

ROLE OF SCIENTIFIC WORLDVIEW IN DEVELOPING CRITICAL THINKING

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INTRODUCTION

Every individual possesses a general understanding of the world, which shapes their relationship to it and defines the scope of their practical and cognitive activities. The more accurate and adequate these representations, the more effective their cognitive and practical endeavors will be, fostering harmonious interaction with the surrounding environment.

The concept of the scientific worldview (SW) emerged as a focus of philosophical inquiry during the 1980s. M. Mostepanenko characterized the SW as "a reflection of objective reality through concepts and ideas specific to a given stage of scientific development, which at this stage of societal progress, holds a uniform meaning across scientific communities."¹ Thus, the SW constitutes a philosophical foundation for scientific cognition. At its core, the SW represents a system of principles and concepts universally recognized by scientists of a specific historical period. These concepts provide a framework for understanding the mechanical, physical, chemical, biological, and social manifestations of matter in motion.

The functional purpose of the SW is to act as a methodological and cognitive instrument for professional activity and creativity. Specialists are encouraged to construct personal SWs based on the latest scientific advancements, transforming them into individualized intellectual tools. This approach underscores the inherently pluralistic nature of the SW, allowing for its adaptation across diverse professional fields. Ultimately, the SW serves as a vital intellectual framework for professionals, including scientists, engineers, educators, healthcare providers, legal practitioners, public officials, and policymakers.

The worldview function of the SW lies in fostering an awareness of the organic unity between humans and the world. In the worldview of the modern era, humanity assumed the role of demiurge, a perspective that has contributed to an anthropological and global crisis. Addressing this crisis requires a

¹ Сабадуха В. О. Філософія критичного мислення та прийняття рішень: підручник. Івано-Франківськ: ІФНТУНГ, 2023. С. 146.

paradigmatic shift toward recognizing humanity's interconnectedness with the environment.

Methodologically, the SW functions as a cognitive toolkit, encompassing a system of concepts and schematic representations that inform scientific and professional activities.

Epistemologically, the SW is designed to reveal the intricate and multifaceted relationships between humans and the world. Without this, human activity risks exacerbating the degradation of both social and natural systems.

Anthropologically, the SW provides a framework for reconceptualizing humanity's place within the cosmos. As articulated by M. Heidegger, humanity must come to view itself as "the shepherd of being," fostering a sense of stewardship for the world. Similarly, J. Holton noted that the SW serves as a unifying force, promoting the cohesion of human societies and guiding their collective endeavors.

Later the scientific worldview embodies an essential intellectual and cultural construct, bridging rational thought and imaginative insight to address the complex challenges of human existence and interaction with the world.

1. Historical Variants of the Scientific Worldview

The formation of the SW is not confined to scientific progress or industrial practice but also arises within cultural contexts. Philosophical discourse on the SW suggests its development must be examined in the interconnected frameworks of practice, science, culture, and worldview. The synthesis of these elements is essential for constructing an SW that aligns with the specific developmental stage of human practice, scientific knowledge, and cultural achievements. Such synthesis addresses the necessity of integrating diverse scientific perspectives to form a cohesive understanding of the world, supporting both theoretical and practical engagements with nature while promoting its preservation and fostering a unified relationship between humans and the environment.

The SW can be defined as a socially constructed paradigm for human existence, designed to represent and reproduce the complexity of the human environment. It serves as a navigational tool for intellectual and practical engagement. By synthesizing the truths of its era, the SW emerges as a product of the human endeavor to master the world both spiritually and practically, directing professionals across disciplines toward unified objectives.

From an epistemological perspective, the SW is simultaneously the result of collective scientific activity and an individualized conceptual system developed by professionals to transcend lay perceptions and meet their specific cognitive needs. A reciprocal relationship exists between these dimensions, enabling the SW to integrate universal scientific principles with individual

professional adaptations. In the context of the anthropological and global crises of the modern era, the development of the SW is necessitated by the imperative to restore harmony between humanity and the natural world and to ensure the survival of life on the planet. This objective underscores the importance of reexamining the anthropocosmic conditions of human existence, particularly in light of industrial disruptions to natural processes.

An effective SW must be precise and accessible. When appropriate, it may employ gestalt images or artistic generalizations to enhance understanding. However, these approaches often conflict, underscoring the challenge of creating a universally applicable SW. The primary requirement is that the SW must be functional within professional contexts, providing conceptual and imaginative tools to inspire theoretical advancements and further scientific inquiry. Artistic and aesthetic elements within the SW are not a limitation but rather an asset, as they stimulate scientific intuition and the generation of heuristic ideas. Consequently, the SW of an individual professional represents a synthesis of scientific concepts and creative imagery.

The SW is not merely a product of rational cognition but also arises from the integration of thought and imagination. This interplay has been widely acknowledged in philosophical traditions. M. Berdyaev, Ya. Golosovker, and J. Ortega y Gasset, for instance, emphasized the pivotal role of creative imagination in driving theoretical and practical endeavors. As Ya. Golosovker observed, creative fantasy serves as the foundation for productive intellectual and practical activities². Thus, the SW is inherently a product of both rational analysis and imaginative synthesis.

Plato's System of Concepts. Plato proposed a framework of core concepts—being, difference, identity, motion, and rest — as fundamental tools for understanding the world. These concepts, he argued, are essential for individuals endowed with exceptional intellectual abilities to effectively engage in intellectual and practical activities.

Being, a central concept in Plato's system, is inherently multifaceted. It encompasses not only material objects, thoughts, emotions, and artistic creations but also the ideal of a true individual who lives in accordance with the needs of the polis. For Plato, being is not static but characterized by an intrinsic interplay of motion and rest, wherein transitions occur while maintaining continuity, resulting in a balance that reflects stability within change.

Central to Plato's analysis of being is the notion of goodness, which he interprets through three core categories: measure, beauty, and reason. These principles ensure the harmonious balance of material and ideal aspects of life,

² Сабадуха В. О. Філософія критичного мислення та прийняття рішень: підручник. Івано-Франківськ: ІФНТУНГ, 2023. С. 147-148.

fostering the emergence of truth. Additional categories include knowledge and art, with pleasure considered subordinate. The emphasis on goodness as a criterion for evaluating manifestations of being underpins a structured, rational approach to philosophical inquiry.

Plato's understanding of reason emphasizes its creative and regulatory functions. Cosmic reason, the primary driver of all existence, operates autonomously, yet its principles are intended to guide human reason and action. While modern interpretations may critique Plato's abstraction of reason from the individual, his framework underscores the necessity of constructing both individual and social realities on rational foundations.

Plato's concept of being, while neither fully material nor ideal, reflects the unity of these dimensions through the activities of reason. The ideal provides the foundation for material development, while materiality allows for the realization of ideal forms. This dialectical relationship aims to harmonize human existence with the world and ensure societal progress.

Plato's philosophy also sought to address the tension between the material and ideal by proposing theories of the ideal individual and society. His vision was not detached from reality but oriented toward its transformation. Plato's ultimate goal was to resolve the sociopolitical and psychological chaos of human life by grounding it in the principles of cosmic reason, which he viewed as the highest governing force.

Aristotle's System of Concepts. Aristotle departed from Plato's abstract approach, emphasizing concrete entities – such as animals, humans, and artifacts – as the foundational elements of reality. These primary substances serve as the basis for Aristotle's conceptual system, which includes categories such as essence, quality, quantity, relation, position, space, time, property, action, and potential for action.

This framework encourages practical engagement with the world, rooted in the observation and analysis of tangible phenomena. Aristotle's system laid the groundwork for scientific inquiry by fostering an empirical approach to understanding the natural and social world. However, it lacks an overarching ethical criterion for evaluating human activity, a limitation that contrasts with Plato's inclusion of goodness as a guiding principle.

The Newtonian Worldview. The Newtonian scientific worldview, characterized by the principles of order, stability, homogeneity, and equilibrium, presented the universe as a mechanical system governed by deterministic laws. Based on the laws of mechanics and energy conservation, this paradigm treated nature as an inexhaustible resource subject to human manipulation.

While Newton's framework revolutionized scientific and technological progress, it also fostered a mechanistic and exploitative relationship with nature. This worldview's influence extended beyond science, shaping social

constructs such as the U.S. Constitution, where the concept of a mechanically stable system informed the design of governance structures.

However, the Newtonian emphasis on stability and predictability overlooked the dynamic and interconnected nature of social and ecological systems. Its mechanistic approach proved insufficient for addressing the complexities of human interaction with the environment, contributing to the current ecological crisis.

Prigogine's Scientific Worldview. By the mid-20th century, the limitations of the Newtonian paradigm necessitated a new scientific worldview. Ilya Prigogine's contributions marked a significant shift, emphasizing the dynamic, non-linear, and heterogeneous nature of the universe.

Prigogine's concepts – chaos, instability, bifurcation, dissipative structures, order, and dialogue – highlight the emergent nature of order from disorder. His framework recognizes instability, diversity, and sensitivity to temporal changes as fundamental aspects of reality. Unlike the Newtonian worldview, which positions humans as dominators of nature, Prigogine advocates for a dialogical relationship that acknowledges mutual interdependence and responsibility³.

Despite its advancements, Prigogine's worldview does not fully address the causes of systemic imbalances or identify the agents responsible for ecological degradation. These issues remain rooted in human activity, particularly the materialistic tendencies of societies driven by consumerism.

The transition from the Newtonian to the Prigogine worldview underscores the evolving understanding of the universe as a complex, dynamic system. While the Newtonian paradigm still serves as a foundational reference in many scientific and economic fields, its mechanistic assumptions have proven inadequate for addressing the interconnected challenges of the modern world.

Prigogine's emphasis on dialogue, responsibility, and the co-evolution of humans and nature highlights the need for a critical reevaluation of existing paradigms. Incorporating teleological determinism, which prioritizes ecological balance and sustainable development, may offer a pathway for aligning human activities with the broader needs of the planet.

In conclusion, the historical evolution of the scientific worldview – from Plato's philosophical foundations to Prigogine's dynamic systems approach – demonstrates the interplay between conceptual frameworks and their practical implications. Each paradigm offers unique insights into the nature of reality while reflecting the intellectual and societal contexts of its time.

³ Сабадуха В. О. Філософія критичного мислення та прийняття рішень: підручник. Івано-Франківськ: ІФНТУНГ, 2023. С. 154.

2. Formation of the Scientific Worldview in the Educational Process

The integration of the scientific worldview (SW) into the educational process is a critical task for fostering intellectual and ethical development. Providing students with a coherent system of concepts enables them to construct their own informed understanding of the world.

A lack of existential purpose among individuals at dependent or mediocre stages of development often leads to excessive material needs, exacerbating exploitation of natural resources and increasing systemic uncertainty and chaos. Motivations and needs, amplified by materialistic ideologies and supported by technological advancements, create significant imbalances between human goals and nature's capacity, further destabilizing societal and individual existence.

In contrast, individuals at higher developmental stages – driven by the desire to strengthen their unity with nature – exhibit a heightened capacity to align their actions with environmental limitations. Such individuals achieve internal clarity, which contributes to societal stability. Geniuses, inspired by ideals, transcend conformity and establish new paradigms. By overcoming both personal and collective unconscious tendencies, they become pivotal for societal order. Their intellectual surplus provides the necessary energy to address social chaos effectively.

Addressing the complexities of the external world requires an inner world of equivalent or greater complexity. This shift necessitates reorienting societal values from materialism to spirituality, a transition often resisted by those benefiting from existing material priorities. Ultimately, overcoming socio-political and psychological chaos demands the surplus spiritual energy characteristic of advanced individuals and geniuses.

Martin Heidegger's reflections on the worldview highlighted a significant shift in modern thought: the emergence of humanity as a subject. However, this subjectivity has been narrowly defined by economic activity, leading to the transformation of Earth into a mechanized workshop devoid of existential meaning. This unexamined approach to existence has resulted in humanity's alienation from being and its essence. Heidegger posited that humanity must act as the "shepherd of being," guided by the "truth of being."

Heidegger's insights are vital for addressing philosophical, methodological, and pedagogical questions about the structure of a modern SW capable of being assimilated in educational contexts.

The development of the SW requires a clear understanding of the interplay between the material and ideal realms. Hegel, following Plato, argued that the world evolves through dialectical laws. Matter, at each stage of its evolution, generates structures corresponding to its developmental level, encompassing

both animate and inanimate phenomena. This hierarchical view posits that each stage emerges from its predecessor while maintaining relative autonomy⁴.

Friedrich Engels expanded Hegel's ideas, emphasizing motion and internal contradictions as the drivers of development. Motion reveals the properties and qualities of nature, and the concept of "forms of motion" explains the qualitative diversity of phenomena, encompassing mechanical, physical, chemical, biological, and social forms. These forms, while interrelated, possess distinct laws and regularities. Each subsequent form incorporates and transcends the previous, representing a qualitative progression in complexity.

Engels's classification of motion forms laid the groundwork for a logical organization of sciences, reflecting the evolutionary trajectory of the universe. Despite its enduring relevance, the idea of hierarchical complexity and genetic generation of forms of motion has not been fully integrated into contemporary educational approaches for constructing the SW.

One key factor contributing to global challenges is the absence of a comprehensive scientific worldview. Without such a framework, human activity is predominantly guided by material needs dictated by dominant social norms. Ukrainian philosopher O. Grechany addressed this gap by proposing an integral SW in both conceptual and schematic forms.

Grechany identified a set of universal concepts fundamental to understanding all phenomena: *Matter, Primary forms of motion, Space-time, Element, Property, System, Structure, Interconnection, Signal, Information, Reflection, Representation*.

These concepts form a logical structure that encompasses their origins and consequences. Grechany's framework organizes these concepts into interconnected categories:

Matter → Primary forms of motion → Space-time

Element → Property → System

Structure → Interconnection → Signal

Information → Reflection → Representation⁵

This system, characterized by its adaptability and scalability, captures the qualitative progression of material structures from inanimate to advanced technological systems, such as computers. It also incorporates the dynamic interaction between humanity and nature, highlighting the importance of integrating scientific perspectives on societal development into the SW.

⁴ Сабадуха В. О. Метафізика суспільного та особистісного буття. С. 367–384.

⁵ Гречаний О., Сабадуха В. Філософія здібностей у контексті пріоритету духовного над матеріальним. Луганськ – Тернопіль – Івано-Франківськ: СЛУ ім. Дала, 2015. С. 122–145.

3. Steps to Constructing a Scientific Worldview by students

Reflective Inquiry: Students should adopt a research-oriented perspective to investigate the contradictions inherent in human existence, identifying these contradictions as the fundamental drivers of the world's complexity.

Dual-Model Representation: Develop complementary models of the SW, integrating Newtonian (static, discrete) and Prigoginean (dynamic, continuous) perspectives. The Newtonian model emphasizes stability and discreteness, while the Prigoginean model focuses on the dynamics of change and continuity.

Epistemological Organization: Guide students to systematically organize their knowledge of the laws governing the seven primary forms of motion, aligning their understanding with both static and dynamic frameworks.

Pedagogical Integration: Use the SW as a methodological tool to empower students to navigate their intellectual and professional development effectively.

By incorporating these steps, educators can support students in constructing a SW that synthesizes diverse disciplinary insights, aligns with the principles of epistemological optimism, and provides a foundation for purposeful action in addressing global challenges. The proposed framework fosters a balance between material and spiritual dimensions, ensuring that human activity is aligned with the broader needs of society and the environment.

A Detailed Exploration of the Scientific Model of Personal Society:

1. The Foundation of the Personal Model of Society

The scientific model of personal society builds on the integral worldview proposed by O. Grechany and incorporates the metaphysical theory of personality, which emphasizes the centrality of the individual in societal existence. This model is grounded in the principle: “personality as the foundation of social existence.”

This principle posits that a personality capable of integrating material and ideal aspects, while addressing ecological, economic, social, legal, cultural, and spiritual dimensions, is essential for a harmonious society. Unlike average individuals, who prioritize materialistic and short-term goals, personalities in this framework embody a long-term vision aligned with collective interests and sustainable development.

1.1. The Role of Teleological Determination

In the personal model, societal organization is guided by teleological determination, where individual and collective actions are purpose-driven and aligned with the shared goals of human flourishing and ecological balance. This ensures that societal systems evolve not randomly but intentionally, fostering unity and progress.

1.2. The Anthropological Connection

This model integrates anthropology and sociology, emphasizing the deep connection between human nature and societal structures. Plato's recognition of isomorphism between an individual's internal qualities and societal organization laid the groundwork for this perspective. Philosophers such as Fichte and Avenarius expanded this concept, emphasizing the inseparability of the subject (individual) and object (society).

In this context, the scientific model of personal society asserts that societal progress depends on the intellectual, moral, and spiritual qualities of its members. Governance, education, media, and cultural institutions reflect and reinforce the prevailing characteristics of the dominant human archetype.

2. *Dual Paradigms of Existence*

2.1. The Impersonal Paradigm: Characteristics and Consequences

The impersonal paradigm of existence is characterized by materialism, consumerism, and the prioritization of individual gain over collective welfare. Its key features include:

Material Orientation: The principle of "having" governs life, leading to excessive focus on wealth accumulation and consumption.

Governance by Mediocrity: Societal power often resides with average individuals who lack the vision to drive progress.

Alienation: Individuals are detached from property, governance, and meaningful participation in social life.

Manipulative Democracy: Democratic systems are used as tools for manipulating public opinion rather than fostering genuine representation.

Moral Relativism: Ethical values are undermined, replaced by hedonistic and utilitarian ideals.

Existential Void: Many individuals experience a lack of purpose, resulting in an existential vacuum.

Exploitation of Nature: Relations with nature are characterized by dominance and exploitation, leading to ecological crises⁶.

2.2. The Personal Paradigm: A New Framework for Existence

The personal paradigm offers an alternative framework, emphasizing the primacy of spiritual development and placing the evolved individual at the center of societal progress.

Key principles of the personal paradigm include:

Spiritual Primacy: Values of ethical universalism and long-term sustainability replace materialistic and short-term goals.

⁶ Генон Р. Криза сучасного світу / пер. з фр. І. Калюга; під наук. ред. Ю. Завгороднього. Київ: Видавець Анна Клокун, 2020. С. 71.

Meritocratic Governance: Leadership roles are based on intellectual, moral, and practical excellence.

Unity with Nature: Human activity is guided by the principles of ecological balance and respect for nature.

Self-Realization: Individuals are encouraged to achieve their potential through creative and meaningful endeavors.

3. The Role of Personality in Social Evolution

The scientific model of personal society places the individual personality at the center of societal evolution. The personality serves as both a driver of progress and a stabilizing force, capable of harmonizing the diverse dimensions of existence.

3.1. The Importance of Spiritual and Moral Hierarchies

In the personal paradigm, moral and spiritual hierarchies inspire individuals to strive for self-improvement rather than creating systems of oppression. These hierarchies are based on virtues such as integrity, wisdom, and creativity, which are recognized as essential for societal progress.

3.2. Addressing Contemporary Challenges

Modern societies face significant challenges, including environmental degradation, socio-political fragmentation, and the dominance of technology over human values. The personal paradigm integrates ethical considerations into decision-making processes, ensuring that progress aligns with the principles of sustainability and human dignity.

4. Scientific Discoveries and Societal Harmony

In the personal paradigm, scientific and technological advancements are evaluated based on their ability to harmonize human-nature relations. Innovations are not judged solely on their utility or profitability but on their contribution to societal well-being and ecological balance.

Key Criteria for Evaluating Scientific Discoveries:

Do they enhance human-nature symbiosis?

Do they foster societal stability and inclusivity?

Do they align with ethical and spiritual values?

5. Implications for Education and Critical Thinking

The transition to the personal paradigm necessitates a transformation in education. The focus should shift from rote learning and utilitarian goals to fostering critical thinking, ethical reasoning, and holistic understanding.

5.1. Educational Goals

Interdisciplinary Knowledge: Encourage students to explore connections between science, ethics, and societal needs.

Moral Reasoning: Integrate ethical considerations into all areas of study.

Personal Development: Foster self-awareness, creativity, and intellectual independence.

5.2. Curriculum Reforms

Educational systems must emphasize the development of a scientific worldview that aligns with the personal paradigm, equipping students with the tools to navigate and address global challenges effectively⁷.

The shift from an impersonal to a personal paradigm of existence reflects humanity's recognition of the limitations of materialism and the necessity for spiritual, ethical, and intellectual development. The scientific model of personal society provides a comprehensive framework for fostering harmonious relationships between individuals, society, and the environment.

By prioritizing evolved personalities and integrating ethical considerations into societal systems, this model offers a sustainable and inclusive path forward for human civilization. While the transition poses significant challenges, it is essential for addressing the complexities of modern life and ensuring the long-term survival and flourishing of humanity and the planet.

CONCLUSIONS

The development of the scientific worldview (SW) represents a critical synthesis of science, philosophy, and culture, providing a framework for understanding and addressing the complexities of human existence and the natural world. It evolves in response to the needs of society, balancing theoretical and practical dimensions while fostering sustainable interactions between humanity and nature. Historical paradigms from Plato, Aristotle, Newton, and Prigogine illustrate the progression of ideas that have shaped the SW, demonstrating the dynamic interplay between stability, change, and interconnectedness.

Plato's emphasis on the unity of material and ideal dimensions laid the groundwork for ethical and rational societal structures, while Aristotle's empirical approach introduced systematic observation and analysis as tools for practical engagement with the world. However, the mechanistic Newtonian worldview, despite its contributions to scientific and technological advancements, failed to account for the dynamic and interconnected complexities of ecological systems. In contrast, Prigogine's dynamic systems theory provided a model of reality as nonlinear and evolving, advocating for a dialogical relationship between humans and nature.

Modern challenges, including ecological crises and societal instability, highlight the need for an SW that integrates material and spiritual dimensions,

⁷ Гречаний О., Сабадуха В. Філософія здібностей у контексті пріоритету духовного над матеріальним. Луганськ – Тернопіль – Івано-Франківськ: СЛУ ім. Даля, 2015. С. 140–145.

guiding human activity toward ecological balance and sustainable development. Integrating this worldview into education is vital for fostering intellectual and ethical growth, enabling individuals to construct their own informed perspectives and contribute to global problem-solving. The hierarchical organization of motion forms, as proposed by thinkers like Hegel and Engels, emphasizes the qualitative progression of complexity in natural and social phenomena, underscoring the importance of a systematic and evolutionary approach to understanding the world.

Ultimately, the SW must harmonize rational analysis with imaginative synthesis, blending scientific rigor with creative insight. This integration is essential for addressing global crises, aligning human activity with planetary needs, and promoting societal and environmental harmony. As a guiding framework, the SW has the potential to unite diverse fields of knowledge and inspire both individual and collective progress.

SUMMARY

The scientific worldview (SW) serves as a socially constructed framework that integrates scientific, cultural, and philosophical perspectives to provide a comprehensive understanding of human existence and the environment. It develops in parallel with societal progress, synthesizing diverse knowledge to address theoretical challenges and practical needs while fostering sustainable relationships between humanity and nature. Plato's philosophical contributions emphasized the unity of material and ideal dimensions, advocating for societal harmony guided by cosmic reason and ethical principles. Aristotle introduced an empirical focus on tangible entities and practical engagement, establishing the foundations for scientific inquiry, though without a unified ethical framework.

The Newtonian worldview revolutionized science with its deterministic and mechanistic approach but proved inadequate in addressing the interconnected complexities of ecological systems. Ilya Prigogine's dynamic systems theory shifted focus to instability, chaos, and interdependence, highlighting the necessity of a dialogical relationship between humans and nature. Modern challenges demand an SW that balances material and spiritual dimensions, aligning human activity with societal and ecological well-being. Educational integration of the SW enables individuals to construct informed perspectives and tackle global challenges effectively. The hierarchical organization of motion forms, as proposed by Hegel and Engels, underscores the progressive complexity of natural and social phenomena. Ultimately, the SW must harmonize rational analysis with creative synthesis, reflecting the interconnectedness of existence while promoting sustainable development.

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