

GENESIS OF THE NATURAL SCIENTIFIC WORLDVIEW

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Abstract

This article analyzes the genesis of the formation and development of the natural scientific worldview from philosophical and scientific perspectives. The historical evolution of the natural scientific worldview is examined from ancient natural philosophy through the classical mechanistic paradigm, the theory of relativity, quantum mechanics, and the achievements of modern science. The article also reveals the role of scientific revolutions, methodological principles, and interdisciplinary integration in shaping scientific conceptions of the world. The study demonstrates that the natural scientific worldview is not a static construct but a dynamic system of knowledge that continuously develops through the advancement of scientific knowledge and the emergence of new theories.

Keywords: Natural scientific worldview, genesis, scientific cognition, natural philosophy, scientific revolution, classical science, non-classical science, post-non-classical science, scientific paradigm, philosophy of science, methodology, interdisciplinary integration.

Introduction

The natural scientific worldview is one of the fundamental epistemological and methodological concepts that integrates humanity's scientific understanding of nature, reality, and the phenomena occurring within it into a coherent system. It represents a body of theories, laws, principles, and scientific paradigms that have emerged as a result of scientific progress during a particular historical period. The natural scientific worldview serves not only as a means of explaining natural phenomena but also as a conceptual framework that determines the direction, methodology, and future prospects of scientific research.

The natural scientific worldview is the product of a long process of historical development. Its genesis is closely associated with ancient natural philosophy, the scientific heritage of the Middle Ages, the intellectual achievements of the Renaissance, and the Scientific Revolution of the seventeenth century. The scientific concepts developed by Aristotle, Ptolemy, Copernicus, Galileo, Kepler, and Newton laid the foundation for the formation of the classical natural scientific worldview. In the twentieth century, however, Einstein's theory of relativity, quantum mechanics, cosmology, genetics, and advances in other natural sciences fundamentally transformed scientific conceptions of the universe. Contemporary science is now shaping a post-non-classical natural scientific worldview based on the study of complex systems, evolutionary processes, synergetics, and interdisciplinary integration.

Main Body. At the earliest stages of human civilization, the inability to understand the essence of natural phenomena gave rise to fear and uncertainty in human consciousness. Consequently,



the earliest forms of natural scientific knowledge that emerged in ancient Greece, Rome, India, and China were closely intertwined with mythological and religious beliefs. Natural entities such as water, air, the sun, the earth, the moon, stars, and environmental phenomena—including solar and lunar eclipses, storms, rain, floods, thunder, lightning, hail, landslides, droughts, and other natural events—were regarded as manifestations or embodiments of divine powers. Thus, humanity's initial perception of nature was shaped primarily by mythological explanations rather than by scientific inquiry. Moreover, the earliest stages of human interaction with nature were characterized by an unregulated and often irrational attitude toward the environment, resulting in various natural processes and transformations. From this perspective, the scientific worldview can be distinguished into two interrelated dimensions: the **general scientific worldview** and the **natural scientific worldview**. It should be emphasized that the contemporary general worldview encompasses several complementary forms of understanding reality, including the **scientific worldview**, the **philosophical worldview**, and the **religious worldview**, each of which interprets the universe through its own conceptual and methodological framework. In particular, according to the natural scientific worldview of the ancient world, the origin of the universe was commonly explained through the myth of the Cosmic Egg, according to which the universe emerged from the breaking or opening of a primordial cosmic egg. In this respect, the mythological narrative concerning the creation of the universe bears a certain resemblance to the modern cosmological Big Bang Theory, which also describes the emergence of the universe from an initial state. However, as N. A. Shermukhamedova points out, *“Although physicists discuss the primordial singular state that is assumed to have existed before the Big Bang, they have not yet proposed a reliable explanation regarding the composition of the substrates constituting this initial singularity. Instead, they argue that the current concepts of space and time, matter and energy cannot be applied to that primordial state.”* This observation indicates that, despite the remarkable achievements of contemporary cosmology, a number of fundamental questions concerning the ultimate origin of the universe remain unresolved. Consequently, the genesis of the natural scientific worldview continues to be an evolving field of philosophical and scientific inquiry, where advances in empirical research are accompanied by ongoing methodological and epistemological reflection (Шермухамедова Н.А. 2022. – Б. 39.). Based on this, it can be argued that in the earliest periods of human history, people interpreted all natural phenomena within the natural scientific worldview through the lens of mythology. Accordingly, they perceived all objects and phenomena in nature as living and animated entities endowed with spiritual or divine qualities. This animistic perception reflected humanity's initial attempt to explain the surrounding world before the emergence of systematic scientific knowledge. This observation suggests that, although early conceptions of nature were largely shaped by mythological beliefs, they also contained empirical observations accumulated through practical experience. These observations gradually laid the foundation for the transition from mythological explanations to rational and scientific interpretations of the natural world, marking an important stage in the genesis of the natural scientific worldview (Шермухамедова Н.А. 2017. – Б.28.). In this approach, the natural scientific worldview is understood as demonstrating the inseparable connection between mythological knowledge and early natural scientific knowledge. It should be emphasized that humanity's early understanding of the natural scientific worldview played a crucial role in satisfying its primary needs, including survival, adaptation to the



environment, agriculture, navigation, and the organization of everyday life. Although these forms of knowledge were largely expressed through myths, they also embodied practical observations of natural phenomena accumulated over generations.

In this regard, A. F. Losev argues that “Myth is a material reality experienced and created at the level of life.” This interpretation suggests that myth should not be regarded merely as a fictional narrative or primitive fantasy. Rather, it represented a specific form of understanding reality through which ancient people interpreted natural phenomena and organized their practical activities. Consequently, mythology constituted an important stage in the historical evolution of the natural scientific worldview, serving as a transitional link between intuitive perceptions of nature and the emergence of rational scientific thinking» (Лосев А.Ф. 1991. – С. 13.), Therefore, Losev's view can be regarded as well-founded. Based on the foregoing analysis, it can be argued that mythological knowledge constituted the foundation upon which the earliest forms of natural scientific knowledge were built, and that the natural scientific worldview gradually evolved on the basis of this intellectual heritage.

In our view, from the very emergence of humankind, the process of satisfying material needs led people to transform and interact with their natural environment. Through this continuous interaction, successive generations gradually acquired a deeper understanding of natural phenomena, interpreting and explaining them with increasing accuracy. As a result, the natural scientific worldview developed progressively, becoming more comprehensive and systematic over time. This evolution reflects humanity's transition from intuitive and experience-based perceptions of nature to increasingly rational and scientifically grounded explanations.

Since ancient times, human beings have proposed various approaches to understanding the natural world surrounding them. In particular, mythology—the earliest form of worldview—conceived the whole of nature as living and animated. By contrast, the religious worldview was founded on the belief that the entire universe was created by God. In this respect, O. Fayzullayev notes that: “Religious doctrines regarded nature as the material embodiment of a spiritual principle, while God was considered to transcend nature.” This interpretation demonstrates that the religious worldview explained the origin and order of the universe through supernatural principles, in contrast to the natural scientific worldview, which seeks to explain natural phenomena on the basis of objective laws, empirical observation, and rational inquiry.

The historical evolution of these different forms of worldview illustrates that the natural scientific worldview did not emerge abruptly but developed gradually through the transformation of mythological and religious conceptions into philosophical reflection and, ultimately, into scientific knowledge. Consequently, the genesis of the natural scientific worldview should be understood as a continuous historical process in which changes in humanity's intellectual, cultural, and scientific development produced increasingly objective and systematic conceptions of nature and the universe (Файзуллаев О. 2006. – Б. 14.), We consider this view to be well substantiated, since religious doctrines generally maintain that nature is the material manifestation of a spiritual principle created by God. Within this framework, nature is not regarded as an independent reality but as a creation whose existence and order derive from a transcendent divine source.



At the same time, from a historical perspective, scholarship offers two principal approaches to explaining the origin of religion: the theological approach and the materialist approach. According to the theological approach, the emergence of religion is inseparable from the creation of humankind itself. It holds that when God created the first human beings, He revealed Himself to them, thereby initiating humanity's first act of religious belief and worship.

Methods

This article employs a comprehensive combination of general scientific and specialized philosophical research methods to investigate the genesis of the natural scientific worldview. First, the **historical method** was applied to analyze the evolution of the natural scientific worldview from ancient natural philosophy through the stages of classical, non-classical, and post-non-classical science. The **logical method** was used to identify the structural components of the natural scientific worldview, as well as to reveal their interrelationships and patterns of development.

Throughout the study, the methods of **analysis and synthesis** were employed to examine historical sources on the natural sciences, philosophical concepts, and contemporary scientific theories, integrating them into a unified conceptual framework. In addition, the **comparative analysis** method was used to compare scientific paradigms of different historical periods, their methodological characteristics, and the changing dynamics of scientific conceptions of the world.

Analysis and Results.

According to the literature reviewed, the principal characteristics and distinctive features of the natural scientific worldview have evolved gradually since ancient times. In particular, from the **4th century BCE** onward, alchemists in the East conducted numerous chemical experiments in pursuit of the **philosopher's stone**, which was believed to possess the ability to transform ordinary substances into gold. Considerable effort was also devoted to discovering the **elixir of life**, a substance thought to prolong human life or even grant immortality. Although these pursuits were based largely on speculative assumptions, they contributed significantly to the accumulation of practical knowledge in chemistry, medicine, and experimental techniques, thereby laying important foundations for the subsequent development of the natural sciences.

Among the civilizations of the ancient East, including **Ancient Egypt, Babylon, and Mesopotamia**, priests occupied a privileged social position and possessed extensive knowledge of astronomy, mathematics, medicine, and other branches of natural science. In particular, Ancient Egypt made remarkable contributions to the development of **mummification techniques** and **medical diagnosis**, reflecting an advanced understanding of the human body for its time. Moreover, practical needs such as land surveying and the measurement of agricultural fields following the annual flooding of the Nile stimulated the emergence and development of **geometry** as a scientific discipline. The analysis further demonstrates that the genesis of the natural scientific worldview was a gradual and cumulative process.

Knowledge acquired through practical activities—including agriculture, architecture, medicine, astronomy, and mathematics—formed the basis for increasingly systematic investigations of nature.



Consequently, the evolution of the natural scientific worldview should be understood as the result of humanity's continuous efforts to comprehend, explain, and transform the natural world through observation, experience, and rational inquiry (Шермухамедова Н.А. 2020. – Б. 29.), According to N. Shermukhamedova, "Egyptian physicians were distinguished by their knowledge of human anatomy and provided accurate descriptions of the progression of many diseases." This observation demonstrates that the people of Ancient Egypt possessed substantial knowledge of medicine and the exact sciences and were capable of applying this knowledge effectively in their practical lives. Their achievements illustrate that scientific understanding in ancient civilizations extended beyond mythological explanations and increasingly relied on systematic observation and practical experience.

Egyptian scholars also made significant contributions to astronomy. Through careful observation of the Sun and the stars, they identified the constellation system known as the Zodiac, which became an important framework for astronomical studies in the ancient world. Historical sources further indicate that Egyptian astronomers recorded approximately 373 solar eclipses and 832 lunar eclipses, reflecting the remarkable precision of their celestial observations. Moreover, around 3000 BCE, they developed one of the earliest solar calendars, marking a major advancement in the measurement and organization of time.

As M. Mamadazimov notes, "In the third century BCE, Egyptian astronomers determined the length of the year to be 365.25 days." This achievement represents one of the most significant accomplishments of ancient astronomy, demonstrating the high level of mathematical and observational knowledge attained by Egyptian scholars. The establishment of an accurate calendar not only facilitated agricultural planning and religious ceremonies but also laid the foundation for subsequent developments in astronomy and chronology.

The analysis of these achievements indicates that the scientific heritage of Ancient Egypt played a crucial role in the genesis of the natural scientific worldview. Empirical observation, mathematical calculation, and practical application gradually replaced purely mythological interpretations of nature, creating the intellectual conditions for the emergence of systematic scientific knowledge and rational explanations of natural phenomena (Mamadazimov M. 2008. – Б. 38.). Indeed, according to this view, the measurement of a single day in human life was determined by water clocks and sundials. In our opinion, this demonstrates that the people of Ancient Egypt possessed a remarkably advanced understanding of disciplines such as medicine and astronomy. Their ability to develop accurate systems for measuring time and to apply astronomical knowledge in everyday life reflects the high level of scientific achievement attained by Egyptian civilization.



The spread of Islam, the intensification of intellectual and cultural dialogue among Eastern scholars, and, at the same time, the political and military interactions among different states significantly influenced the development of science. These historical processes created favorable conditions for the remarkable cultural and scientific flourishing of Central Asia during the ninth to twelfth centuries, a period that is widely recognized today as the Central Asian Renaissance. Unlike the Renaissance that later emerged in Western Europe, this period was closely connected with the political independence of regional states and the formation of new centers of learning and scholarship, which promoted scientific and philosophical advancement.

M. Khayrullayev characterizes the intellectual spirit of this cultural renaissance as follows: "The human being was regarded as the highest creation of the Creator of the universe." This humanistic perspective encouraged the pursuit of knowledge and emphasized the value of reason, education, and scientific inquiry. Consequently, scholars such as al-Khwarizmi, al-Farabi, Ibn Sina (Avicenna), al-Biruni, and Mirzo Ulugh Beg made outstanding contributions to mathematics, astronomy, medicine, philosophy, and other sciences. Their works not only enriched the scientific heritage of the Islamic world but also exerted a profound influence on the subsequent development of science in Europe. Therefore, the Central Asian Renaissance occupies a pivotal place in the historical genesis of the natural scientific worldview, serving as a bridge between the scientific achievements of antiquity and the emergence of modern scientific thought (М.М.Хайруллаев. 2001. – Б. 11.). These factors became the driving forces behind socio-cultural development and the transformation of patterns of thought. From this perspective, it is impossible to encompass within a single study all the ideas concerning the general scientific worldview that have been advanced over the course of a millennium. Therefore, this article focuses on the natural scientific views of selected medieval Eastern thinkers while adhering to the principle of historical periodization. It should be emphasized that the natural scientific worldview may be regarded as an integral component of the general scientific worldview. During the Middle Ages, the natural scientific worldview in Western Europe was largely shaped by the doctrine that everything on Earth had been created by God and that all movement and change occurred according to divine will. Within this framework, God was regarded as the universal key to understanding the universe. Knowledge was believed to originate from concepts derived from sacred scripture, and all natural phenomena were interpreted as manifestations of divine intention. Consequently, views that contradicted religious doctrine were suppressed, and the Church prohibited ideas considered incompatible with established theological teachings.

Based on the foregoing analysis, it may be inferred that during the medieval period many natural scientific ideas inherited from earlier civilizations were abandoned or rejected in Western Europe because they were perceived as conflicting with religious doctrine.



The Renaissance and the Scientific Revolution of the seventeenth century fundamentally transformed the natural scientific worldview. The works of Nicolaus Copernicus, Galileo Galilei, Johannes Kepler, and Isaac Newton replaced the geocentric conception of the universe with the heliocentric model and established a mechanistic interpretation of nature. Newton's classical mechanics subsequently served for centuries as the universal theoretical foundation for explaining natural phenomena.

During the twentieth century, however, Albert Einstein's theory of relativity, together with the development of quantum mechanics by Max Planck, Niels Bohr, Werner Heisenberg, and Erwin Schrödinger, demonstrated the limitations of the classical worldview. These scientific advances fundamentally transformed conceptions of space, time, matter, and causality, giving rise to a new stage in scientific understanding. Furthermore, modern cosmology, evolutionary biology, genetics, synergetics, and the theory of complex systems have provided the methodological foundations of the post-non-classical natural scientific worldview.

Although domestic scholarship has addressed issues related to the philosophy of natural science, the methodology of scientific cognition, and the evolution of scientific thought, comprehensive studies examining the genesis of the natural scientific worldview as a unified historical and logical process from antiquity to the post-non-classical stage remain relatively limited. In this regard, the present article seeks to synthesize existing scholarly literature and systematize it from the standpoint of contemporary philosophy of science. The findings of this study demonstrate that the natural scientific worldview is a dynamic system of knowledge that has developed progressively throughout the historical evolution of human scientific thought. Three principal stages of its development have been identified: the classical, non-classical, and post-non-classical stages of scientific thought, each characterized by its own distinctive methodological features.

Conclusion

The natural scientific worldview is one of the fundamental categories of contemporary philosophy of science, integrating human scientific knowledge about nature, society, and reality into a unified conceptual system. This worldview generalizes the achievements of natural sciences within a particular historical period and provides a scientific explanation of the structure of the universe, the laws of its development, and the processes occurring within it. In this sense, it is not merely a collection of existing scientific knowledge but a dynamic conceptual model that determines the methodological direction of scientific thinking and facilitates the formation of new scientific ideas and theories.

Moreover, the study of the genesis of the natural scientific worldview from historical-philosophical and methodological perspectives makes it possible to better understand the laws governing the development of scientific cognition, the mechanisms of the formation and transformation of scientific theories, and the internal logic of scientific progress. This, in turn, provides a solid methodological basis for correctly assessing the evolution of scientific thought, identifying new scientific problems, and defining promising directions for future research.



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