quran:

In the creation of the heavens and the earth, the alternation of night and day, and sailing of ships across the ocean with what is useful to man, and the water that God sends from the sky enlivening the earth that was dead, and the scattering of beasts of all kinds upon it, and the changing of the winds, and the clouds which remain obedient between earth and sky, are surely signs for the wise.[22]

Naturalism is the fiercest alternative to theism in contemporary thought. The so-called new-atheists are naturalists. The relevant question is: Does a naturalist have a rational foundation for assuming that the mind can reach the truth? Philosopher of mathematics Mark Steiner claims that the harmony between the universe and mind is a problem for naturalism: *"... true*

[20]Galileo Galilei, Dialogue Concerning the Two Chief World Systems, University of California Press, Berkeley, 1967, p:104.
[21]Gerald Holton, Thematic Origins of Scientific Thought: Kepler to Einstein, Harvard University Press, Cambridge MA, 1988, p:84. "1957.
22 Surah Al-Baqarah, 2-164.

'correspondence' … between the human brain and the physical world as a whole. The world, in other words, looks 'user friendly'. This is a challenge to naturalism."[23] Charles Darwin was engulfed with a "horrible doubt" whether a human mind that had evolved from lower animals, "a monkey's mind," was capable of acquiring knowledge of the world.[24] Naturalist evolutionary biologist J.B.S Haldane likewise conceded the troubles with naturalism inherent in trusting the mind with his following words: *"If my mental processes are determined wholly by the motions of atoms in my brain, I have no reason to suppose that my beliefs are true ... and hence I have no reason for supposing my brain to be composed of atoms."*[25] Naturalism, so it seems, does not comport well with the mind-universe harmony.

Alvin Plantinga's "evolutionary argument against naturalism" shows that the naturalist paradigm undermines rational belief in the mind's ability to reach truth.[26] Plantinga argued that the theory of evolution and naturalism cannot be reconciled. Evolution, after all, aims at survival not at truth; we should expect our beliefs to aid our survival not to be true. Acording to the naturalist-atheist evolution viewpoint, we should not be expected to have "reliable mental faculties" because the mechanisms of evolution would select cognitive faculties that are aimed at survival not at true beliefs. Naturalism, which is blind to truth, does not provide any reason to think our cognitive faculties, evolutionarily produced, aim at truth. However, theism and the theory of evolution do not undermine trust in our cognitive faculties.[27] Since a theist believes that God has created humans to recognize Him and appreciate His world, they have reason to expect to acquire true beliefs. Since naturalists have no ground to claim the reliability of our cognitive faculties, they cannot assert the truth of any belief, including evolutionary theory itself! According to Plantinga, the theory of evolution and naturalism are"self-defeating."

Plantinga's opponents argue that since true beliefs enable survival, natural selection favors true beliefs. However, from a naturalistic perspective, it may be that our the neuronal structures in our brain cause us to act the way we do. These neurons mediate behaviors via their bio-chemical structures, so the content of thought (whether it is true or not) is irrelevant. We can see the problem by imagining contradictory thoughts that allied to to the same bio-chemical structures;

[23]Mrk Steiner, The Applicability of Mathematics as a Philosophical Problem, Harvard University Press, Cambridge MA, 1998, p:176.
24 Darwin, Francis, 1887, The Life and Letters of Charles Darwin Including an Autobiographical Chapter, London: John Murray, Volume 1, p.315-316.
25 Haldane, J.B.S., 2001, Possible Worlds, New Brunswick, N.J.: Transaction Publishers, p. 209
[26] Beilby, James K. (ed.) 2002. Naturalism Defeated?:Essays on Plantinga's Evolutionary Argument Against Naturalism, Cornell University Press. P.1-15.
[27] Taslaman, Caner, Evrim Teorisi, Felsefe ve Tanrı, İstanbul, İstanbul Yayınevi, 2014.

in this case, opposing thoughts would result in the same behavior because the bio-chemical structure that causes the behavior is independent of the thought. Consider a deer running away from a lion; what keeps the deer alive is the action of running away from the lion. Supposing the deer had beliefs, it would be irrelevant whether its belief is true or not. It may have run away to avoid the disturbance of the smell coming from the lion, or perhaps it thinks its nose would hurt because of the smell, or it can think that it is just a race so it runs as fast as it can… These and similar other scenarios, since they cause the same behavior to be performed, cause the deer to live and to transfer its genes to the next generations. As a result we have a single correct thought against a very large set of wrong ideas. Any one of these ideas, however, allows the deer to survive and to transfer its genes because they result in the same behavior. Nothing in naturalism necessitates true beliefs. Natural selection does not choose true beliefs; rather it selects bio-chemical structures that produce survival behaviors.

A naturalist who holds that our reasoning capacity is the result of unguided natural selection cannot defend the reliability either of our cognitive faculties, including simple reasoning processes. Hence, the naturalist cannot claim that either naturalism or the theory of evolution are true (or any idea reached through high levels of reasoning).

According to theism, however, the evolutionary process has been realized by the Creator's reason and will, giving humans cognitive faculties aimed at true beliefs. Theism, then, supports reason's capacity for finding true beliefs.

Which one is more trustworthy for doing calculations: A calculator designed to perform mathematical operations, or a machine generating random numbers? Likewise, since reason was created to acquire true beliefs as indicated in the Quran, the expectation for the reason to have a capacity to acquire true beliefs and to practice scientific activity with this presupposition has a rational ground. But according to the naturalism, the abilities of mind exist just to ensure the survival and the transfer of the genes, and have nothing to do with acquiring true beliefs. When we compare these views, the angle of the Quran and of the other theist beliefs better support the presupposition that claims that in its pursuit of science, the "human mind can acquire knowledge about the universe".

3- THE PROPERTIES OF THE UNIVERSE ARE DISCOVERABLE

The pursuit of scientific knowledge leads us to go beyond comprehending the phenomena of the universe and towards discovery of the properties of the universe. If our mind did not have the capacity to grasp such phenomena as "water boils when heated", life and science would not be possible in the world. (It was the capacity of mind to comprehend the universe to which we drew attention in the first item.) We do not suffice with this basic level of comprehension and we try to add to the knowledge discovered thus far such as what the heat is and the details of the movements of the water molecules etc.

We cannot control the beating of our heart, but we can discover some of the properties of the stars. Our solar system within the vastness of the universe, our own planet within the solar system and us in the world, are all just like small spots. Faced by such an enormous weakness, the capacity of our mind to comprehend the phenomena in the universe is marvelous. It is through our scientific endeavors that we have discovered the evolution of the universe, a process which thus far has taken 13.8 billion years; the Higgs particle that gave mass to matter, the dinosaurs that lived millions of years ago, and the micro details of our development in our mother's womb…

The aim of scientific activity is to discover the causes of the phenomena of the universe and the processes that brought these phenomena to their present states. As can be seen, while starting a scientific activity, the presupposition that claims that "it is possible to discover the properties of the universe" is assumed. Of course, the universe being discoverable does not mean that man can know everything about the universe. But it is clear how a presupposition like this supports scientific activity. A person who digs into the ground to construct a water well has a presupposition that water is discoverable. Even though knowing the possibility of discovering the water there does not guarantee the discovery of water, the possibility of it makes the well to be dug. Similarly, the possibility of the universe being discoverable can motivates us to engage in scientific activity. But it must be noted that not all the answers to our questions should be discovered or should be discoverable.

Many scientists have tried to discover the properties of the universe without conscious awareness of assumption of the discoverability of the universe. Such scientists are like singers who sing without thinking about vocal cords or athletes who run without thinking about their fast twitch muscles. Such singers focus so intently on their songs and such runners on running that it never occurs to them to ponder upon what it is that makes those actions possible. Only in rare cases, when their vocal cords or feet become injured, do they start thinking about these issues; but even in these kinds of cases their thinking focuses on the cure, they do not focus on how the vocal cords produce sound or the physiology of the feet. Likewise, scientists while scientist aim, for example, to discover how the stars emit light or how the heart beats, they do not ponder why the universe is discoverable (let alone what might provide rational grounds for the presupposition that the universe is discoverable).

Even though the results of the scientific endeavors show the degree of the discoverability of the universe, these results do not explain why the structure of the universe is discoverable. We have to ask questions such as: "How is it possible that with our huge limitations we still can discover the process of the evolution of the universe which took billions of years and the contents of the starts which are billions of light years away?" and "Which system(s) of thought support the discoverability of the universe?" Today there are mainly two opposing views in explaining the marvelous aspect of discoverability: theism and naturalism.

According to theism, God created both the universe and man. Since the universe is an area where God's might and art are visible, discovering the phenomena in the universe helps us discover the art and might of God. Since God consciously made the universe discoverable for humans, it is no surprise that man can discover the universe despite his limitations. On the other hand, according to the naturalism, there is no reason to expect the universe to be discoverable; the universe is an eternal substance that is unconscious and purposeless. According to naturalism, there is no reason to expect the universe to be discoverable; discoverability is just a "happy coincidence". Accepting the discoveries of processes that go back billions of years and that are billions of kilometers away from our world as "happy coincidence" does not seem to be intellectually satisfying.

In addition, we can comfortably claim that even if many of our discoveries (structures of neutron stars, Higgs particle etc.) had not happened, the human race would still continue to survive. That is why we cannot claim that our capacities that enables us to make such discoveries is favored in the process of natural selection which only selects capacities enabling

survival. (We should note that the only atheist interpretations of evolution and natural selection pose a problem regarding the claims above and our philosophical-theological views.)

Who should be surprised about the discoverability of the universe: a theist or an atheist? The correct answer is the one whose beliefs consider the present situation as less surprising. Here, there is no reason for surprise for a theist. But for an atheist it should be very surprising to be able to make important discoveries related to this vast universe with the limitations of humans. It is a remarkable fact that the discoverability of the universe is dependent upon many factors, and yet all these factors exist and contribute to the discovery of the universe. While theism presents a reasonable explanation for this fact, naturalism provides no explanation.[28]

Hundreds of verses in the Quran that lead us to the phenomena in the universe and urge us to examine them show that, from the point of the theism preached in the Quran, the discoverability of the universe is an expected aspect. If the universe which the Quran leads us was not suitable to be discovered then would not this leading be meaningless? It must be remembered that in the time when these verses were revealed, there was no widespread culture that would appreciate research and discovery related to the phenomena of the universe. The following verses are examples for the verses of the Quran that support contemplating on the universe:

Have they not looked at the sky above them, how We have fashioned and adorned it, and it has no flaw? We stretched the earth and placed upon it firm stabilizers and We made every kind of splendid thing to grow upon it.[29]

In brief, while theism preached by the Quran supports the presupposition in our minds that the universe is discoverable, there is no aspect in naturalism to support this. A naturalist scientist, by looking at the achievements of science, may have a presupposition that the universe is discoverable but this is a surprising, an unexpected situation because of his ontological perspective. Our increasing knowledge shows the discoverability of the universe, but at the same time it also makes us remember how incapable we are. There is no paradox in this situation

[28] As an example, let us consider the fact that we discovered the structures of stars very far away. For this achievement, apart from many other factors, the use of telescopes is needed. This would only be possible with the existence of laws that allow fitting the images of very large objects into very small areas (these laws allow areas of billions of square-meters to fit into the lenses of telescopes of only a few centimeters and then be perceived by our eyes), presence of raw materials for making telescopes, and with the light coming from the stars containing information about their structures.

29 Surah Qaf, 50-6,7.

from a theist perspective, for we acknowledge that we are incapable against the unlimited might of God and His amazing creations. Despite this, since our Creator made the universe discoverable to us, we also know that we can still discover the universe notwithstanding our tiny existence in this limitless universe.

4- THE LAWS OF NATURE ARE UNIVERSAL

One of the most fundamental presuppositions of science is that the laws of nature are universal. It would have been impossible for us to make scientific projections either into the past or the future if the laws of nature, which determine the processes in the universe, were not universal in time. Both the sciences of geology and cosmology, which study the past, depend on the supposition that the laws of nature are the same today as they were in the past. On the other hand, the fact that the laws of nature are universal in space grounds scientific disciplines like astrophysics which study objects that vastly exceed our physically reach. The universality of the laws of nature is also necessary for our daily lives; without them we could not judge the outcomes of our daily actions. If the law of biology that requires us to drink water in order to live kept changing or if the law of gravity which causes us to fall down when we jump from an elevated place kept changing, it would have been impossible to know the results of our actions and so impossible to live a normal life.

Every scientist, therefore, assumes that the laws of nature are universal. There are four different universalities in regard of the universality of natural laws:

1. Laws do not make reference to spatio-temporal location.

2. Laws have unlimited range in space and time.

3. Laws do not contain space and time coordinates explicitly.

4. Laws are invariant under space-time transformations. [30]

The universality of laws is closely related to the problem of induction, a crucial subject in the philosophy of science. Induction is the process of finding a general principle, one that in principle applies to an infinite number of things at an infinite number of times, from a finite number of observations. For example, after observing repeatedly that particles with the same charge repel each other, if we conclude that "all particles with the same charges repel each other," then we would be engaging in induction. How rational is this process of induction? In other words, is the knowledge gained through induction trustworthy? According to the famous

[30]Earman, John, 1978, "The Universality of Laws", Philosophy of Science, 45: 173–181.

philosopher David Hume, the answer to this question is negative;[31] for him induction has no rational justification. The problem with induction is its quest for rational justification of induction. The problem of induction is closely related to the universality of the laws. Hume was aware of this, for him if it was assumed that the laws of nature were universal, the mentioned problem with induction would vanish. Because, as the result of the observations conducted many times in the past, prediction can be made about the future with the assumption that the universe has fixed laws and these deductions can be trusted. But Hume claimed that this assumption, since it is related to induction itself, cannot solve the problem. According to Hume, the universality of laws can only be grounded through induction and induction can only be grounded through the universality of laws.

Because of the logical difficulties with induction, some philosophers argue in favor of falsification. According to this proposition, proposed by Karl Popper, since no universal scientific law can be established (or verified or confirmed) on the basis of a finite set of observations, Popper claimed that a statement is scientific only if it can be falsified with empirical and observational data.[32] For example, the assertion that "like charged particles repel each other" is scientific because, at least in principle, one could observe like charged particles that do not repel each other. Therefore, the negation of that assertion can be proven experimentally. (But because of the problem of induction it cannot be claimed true). Even though falsification has lost its former popularity in philosophy of science, it is still respected by many scientists. Some wrongly assume that only induction is based on the universality of the laws, whereas in reality falsification is also closely related to the same universality. If the universality of the laws is not accepted as a presupposition, then we cannot know whether a proposition that had passed the test would not be falsified by the same test in the future and a proposition that had been falsified would pass the same test in the future. Let's take the proposition "like charges repel each other" as an example. This proposition could be falsified easily by an experiment conducted with any two particles of the same charge. For example if we put two electrons together, we would see that they attracted each other. According to Popper, this observation would be sufficient to falsify the proposition above; and hence "like charges repel each other" is a proper scientific statement. Well, then how do we know that two electrons will not suddenly start attracting each other tomorrow? Without assuming that the laws

31 Hume, David, 1888, Hume's Treatise of Human Nature, Oxford: Clarendon Press.
32Popper, Karl,1962, Conjectures and refutations. The growth of scientific knowledge, New York: Basic Books.

governing the charges will stay the same, it is not possible to make this inference. So falsification is also connected to the presupposition that the laws are universal, that they do not change in time and they do not emerge and disappear suddenly. If we abandon this presupposition, then falsification will become unreliable.

In the naturalist paradigm, there is no reason to expect universal laws. According to physicist Paul Davies:

"...to be a scientist, you had to have faith that the universe is governed by dependable, immutable, absolute, universal, mathematical laws of an unspecified origin. You've got to believe that these laws won't fail, that we won't wake up tomorrow to find heat flowing from cold to hot, or the speed of light changing by the hour. Over the years I have often asked my physicist colleagues why the laws of physics are what they are? ...The favorite reply is, There is no reason they are what they are--they just are."[33]

On the other hand, the theist Isaac Newton, the towering figure of the scientific revolution, correlated the universality of the laws of nature and theism:

"If there be an universal life and all space be the sensorium of a thinking being [God] who by immediate presence perceives all things in it [then] the laws of motion arising from life or will may be of universal extent."[34]

In the previous chapter, we have mentioned two possible approaches of a naturalist towards the laws of nature. If the laws of nature are records of regularities in nature as the "regularity approach" claims, and if these regularities are the result of cosmic coincidences, then there would be no reason to expect that these regularities would continue in the future or that they would exist in the parts of the universe we cannot observe.

Let's give an example to comprehend this better: Imagine we are visiting a city in new country for the very first time. Suppose that in our first few days all the taxis we see are blue. From our observations, what can infer about the colors of other taxis in that city? Not much. We should assume that all the taxis that country are blue only if we have an explicit reason for thinking all of the city's taxis are blue. Lacking such an explanation, we should think it sheer coincidence that we have seen only blue taxis so far. We should, rationally, refrain from generalizing from

33 Davies,Paul, "Taking science on faith",New York Times, 24 November 2007.
34 Brooke, John Hedley,1991, Science and Religion: Some Historical Perspectives, Cambridge: Cambridge University Press, p. 139.

our very finite experience to the claim that all the city's taxis are blue. Even if we were to continue to observe only blue taxis, that would also likely be a coincidence (we'd have no reason to think it's not).

Without a well-grounded assumption of the universality of the laws of nature, the regularities we observe in nature could be, for all we know, mere coincidences. Our very finite experiences of regularities would be like our very finite experiences of blue taxis. Interesting coincidences with no good reason to think that they apply beyond this particular time and place. Without a well-grounded assumption of the universality of the laws of nature, we have no reason to think these regularities are the same in the future and the past or that are valid throughout the entire universe. According to the regularity approach of the laws of nature, the apparent universality of the laws of nature is nothing but a surprising coincidence; it provides is no reasonable expectation of universality.

The universality of the laws of nature is also surprising given the second approach of the naturalist: the claim that laws of nature are necessary relations between universals. The propositions "there will be a relation between universal A and universal B until eternity" and "there will be a relation between universal A and universal B until time t" explain our past observations equally well. But if the second proposition is true, the law described by these universals is not universal; this law will be invalid after time t in the future. From the naturalist point of view, there is no reason to prefer the first proposition over the second. Worse, since the time t can take infinitely many different values and since a naturalist cannot present any reason to prefer the first proposition over any subset of the second one (for example t=10 millennia later), the second proposition is infinitely more probable compared to the first one.[35] Therefore, from such a naturalist point of view, there is no rational way to expect for the laws of nature to be universal; on the contrary, one might even claim that the expectation is higher for the laws of nature to be invalid some day in the future. As a result, a naturalist has no rational reason to expect the laws of nature to be universal, regardless of whether he/she sees them as the description of regularities or as necessary relations between universals.

From a theistic point of view, however, the universe has been created and is being sustained by the supreme Creator. Since God is immutable, a change in His nature is not in question.

35 Beebee, Helen. 2011. Necessary Connections and the Problem of Induction. Nous 45: 504-527.

Therefore, it is expected that the laws designed and protected by God, whose nature does not change, will also be unchanging in time and in space.

Another reason the theist might expect the laws of nature to be unchanging is the belief in the oneness of God and in that He is the Lord of all beings, both emphasized in the Quran. The belief that God is the Lord of all beings offers a rational base for the laws to remain the same at all times and locations. According to polytheism, different gods control different phenomena and different regions. Though each region might have its own laws, there is no reason to think these laws are universal. In polytheism, the laws of nature would likely differ from region to region and from phenomenon to phenomenon. Moreover, in polytheisms, since gods are often at war with each other, gods who are dominant in a certain region or over a certain phenomenon may lose their power. The victorious gods may then change the laws in those regions or for those phenomena. Therefore, from a polytheist point of view, we should expect laws to be both location and time dependent (anything but universal). The following verse of the Quran points out to the chaos that would emerge if there were gods apart from the one God:

Had there been gods apart from God, both (the heavens and the earth) would have been despoiled.[36]

According to the monotheism, however, one Entity created the universe, and determined and sustains its laws. The idea that there is One Absolute Master of the universe supports the belief that the laws of nature are universal.

According to Nobel laureate biochemist Mervin Calvin, monotheism's commitment to the unity of the universe grounds the universality of laws assumed in the foundations of modern science.[37] He writes:

> The fundamental conviction that the universe is ordered is the first and strongest tenet. As I try to discern the origin of that conviction, I seem to find it in a basic notion discovered 2000 or 3000 years ago, and enunciated first in the Western world by the ancient Hebrews: namely that the universe is governed by a single God, and is not the product of the whims of many gods, each governing his own province according to his own laws. This monotheistic view seems to be the historical foundation of modern science.

36 Surah Al-Enbiya, 21-22.
[37] Melvin Calvin, Chemical Evolution, Clarendon Press, Oxford, 1969, p:258.

Within the theistic ontology of the Quran, another reason for the expectation for the laws of nature to be universal is, again, the world's as a trial place. For the trial to be just and meaningful, people need to be able to accurately predict the outcomes of their actions. This can happen only if the laws of nature are universal. For example, if we give water to an old man in order to help him and if all of a sudden the laws of bio-chemistry change and the water becomes poisonous, then this action would end up killing the old man. Such trials would lose their meaning in a universe in which people cannot predict the outcomes of their actions. Therefore, our being in a world of trials supports the presupposition that the laws of nature are universal.

The paramount message of the Quran is the Oneness of God. This message and the teaching of the Quran about the world of trial, support the presupposition that the laws of nature are universal. Of course, many scientists share this presupposition without even sharing an ontology and world view which support it. But the ontology and mindset of the Quran afford a rational basis for believing that the laws of nature are universall; thus the Quran supports scientific activity.

5- Studying the Universe is Valuable

Another presupposition of science is the idea that studying the universe is inherently valuable. Beliefs that demean the study of the universe create serious obstacles for the practice of science. In this high-tech era, it may seem obvious that studying the universe is worthwhile. After all, science plays critical roles in producing technology and making our lives better. Cultures that appreciate scientific pursuits spread globally, and scientific activities receive generous governmental and societal support. However, when we look more closely at human history, we can see that this has not always been the case. Numerous civilizations in the history offered no serious encouragement and resource for studying the universe, apart from those that offered immediate practical benefit. Even though the inherent human desire to learn supports studying the universe, this intrinsic desire does not present a rational ground for this study.

As remarked previously, not every religious or philosophical view supports scientific activity. For example, religious or philosophical notions that view the universe or matter as inherently evil denigrate the study of the universe. Throughout human history, there have always been religious and philosophical schools of thought that describe the matter (the building blocks of the universe) as evil and thus oppose its study. But the Quran rejects such beliefs: since God is the Creator of the universe matter is good. Moreover, the Creator encourages the study of his good universe.

Some religions of the Far East claim that the outer world - the universe - lacks objective reality and is a mere illusion (some theists, for example some Sufi schools, also defend similar views). But it would unreasonable to study an entity which lacks objective reality; it is folly to study the science of an illusion. Therefore, the worldview of many Far East religions contradicts the presupposition that claims "studying the universe is valuable".

The Quran, however, holds that the universe and the earth have been created "with truth" so that they are not illusion. The following verse is an example for this:

God has created the heavens and the earth with truth. Surely in this is a sign or those who believe.[38]

38 Surah Al-'Ankebut , 29-44.

According to naturalism, there is no existence beyond space-time and matter. All the existing laws of nature are only factual. According to Hume's principle "only factual propositions can be derived from factual propositions", all objective true propositions in naturalism have to be factual only.[39] Therefore according to naturalism, value propositions lack rational grounds. Not only can naturalists not define objective morality or aesthetics, they can also not attribute objective "value" to any activity. [40] This means that a naturalist cannot attribute value to the study of the universe. Atheist Richard Dawkins, a renowned scientist, says:

"The universe that we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference."[41]

As a result of this, according to naturalist philosophy it cannot be claimed that practicing science is valuable. But rejecting the existence of objective values and then attributing an objective value to a scientific activity is self-referentially inconsistent. Hence, while many naturalists attribute value to scientific activity, such an attribution has no rational basis.

A Muslim, who accepts the existence of good God, he has an ontology that rationally ground values. Therefore, scientific activities are valuable because the creator has declare the creation worthy of study.

According to the Quran, the study of the creation is also valuable because it leads us to a comprehension of the existence, Might and Knowledge of God. For example, God's creation of the universe is offered as evidence to show how easy it is for God to create the Hereafter. This supports the presupposition that the study of the nature is intrinsically valuable because it leads us to a better understanding of how easy it is for God to create the afterlife (a very significant Muslim belief). The verse below emphasizes this:

How can He who created the heavens and the earth not be able to create others like them? Yes indeed; He is the creator, the Omniscient.[42]

39 Hume, David, 1739, A Treatise of Human Nature, London: John Noon, p. 335.
40 For further discussions on the lack of objective values in naturalism, …
41 Dawkins, Richard, 1995, River Out of Eden: A Darwinian View of Life ,New York: Basic Books/Harper Collins, p. 132-133.
42 Surah Ya-Sin, 36-81.

Suppose you accept the presuppositions of science –the universe is comprehensible, the mind can comprehend the universe, the universe is discoverable, and the laws of nature are universal. Suppose further that you reject the claim that the universe is worthy of study. How likely would it be to undertake a scientific activity? For example, if you had a beach house on the ocean, even though you could count the grains of sand on your beach, you would not think it worth your time.The reason you wouldn't count the grains of sand is because you lack a sense that it would be a worthwhile pursuit. However, the Quran deeply affirms the value of the study of the universe.[i] But we must also remind that this presupposition is present not only in the theism of the Quran. There have been numerous thinkers within the Judeo-Christian tradition, who stated that God can be better comprehended by studying the universe. We present several such quotes in this book.

This Quranic perspective has been ignored by many Muslims. But not by all of them. Ibn al-Haytam, considered as the "first scientist" by some historians of science (he is believed to have been the first person to apply the experimental method to scientific endeavors), was influenced by the perspective of the Quran. He started practicing science because:

I constantly sought knowledge and truth, and it became my belief that for gaining access to the effulgence and closeness to God, there is no better way than that of searching for truth and knowledge.[43]

Naturalism might think that the universe should be studied for its practical benefits -- the productions of technology, the possibility of earning money, and a measure of fame can all be achieved through scientific activities. However, the naturalist ontology undermines the very values it would require to deem the study of the universe valuable. According to the Quran, however, and theist perspectives akin, investigating the universe is an intrinsically valuable activity (notwithstanding its practical benefits).

43 Plott, C.,2000, Global History of Philosophy: The Period of Scholasticism, Motilal Banarsidass, p. 465

6- OBSERVATION IS IMPORTANT FOR GATHERING KNOWLEDGE ABOUT THE UNIVERSE

Some thinkers in the history of philosophy valued armchair philosophy and claimed that productive results cannot be acquired by observational methods. It is of course possible to set up philosophical arguments or to develop mathematical theorems by armchair philosophy. Knowledge can be attained by thought experiments used in philosophical arguments or by theorems set up by deductive methods in mathematics without using observations. Part of the knowledge gained this way in philosophy and mathematics is also useful for natural and social sciences. For example, philosophy can help clarify the methodology of science, and mathematics is invaluable to both the natural and social sciences. But while philosophy and mathematics are valuable, without observations we don't gain any knowledge of the world. Without observation and experimental methods it would have been impossible to discover the periodic table in chemistry, the inner structure of the sun or the organelles of a cell.

Experiment, perhaps the most important and fundamental method of modern science, is a process of observations systematically performed under precisely specified conditions. The belief that experiment is a successful method is based on two fundamental presuppositions. The first (the main focus of this chapter) is that observation is a reliable source of information to understand the universe. One who does not regard observation as a source of information cannot regard experiment (systematic observations) as an important method. The second is our fourth presupposition: "the laws of nature are universal". The idea that the observations in laboratories are essential to understand the processes in the nature is based on the presupposition that the laws of nature are equally valid in the laboratories. Similarly, repeatability, the primary criterion of the experimental method, assumes the universality of laws (the laws do not change over time). As a result, a mindset with these two presuppositions would identify experiment as important and useful.

Today, virtually every scientist accepts observations of the phenomena of the universe or observations conducted in the laboratory as fundamental sources of information. But we learn from the history of science that observation did not play such a fundamental role in the past. In Ancient Greece, many prominent thinkers did not appreciate the importance of observation, except in the case of practical knowledge. Plato, for example, claimed that knowledge is unchanging, eternal, and timeless (ultimately of the so-called "Forms"); and this kind of

knowledge can be acquired only through pure thought.[44] Observation (of the changing and temporal) is not only not helpful in this process, it is misleading. Although Aristotle, by attaching the forms to matter, developed a philosophy which affirms observations more than Plato did, his epistemology science still seeks knowledge which is metaphysically necessary (like mathematical propositions). Contingent observations cannot attain to necessity. According to Aristotle, the aim of the knowledge is to comprehend the eternal forms attached to matter. Once one comprehends the essence of an object with rational thought one can infer everything related to that object by deduction; inference, not observation, is the way of knowledge. Even though observation is useful in comprehending the essence of the objects, it is not mandatory since essence can also be comprehended by pure thought. So, observation does not play a central role in Aristotle's thought.

Other civilizations observed the phenomena in the universe to be safe from the floods or to make use of them in farming or in agriculture. While they gave importance to gathering observations of nature for their practical benefits, they did not requires observation for knowledge of the universe.

Supposing that all knowledge can be acquired by contemplation is an enemy of observation-based inquiry. So is supposing that everything about the phenomena of the universe can be learned by consulting to the views of certain people who (supposedly) have solved all the problems of the universe. A famous anecdote nicely illustrates this influential attitude. A person asked how many teeth a horse had. He was told, "Let's look at Aristotle's book".[45]

Ibn al-Haytham reject this reliance on tradition:

"The seeker after the truth is not one who studies the writings of the ancients and, following his natural disposition, puts his trust in them, but rather the one who suspects his faith in them and questions what he gathers from them, the one who submits to argument and demonstration, and not to the sayings of a human being whose nature is fraught with all kinds of imperfection and deficiency."[46]

The rejection of Aristotle's authority was an important step towards the emergence of the scientific revolution of the 17th century.

[44]Platon, Republic, 479e-484c.
[45] Ary,D.,Jacobs,L.D. and Razavieh A., 1979, Introduction research in education, Rinheart and Winston, p.6
[46]Sabra.2003. Ibn al-Haytham: Brief life of an Arab mathematician, Harvard Magazine, October–December 2003.

The Quran, for its part, deeply affirms observation. The Quran does not tell us to learn everything related to the universe from the Quran. It encourages believers to make observations and to draw conclusions about the universe. The Quran does not see observations (and inferences drawn from them -- science) as a threat to its authority. Rather it holds that the results acquired through observation and inference as confirming its claims. Consider two verses encouraging observation of the universe:

Say: "Travel on the earth and see how the creation started".[47]

There are so many proofs in the heavens and in the earth but they pass by and ignore.[48]

The first verse invites us to examine the phenomena on the earth and to gather knowledge of the creation; the second criticizes those who ignore the evidence in the world. One who reads these and countless similar verses would understand that one cannot comprehend all the details regarding the processes in the universe and on the earth only by reading the Quran; one can and should gain knowledge by observation and examination. In short, the Quran constructs a worldview which values observations of the phenomena in the universe.

The tremendous success of observation-based science has been well established. Every contemporary scientist now assumes the importance of observation. While they make this assumption, most don't have adequate grounds for it. The Quran, as noted, encourages observation independent of its practical outcomes, encouraging us to make observations which will help us to better comprehend the creation. To that end, these verses require a "qualified comprehension". The Arabic words used in the Quran to direct us to the universe mean contemplating, reflecting, and penetrating. In short, the presupposition "observation is important for gathering knowledge about the universe" which has an important role in the scientific processes, is supported by many Quranic verses which encourage observing the universe.

[47] Surah al-'Ankebut, 29-20.
[48] Surah Yusuf, 12-105.

7- MATHEMATICS IS ESSENTIAL IN COMPREHENDING THE UNIVERSE

In the scientific methodology, mathematics plays an essential role in expressing the knowledge acquired through observation and experimentation. Particularly in physics, mathematics has central importance for comprehending the universe. When the existing phenomena are combined with mathematical laws, it becomes possible to make predictions about the future and retrodictions about the past. Because of mathematics' penetration into the universe we can determine, for example, what happened in the first moments of the universe or the age of the earth. Without mathematics we could not manufacture or use technological wonders such a mobile phones, computers and satellites. One simply cannot full grasp essential theories of modern science like the quantum theory or the general theory of relativity without mathematics. Even the most abstract mathematical theorems from group theory to topology, from complex analysis to differential geometry, play significant roles in comprehending the universe.

Two of the leading philosophers of 20th century, Hilary Putnam[49] and Willard Quine,[50] argued for the indispensability of mathematics for science. According to this notion, known as "Putnam-Quine indispensability thesis," mathematics is an indispensable aspect of the natural sciences; thus, a science without mathematics is incomplete. This thesis is accepted widely by philosophers of science. Hartry Field, who argues that natural science without mathematical is possible, agrees that mathematics significantly facilitates and simplifies reasoning about nature. Mathematics, he thinks, is the most appropriate language for describing the universe and is, thus, indispensable to science.

Though both widely assumed and taken for granted, the mathematization of the universe is both surprising and unexpected. In his famous article "The Unreasonable Effectiveness of Mathematics", Nobel laureate and one of the founders of quantum mechanics Eugene Wigner explains the astonishing accordance of mathematics with nature:

[49]Putnam, Hillary, 1979, "What is Mathematical Truth", in Mathematics Matter and Method:Philosophical Papers, Volume 1,2nd edition, Cambridge University Press, p.60-78.
[50]Quine, W.N.:1980, "On What There is", re-printed in From a Logical Point of View, 2nd Edition, Cambridge, MA, Harvard University Press, p.1-19.

…the enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious and that there is no rational explanation for it.[51]

Nobel laureate physicist, Steven Weinberg expresses a similar sentiment:

It is very strange that mathematicians are led by their sense of mathematical beauty to develop formal structures that physicists only later find useful, even where the mathematician had no such goal in mind. . .Physicists generally find the ability of mathematicians to anticipate the mathematics needed in the theories of physics quite uncanny. It is as if Neil Armstrong in 1969 when he first set foot on the surface of the moon had found in the lunar dust the footsteps of Jules Verne.[52]

The universe's yielding to mathematics is unexpected from the naturalist point of view. Naturalists, generally, take an anti-realist stance to the mathematical truth: they see the mathematical objects—numbers, for example, as the outcomes of human mind. Mathematical realists, on the other hand, hold that mathematical objects exist independent of the human mind.

If mathematical objects were merely products of the human mind, there would be no reason to expect that its structure would match the structure of the universe (our thinking processes, maybe, but not the universe). After all, the rules of chess don't describe the universe. Why, then, should another human construction, mathematics, describe the universe? Even if the naturalist were a realist perspective, they would still have no reason to expect mathematics to structure the universe. Because mathematical objects are abstract, they are not bound by space-time and they do not have causal interactions. Thus, they cannot causally affect the universe in any way. If mathematical objects cannot causally affect the universe, than how is it possible that the universe is describable by mathematical objects? As a result, there is no reason for a naturalist, whether a realist or an anti-realist, to expect the universe to be describable through mathematics,.

Theism, on the other hand, can explain the mathematical structure of the universe under both realist and anti-realist standpoints. If mathematical objects exist as transcendently[53], as claimed by the realist, God could have created the universe in accordance with them. The causal gap between mathematical objects and the universe in naturalist perspective disappears in theism.

[51]Wigner, E.P.:1964, 'The Unreasonable Effectiveness of Mathematics in the Natural Sciences', in Symmetries and Reflections, Cambridge MA:MIT Press, p.223.
[52]Weinberg, S.:1993, Dreams of a Final Theory, London:Vintage.p.125.
[53] Multiple views of realism is possible within theism. God might have created a world of mathematical objects, independent from our universe; or, mathematical objects could be the products of God's will; or they might somehow be related to aspects of God.

If mathematics is an invention of human mind, there is still no problem in theist perspective. As we have seen in the previous chapters, the fundamental expectation under theist view is the universe to be understandable and of a compatible structure with the human mind. If the human mind is able to invent mathematics and if mathematics is an efficient mediator for humans to reflect on the nature more efficiently or make better predictions, then it is quite expectable for the universe to be created as mathematically understandable and compatible with human mind. Since the universe is not a creation of human mind, naturalism has no explanation for a creation of human mind (mathematics) to be in such compatibility with it; theism has no difficulty here as the universe is creation of God. As a result, in theist perspective, the anti-realist position against mathematical objects does not cause any problem for the universe being in mathematically describable structure. Anthony Flew, once one of the most famous atheists of the 20th century, counted the mathematical structure of the universe as one of the main reasons for his departure from atheism and conversion to belief in God. Many prominent figures of the scientific revolution, including Descartes, Kepler, Galileo, Leibniz and Newton, believed that mathematics is the language in which God has written the universe.[54]

Scientists assume that mathematics is essential to comprehending the universe (although most don't explicitly think about the philosophical aspects we discuss above). However, many civilizations and thinkers throughout the history failed to appreciate the role of mathematics in comprehending the universe.In the Quran, however, many verses affirm a relationship between mathematics and nature, such as:

The sun and the moon are perfectly calculated.[55]

He encompasses what is with them and He has counted the numbers of all things.[56]

These verses support the presupposition that mathematics is essential for comprehending the universe. One of the primary meanings of the word "qadar," which is used many times in the Quran, is "to be bound by a measure." The following two verses are examples where the word "qadar" means "measure":

Surely We have created everything according to a measure.[57]

[54] Anthony Flew, There is a God: How the World's Most Notorious Atheist Changed His Mind? Harper Collins, New York, 2007, p:96-112.
[55]Surah ar- Rahman, 55-5.
[56] Surah al-Jinn, 72-28.
[57]Surah al-Qamar, 54- 49.

And We send down from the sky water in measure.[58]

Verses marking mathematical measure support the importance of mathematics to science. In today's world, thanks to unprecedented practical utility of mathematics in producing new technologies and facilitating our lives, there is almost no scientist who does not assume that "mathematics is essential in comprehending the universe."

[58]Surah al-Mu'minun, 23-18.

PART II

THE QURAN AND MOTIVATION FOR SCIENCE

The motivation for scientific endeavor is another important subject of our inquiry. In this part of the book, we will investigate the relationship of such a motivation to the content of the Quran. Since the scientific endeavor is a rigorous form of intellectual activity, it requires motivation. Scientific work is typically not performed to satisfy such basic needs as eating, drinking or sleeping. Since satisfying these basic needs is clearly a powerful motivator, their absence makes one wonder about the rationale for spending so much time, effort and resources for an action that is seemingly not related to any fundamental need. While salaries, reputation, social status and titles can motivate the doing of science, these motivations can be equally reached by through other, less demanding and more rewarding, professions. For example business, sports and politics can provide more fame and money than scientific professions. These sources of motivation are not particular to science and, although they enable scientific endeavor, they don't adequately explain science as opposed to, say, business. And while scientific work can satisfy certain practical and technological needs, such practically-oriented motivations don't apply disciplines dealing with fundamental questions (such as cosmology, which deals with the past and beginning of the universe). Such utility-centered motivations would explain various disciplines such as engineering and they also lead to viewing the fundamental sciences only as tools for facing engineering challenges.

Since the Quran endorses the sheer wonder of knowing the world, it can adequately, motivate science at every level. By affirming observing the universe as a mandate from God, it motivates science as a means of recognizing the Might and Art of God. Ibn-Rushd, the famous Muslim philosophers of 12^{th} century pointed out that studying nature helps better understand God and he claimed that it is mandatory to work on philosophy (the word "philosophy" is used broadly,

including the meaning we use for science today), thereby expressing his motivation for philosophy-science.

"…they witness the existence of God only through learning about His creations; in addition, only when the content of beings is well known, the knowledge about God becomes complete. If investigation of beings is recommended and encouraged in religion, it is obvious that whatever philosophy indicates is a must or recommended in terms of that religion. It is crystal clear that in the verses of the book of God; the Almighty, religion invites to evaluate the beings through reason… "[59]

Such a motivation provides the required drive even in the absence of any other worldly opportunities. Furthermore, as opposed to the pragmatic motives, this motivation cannot be satisfied by any other discipline; it is particular to science as the struggle to understand the universe. It also motivates fields where science cannot be utilized as tools for practical benefits and worldly satisfactions. In an ideal Muslim society, in which the Quranic teaching to study the universe is well understood, scientific endeavor is inevitable. In the worldview presented by the Quran, science is an inevitable part of the effort to understand the universe in the most sophisticated possible way.

Furthermore, our God-created intrinsic curiosity can also be a source of motivation. As Aristotle says, "All men by nature desire to know" [60]. The "desire to know" is a distinctive aspect of of our God-created human nature[61]. This desire is common to all humans--theist, atheist, Hindu, Buddhist, Muslim, Christian or Judaist. Although this intrinsic desire to know could also be a source of motivation, it does not constitute a rational ground for spending the astonishing time and resources required scientific endeavors. Desires, it should be noted, can conflict with reason. For example, an intrinsic desire can push a person to eat desert; but if he is obese or diabetic, he should not follow this desire; in certain cases, it is rational not to follow a desire. The Quran, on the other hand, motivates by presenting a rational basis. While satisfying desires is an important aspect of human nature, finding rationales and mental satisfaction are also part of this nature. By offering rational motivations the Quran satisfies our intellectual nature.

[59] Averroes, (Translation by C.E. Butterworth) The Decisive Treatise, Brigham Young University, 2002.
[60]Aristotle, **Metaphysics**, Penguin Classics, London,1999
[61] Surah ar-Rum, 30- 30

Hundreds of verses of the Quran invite us to explore the phenomena in the universe and to draw conclusions from them. None of the other major religions offer such an incentive. For a devout Muslim, obeying God's commands and struggling to comprehend God through nature is the strongest source of motivation. Such a rational motivation supports the commitment required for studying the universe even in the absence of worldly benefits such as money, reputation and title. If this incentive is followed, it will lead to scientific works (to perform these works and to acquire the knowledge emerging thereby). Al-Biruni (973-1048), one of the leading scientists of his time, said "Verse 191 of the Surah Ali 'Imran is the reason why I studied science".[62]" The translation of this verse reads:

They remember God while standing, sitting, and on their sides, and they reflect upon the creation of the heavens and the earth: "Our Lord, You did not create all this in vain. Be You glorified. Save us from the retribution of Hell."[63]

Many other verses in the Quran leading to study the phenomena in the universe., including:

Say, "Look at all the signs in the heavens and the earth." All the proofs and all the warnings can never help people who decided to disbelieve.[64]

The heavens and the earth are full of proofs for the believers. Also in your creation, and the creation of all the animals, there are proofs for people who are certain. Also, the alternation of the night and the day, and the provisions that God sends down from the sky to revive dead lands, and the manipulation of the winds; all these are proofs for people who understand.[65]

He is the One Who sends down water from the sky. You have something to drink from it, and from it shrubs you use for forage. He grows you crops by means of it: olives, date palms, grapevines and every sort of fruit. In that is a sign for folk who will think things over. He has regulated night and daylight for you, while the sun, moon and stars are subjected to His command. In that are signs for folk who use their minds..[66]

[62]Mehdi Golshani, **The Holy Qur'an and the Sciences of Nature**, Global Scholarly Publications, New York, 2003, p. 154
[63] Surah Ali 'Imran, 3-191.
[64] Surah Yunus, 10-101.
[65] Surah al-Jathiyah, 45- 3-5.
[66] Surah an-Nahl, 16- 10-12.

He is the One who constructed the earth and placed on it mountains and rivers. And from the different kinds of fruits, He made them into pairs—males and females. The night overtakes the day. These are solid proofs for people who think.[67]

In the creation of the heavens and the earth, and the alternation of night and day, there are signs for those who possess intelligence.[68]

In today's world of scientific specialization, the phenomena of the universe fall within domains of different disciplines, which are likewise affirmed in the Quran. For example, the following verse in the Quran points out to Astronomy:

Have they not looked at the sky above them, and how we constructed it and adorned it, without a flaw?[69]

The verse below is related to geology:

And the mountains and how they are constructed. And the earth and how it is built.[70]

The following verse is about the origin of life and paleontology:

Say, "Roam the earth and find out the origin of life." For God will thus initiate the creation in the Hereafter. God is Omnipotent.[71]

The verse below is related to archeology:

Have they not roamed the earth and noted the consequences for those who preceded them? They used to be more powerful, more prosperous, and more productive on earth. Their messengers went to them with clear signs. Consequently, God was not the One who wronged them, they are the ones who wronged their own souls.[72]

The verse below is related to botany:

He is the One who sends down from the sky water, whereby we produce all kinds of plants. We produce from the green material multitudes of complex grains, palm trees with hanging

[67] Surah ar-Ra'd, 13-3.
[68] Surah Ali 'Imran, 3-190.
[69] Surah Qaf, 50-6.
[70] Surah al-Ghashiyah, 88- 19-20.
[71] Surah al-'Ankabut, 29-20.
[72] Surah ar-Rum, 30-9.

clusters, and gardens of grapes, olives and pomegranate; fruits that are similar, yet dissimilar. Note their fruits as they grow and ripen. These are signs for people who believe.[73]

The verse below is related to zoology:

And in the livestock there is a lesson for you: we provide you with a drink from their bellies. From the midst of digested food and blood, you get pure milk, delicious for the drinkers.[74]

The verse below draws attention to embryology:

O people, if you have any doubt about resurrection, (remember that) we created you from dust, and subsequently from a tiny drop, which turns into a hanging(embryo), then it becomes a fetus that is given life or deemed lifeless. We thus clarify things for you. We settle in the wombs whatever we will for a predetermined period. We then bring you out as infants, then you reach maturity. While some of you die young, others live to the worst age, only to find out that no more knowledge can be attained beyond a certain limit. Also, you look at a land that is dead, then as soon as we shower it with water, it vibrates with life and grows all kinds of beautiful plants.[75]

Most Muslims read these verses without grasping their meaning. While the Quran is the most widely read and memorized book in the world, grasping its meaning typically loses out in the struggle for reading and memorization. Nobel laureate Abdus Salam, who received the prize in 1979 for his contributions to unification of electromagnetic force and the weak force, criticized Muslims for not abiding by those verses of the Quran and ignoring science:

"The Qur'an emphasizes the superiority of the 'alim—the man possessed of knowledge and insight, asking: How can those, not possessing these attributes, ever be equals of those who do? Seven hundred and fifty verses of the Qur'an (almost one-eighth of the Book) exhort believers to study nature, to reflect, to make the best use of reason in their search for the ultimate and to make the acquiring of knowledge and scientific comprehension part of the community's life."[76]

[73] Surah al-An'am, 6- 99.
[74] Surah an-Nahl, 16- 66.
[75] Surah al-Haj, 22-5.
[76] http://reviewofreligions.org/9422/from-the-archives-islam-and-science-concordance-or-conflict/

During his Nobel lecture, Abdus Salam recited the Quran as a symbol of his philosophy on science and religion[77]. The verses he recited were:

He created seven universes in layers. You do not see any imperfection in the creation by the Most Gracious. Keep looking; do you see any flaw? Look again and again; your eyes will come back stumped and conquered.[78]

Getting to know the universe is also a means of getting to know the Creator, which can likewise motivate all theists. From this perspective, Islam is on a par with the other two monotheist religions, Judaism and Christianity. Numerous members of these religions expressed their motivations for studying the universe as contemplating the Might and Art of the Creator. For example, some Christian thinkers state that God has written two books--Holy Scripture and the universe; both books, they argue, are sources of knowledge about the existence and attributes of God[79]. Morevoer, many Christian scientists were motivated by such religious beliefs[80]. Newton, for example, said "God is known from his works"[81] Of the major thinkers of the scientific revolution, Del Ratzsch argues:

"Since the cosmos was a creation of God, and represented God's own work, it was worth studying. In fact some Christians saw investigation of the creation as itself having religious significance – learning to appreciate what God has done – and they saw scientific work itself as a type of religious obedience to God."[82]

Muslim thinker and mathematician Khwarizmi (8^{th}-9^{th} century),is known as "the father of algebra," introduced the modern number system and the number zero to the Western world. Khwarizmi conceived of his scientific studies as a form of worship:

"That fondness for science, ... that affability and condescension which God shows to the learned, that promptitude with which he protects and supports them in the elucidation of obscurities and in the removal of difficulties, has encouraged me to compose a short work on

---

[77] http://www.nobelprize.org/nobel_prizes/physics/laureates/1979/salam-speech.html
[78] Surah al-Mulk, 67- 3-4.
[79] Peter Harrison, **The Bible, Protestantism and the Rise of Natural Science**, Cambridge University Press, Cambridge, 1998;Kenneth J. Howell, **God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science**, University of Notre Dame Press, Notre Dame, 2002.
[80] James E. Force ve Richard H. Popkin (ed.), Newton and Religion: Context, Nature and Influence, Kluwer Academic Publishers, Dordrecht, 1999.
[81] Arri Eisen, Science, Religion and Society: An Encyclopedia of History, Culture, and Controversy, Taylor&Francis, 2007, p 364.
[82]DelRatzsch, "The Religious Roots of Science", Melville Y. Stewart (ed.), **Science and Religion in Dialogue**, Wiley-Blackwell,New York, 2010, cilt.1, s. 65.

calculating by al-jabr and al-muqabala, confining it to what is easiest and most useful in arithmetic.."[83]

The majority of the theist thinkers of today reject "God of the gaps" arguments, which stem from our ignorance. Those who support "God of the gaps" and similar arguments assert the existence of God through the gaps in our knowledge about the universe. Arguments like "We do not perfectly understand how the heart works, so it must be created by God" or "We do not know how the stars produce their light, so God made the stars" are examples of "God of the gaps" type arguments. The main flaw of the Goid of the gaps approach is that every scientific achievement explains something previously unknown hence fills a gap and dispenses the necessity to refer to God for that gap. It is almost as if this stance glorifies ignorance rather than comprehending the universe. Few contemporary theistic thinkers adopt the "God of the gaps" as a supporting argument for the existence of God. Seeking God in gaps contradicts with the spirit of theism. For a theist, God is not an entity that appears solely in gaps; He is present and in action everywhere in the universe at every time. He has a mark beyond every phenomenon in the nature. The Quran supports approaches based on knowledge, rather than ignorance. Studying the universe broadens our understanding about the stars, our world, the life and so on, which, in turn, support knowledge of God. Aiming to develop such an understanding also provides motivation for scientific work. Ibn-Rushd, the famous Muslim philosophers of 12th century pointed out that the action of studying the nature helps better understand God and he claimed that it is mandatory to work on philosophy (the word "philosophy" is used broadly, including the meaning we use for science today), thereby expressing his motivation for philosophy-science.

"…they witness the existence of God only through learning about His creations; in addition, only when the content of beings is well known, the knowledge about God becomes complete. If investigation of beings is recommended and encouraged in religion, it is obvious that whatever philosophy indicates is a must or recommended in terms of that religion. It is crystal clear that in the verses of the book of God; the Almighty, religion invites to evaluate the beings through reason… "[84]

[83]Victor J. Katz, **A History of Mathematics: An Introduction**, Pearson, 2008, s. 271.

Tthe Quran likewise encourages the sharing of knowledge. Those who seek scientific knowledge for the sake of wealth and reputation are likely to keep discoveries to themselves. Throughout history, there are many examples of knowledge passed from master to apprentice and deliberately hidden from others. For this reason, some skills stayed within the monopoly of small isolated groups. It is not hard to guess that part of the accumulated knowledge was lost before being transferred to new generations, or part of it had to be reinvented. For example, the manufacturing and contents of the famous "Greek fire" of the Byzantines is still not completely understood. Likewise, the well-known "Damascus steel" and countless other antique products of craftsmanship are being tried to be reverse engineered in modern times, without complete success. It is likely that the lack of knowledge on how the great pyramids of Egypt were constructed is due to a similar loss. On the other hand, for those who try to reach knowledge with the motivation of following the orders of God and understanding his Might and Art, it would be meaningless to try to hide the knowledge. On the contrary, this type of motivation supports dissemination of knowledge and not leaving it into the monopoly of a small group. Of course, dissemination of scientific knowledge can also be achieved through other motivations; yet, it is important to mark that the motivation provided by the Quran supports this critical process.

Historically, scientific knowledge was produced by people of many different beliefs, including Jews, Christians, Muslims, Hindus, and atheists. In order to benefit from cumulative and incremental nature of scientific knowledge, one should be open to obtain knowledge from all beliefs and avoid being "capricious". Notably, as the Quran guides to study the phenomena in the universe, it does not contain any implication of such a capricious view. To the contrary, the Quran criticizes racism and nationalism and forms a mental structure which disregards race, skin color, gender and family differences, but regards universal values and truth above them. This attitude rejects diminishing other nations or races or religions and staying away from their knowledge. Consider the following verses of the Quran:

O people, we created you from the same male and female, and rendered you distinct peoples and tribes, that you may recognize one another. The best among you in the sight of God is the most righteous. God is Omniscient, Cognizant.[85]

[85] Averroes, (Translation by C.E. Butterworth) The Decisive Treatise, Brigham Young University, 2002.
[85] Surah al-Hujurat, 49-13.

Among His proofs are the creation of the heavens and the earth, and the variations in your languages and your colors. In these, there are signs for the knowledgeable.[86]

From the perspective of the Quran, the universe and the nations are creations of the One God and hence the truth is universal; it cannot change from one society to another. The Quran equally rejects both the polytheist systems of the past, which accepted distinct Gods for each society, and the post-modern philosophies of our time, which reject the existence of universal truths. According to the Quran, universal truths and realities exist. Hence, whichever society reaches them, the nature of these truths stays unchanged. Thus, the truths discovered by other nations are valuable since they concern the same the universe created by the One God. The Quran unequivocally opposes the fanatical thought of rejecting everything that comes from other societies. Such fanatical thoughts can be better appreciated by considering the infamous track record of many "spokesmen" of Islam. Islam Al-Kindi, an early Islamic philosopher (9th century), describes such "spokesmen" as "merchants of religion;" he summarizes the proper Muslim attitude towards the knowledge stemming from other beliefs:

"We ought not to be embarrassed of appreciating the truth and of obtaining it wherever it comes from, even if it comes from races distant and nations different from us. Nothing should be dearer to the seeker of truth than the truth itself, and there is no deterioration of the truth, nor belittling either of one who speaks it or conveys it."[87]

In addition to motivating science, the Quran demands, morally, the application of knowledge to the welfare of mankind *without doing damage to nature* (God's creation)[88]. Knowledge is a kind of power and the use of this power without any ethical bounds can be devastating. Staying on the side of the good and the right, opposing the bad and the wrong, protecting the weak without expectation of benefit are fundamental Quranic principles. These principles are important in all aspects of life, including the use of scientific knowledge. The benefits of medical knowledge to the weak and the poor are evident. On the other hand, respecting the environment is equally valuable, since the damage we do to the environment harms both ourselves and future generations. The Quran warns of the dire consequence of human actions:

[86] Surah ar-Rum Suresi, 30-22.
[87] Al-Kindi, "Kitab fi'l Felsefeti'l Ula"
[88]The relation between scientific activity and the ethics built by the Quran could be a whole chapter by itself. For brevity, we touch upon this issue only in relation to the motivation given by the Quran.

Disasters have spread throughout the land and sea, because of what the people have committed. He thus lets them taste the consequences of some of their works, that they may return (to the right works).[89]

In the Quran, the phenomena in the universe are presented as "verses" (evidences) of God and the mentality that God is the real owner of the universe is developed. For a Muslim, the verses of God are valuable; treating them vulgarly, doing harm on other people and the posterity by doing damage on the nature is against the feeling of responsibility developed in the Quran. One who regards the nature through the mind constructed by the Quran and the system of ethics developed by it should refrain from doing damage on the nature.

In brief, the Quran's directive -- investigate the universe as a way to understand the Might and Art of God – provides ample motivation for science, to a degree that is unseen in any other major religion. Along with this motivation, the Quran also encourages the sharing and dissemination of knowledge and endorses learning from other nations and beliefs. Finally, the Quran never sets ethical considerations aside and supports protecting the environment.

[89] Surah ar-Rum, 30-41

CONCLUSION

In this book, we aimed to present the relationship between the mindset constructed by the Quran and scientific activities. In the first part, this relation is investigated regarding the presuppositions of scientific studies. When we do science, we tacitly assume many principles –whether we realize them or not. For example, if everyone assumes that "the universe has a rational, comprehensible structure" and that "the laws of nature are universal." In this book, we argued that the Quran provides rational basis for seven of these crucial presuppositions, which the common naturalist-atheist approaches of the modern academic world does not.

The Quran supports these presuppositions partly by presenting a theistic ontology, partly by endorsing responsibilities for our deeds, sometimes by inviting to struggle to understand the universe, etc. The Quran is in line with Judaism and Christianity regarding the presuppositions it supports via theist ontology. However, the content of the Quran differs from other theistic beliefs (in degree and, sometimes, in essence). For example, the Quranic support for to the presupposition "Observation is important for gathering knowledge related to the universe" is much more comprehensive as compared to other theist beliefs.

One can, of course, base these presuppositions on practical benefits without any rational basis. For example, one might think that "studying the universe is valuable" because of the benefits of scientific achievements in developing new technologies. However, the Quran rationally grounds these presuppositions even if there were no practical benefit. Lacking such rational grounds is intellectually unsatisfying. This is an intellectual advantage of a Quranic worldview over naturalists-atheist philosophies.

In the second part of the book, we focused on the motivation provided by the Quran for realization of scientific work. More than any other religion in the world, the Quran directs believers to study the phenomena in the universe and derive conclusions from them (thereby comprehending the Might and Art of God). Finding a driving force for scientific endeavor is as indispensible as having the required presuppositions in mind. Earning money, reputation and social status can be sources of motivation, yet, the Quran provides motivation without any worldly benefit.

The relationship of the content of the Quran with the presuppositions needed for scientific work is not discussed in previous works, to the best of our knowledge. The motivations, however, are discussed in various studies. The distinction and novelty of this book is that it by considering the support of the Quran for the discussed presuppositions together with the motivation provided by it, a detailed picture of construction of scientific mind by the Quran is presented.

On the subject of construction of scientific mind by the Quran, it is obviously possible to add new topics to the ones discussed here or expand on the ones that we kept brief. For example, the subject of ethics could and should be explored in greater depth. Making sure that science benefits of mankind, next generations, environment and other living beings is an important ethical consideration. In a future study, we plan to expand these discussions and include further related issues that were not considered here.

Although the Quran supports scientific studies, many Muslim societies, particularly in the last few centuries, have not followed the Quran in this regard. The reason behind this is subject of other studies. Nevertheless, we believe that when such failures in 17^{th}-21^{st} centuries, as well as successes in 9^{th}-13^{th} centuries are to be considered, the discussions we present in this book can provide pertaining contributions and guidelines.

REFERENCES

Aristotle, **Metaphysics**, çev: Hugh Lawson-Tancred, Penguin Classics, Londra, 1999.

Armstrong, David, "Reply to Van Fraassen", **Australian Journal of Philosophy**, 66:2, 1988.

Armstrong, David, **What Is a Law of Nature?**,Cambridge University Press, Cambridge, 1983.

Ary, D., Jacobs L.D. ve Razavieh, A., **Introduction Research in Education**, Harcourt Brace College Publishers, Orlando,1996.

Beebee, Helen, "Necessary Connections and the Problem of Induction", **Nous**, 45, 2011.

Brooke, John Hedley, **Science and Religion: Some Historical Perspectives**, Cambridge University Press, Cambridge, 1991.

Calaprice, Alice, **The Quotable Einstein**, Princeton University Press, Princeton, 1996.

Calvin, Melvin, **Chemical Evolution**, Clarendon Press, Oxford, 1969.

Darwin, Francis, **The Life and Letters of Charles Darwin Including an Autobiographical Chapter**, John Murray, London, 1887.

Davies, Paul, "Taking Science on Faith", **New York Times**, 24 Kasım 2007.

Dawkins, Richard, **River Out of Eden: A Darwinian View of Life**, Basic Books/Harper Collins, New York, 1995.

Doko, Enis, "Aksiyolojik Argüman: Değerlerin Ontolojik Temellendirmesi Tanrısız Mümkün Mü?", Caner Taslaman ve Enis Doko (ed.), **Allah, Felsefe ve Bilim**, İstanbul Yayınları, İstanbul, 2014.

Doko, Enis, **Dahi ve Dindar: Isaac Newton**, İstanbul Yayınları, İstanbul, 2011.

Dretske, Fred, "Laws of Nature", **Philosophy of Science**, 44, 1977.

Earman, John, "Laws of Nature: The Empiricist Challenge", R. Bogdan (ed.), **D. M. Armstrong**, D. Reidel Publishing Company, Dordrecht, 1984.

Earman, John, "The Universality of Laws", **Philosophy of Science**, 45, 1978.

El-Battani, **El-Zij es-Sabi.**

Field, H. H., **Science Without Numbers: A Defence of Nominalism**, Blackwell, Oxford, 1980.

Flew, Antony, **There Is A God: How the World's Most Notorious Atheist Changed His Mind,** Harper Collins, New York, 2007.

Force, James E. ve Popkin, Richard H. (ed.), **Newton and Religion: Context, Nature, and Influence**, Kluwer Academic Publishers, Dordrecht, 1999.

Galilei, Galileo, **Dialogue Concerning the Two Chief World Systems**, çev: Stillman Drake, University of California Press, Berkeley, 1967.

Golshani, Mehdi, **The Holy Qur'an and the Sciences of Nature**, Global Scholarly Publications, New York, 2003.

Haldane, J.B.S., **Possible Worlds**, Transaction Publishers, New Brunswick, 2001.

Harrison, Peter, **The Bible, Protestantism and the Rise of Natural Science**, Cambridge University Press, Cambridge, 1998.

Hawking, Stephen ve Mlodinow**,** Leonard, **Büyük Tasarım**, çev: Selma Öğünç, Doğan Kitap, İstanbul, 2012.

Holton, Gerald, **Thematic Origins of Scientific Thought: Kepler to Einstein**, Harvard University Press, Cambridge MA, 1988.

Howell, Kenneth J., **God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science**, University of Notre Dame Press, Notre Dame, 2002.

Hume, David, **A Treatise of Human Nature**, John Noon, London, 1739.

İbn Rüşd, "Felsefe-Din İlişkisi Hakkında Son Söz", **İslam Filozoflarından Felsefe Metinleri**, çev: Mahmut Kaya, Klasik, İstanbul, 2005.

Katz, Victor J., **A History of Mathematics: An Introduction**, Pearson, 2008.

Kindi, "Kitab fi'l Felsefeti'l Ula", **İslam Filozoflarından Felsefe Metinleri**, çev: Mahmut Kaya, İstanbul, Klasik, 2005.

Lewis, David, **Counterfactuals**, Harvard University Press, Cambridge MA, 1973.

Mill, John, **A System of Logic**, Longmans, London, 1947.

Plantinga, Alvin, "Naturalizme Karşı Evrimsel Argüman", Caner Taslaman ve Enis Doko (ed.), **Allah, Felsefe ve Bilim**, İstanbul Yayınları, İstanbul, 2014.

Plato, **Republic**, çev: R. Allen, Yale University Press, Yale, 2006.

Plott, C., **Global History of Philosophy: The Period of Scholasticism**, Motilal Banarsidass, Delhi, 2000.

Popper, Karl, **Conjectures and Refutations. The Growth of Scientific Knowledge**, Basic Books, New York, 1962**.**

Putnam, Hillary, "What is Mathematical Truth", **Mathematics Matter and Method: Philosophical Papers**, Cambridge University Press, Cambridge MA, 1979.

Quine, W. V , "On What There Is", **From a Logical Point of View**, Harvard University Press, Cambridge MA, 1980.

Ramsey, Frank, **Foundations**, Routledge, London, 1978.

Ratzsch, Del, "The Religious Roots of Science", Melville Y. Stewart (ed.), **Science and Religion in Dialogue**, Wiley-Blackwell, New York, 2010.

Sabra, A. I., "Ibn al-Haytham: Brief Life of an Arab Mathematician", **Harvard Magazine**, Eylül-Ekim, 2003.

Steiner, Mark, **The Applicability of Mathematics as a Philosophical Problem**, Harvard University Press, Cambridge MA, 1998.

Swartz, Norman, **The Concept of Physical Law**, Cambridge University Press, New York, 1985.

Taslaman, Caner, **Arzulardan Allah'a**, Etkileşim Yayınları, İstanbul, 2014.

Taslaman, Caner, **Evrenden Allah'a,** Etkileşim Yayınları, İstanbul, 2014.

Tooley, Michael, "The Nature of Laws", **Canadian Journal of Philosophy**, 7, 1977.

Van Fraassen, Bas, "Armstrong, Cartwright and Earman on Laws and Symmetry", **Philosophy and Phenomenological Research**, 2, 1993.

Weinberg, S., **Dreams of a Final Theory**, Vintage, London, 1993.

Wigner, E. P., 'The Unreasonable Effectiveness of Mathematics in the Natural Sciences', **Symmetries and Reflections**, MIT Press, Cambridge MA, 1964.

http://reviewofreligions.org/9422/from-the-archives-islam-and-science-concordance-or-conflict/

http://www.nobelprize.org/nobel_prizes/physics/laureates/1979/salam-speech.html

[i]