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SCIENTIFIC CREATIVITY: PHILOSOPHICAL ASPECT

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Abstract

The article is devoted to the philosophical study of the phenomenon of scientific creativity. The study is based on a comparative analysis of approaches to creativity and its criteria in classical and non-classical philosophy. The use of a concrete historical approach to studying creativity in different eras allowed considering main approaches to this phenomenon through a comparative analytical method of understanding creativity. It also allows presenting scientific creativity ontological foundations in the various conceptual positions characterized by inter-paradigm nature of research directions. The article considers the main provisions of scientific creativity in the framework of T. Kuhn's paradigm, I. Lakatos' research programs, and P. Feyerabend's concept of subjective creativity. At the present stage of science development, hundreds of thousands of people with different ideological positions, scientific ideas, and ethical values are involved in the implementation of scientific work. Critical rethinking in the dialectical interaction of scientific creativity theories expands the scientific cognitive field and the scientist's creative abilities. A comparative analysis of approaches to the understanding of scientific creativity and its criteria in classical and non-classical philosophy allowed: identifying rational foundations of creativity, which formed the classical concept of creativity, where it is interpreted from the standpoint of universal categories; studying changes in the understanding of the phenomenon of creativity in a non-classical concept, which are primarily related to the view of reality in its processual, movement, formation; identifying models of creative activity in scientific knowledge; reveal practical aspects of scientific creativity by the example of analytical reading.

Keywords: Scientific creativity, classical philosophy, non-classical philosophy, scientific knowledge.

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1. Introduction

The problem of scientific creativity is controversial and multifaceted. Modernization processes occurring in all areas of science require non-standard solutions. Therefore, the study of creativity becomes particularly relevant.

2. Problem Statement

At present, the study of creativity and its philosophical foundations is conducted from the standpoint of various conceptual positions, which are studied in the context of poly-variant and inter-paradigm research directions.

3. Research Questions

The main questions of this article are: identifying rational foundations of creativity, which formed the classical concept, where creativity is interpreted from the standpoint of universal categories; studying changes in the understanding of the phenomenon of creativity in a non-classical concept, which are primarily related to the view of reality in its processual, movement, formation; identifying models of creative activity in scientific knowledge; revealing practical aspects of scientific creativity by the example of analytical reading.

4. Purpose of the Study

The purpose of the article is a philosophical study of the phenomenon of scientific creativity.

5. Research Methods

The realization of the research idea is based on the application of philosophical methods and a concrete historical approach to the problem of creativity in different eras – from antiquity to the present.

6. Findings

6.1. Criteria of creativity in classical and non-classical philosophy

The study of the phenomenon of creativity in classical and non-classical philosophy allowed departing from the schematic interpretation of creativity, where it is considered in the framework of only one philosophical concept (Kupers, Van Dijk, & Lehmann-Wermser, 2018; Tomyuk, 2014).

Classical philosophy considers creativity from the standpoint of rationalism. It defines creativity as the process of discovering new things on strictly logical grounds, while the rationale for creativity is associated with some unique ways of thinking. Teachings of Plato had a significant influence on the formation of the classical tradition in the study of creativity. His understanding of creativity is extremely abstract and is based on the logic of the universal. Plato sought answers to questions related to the nature of creativity, its meaning, and mechanisms of creative activity. In classical philosophy, creativity was

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studied from the position of the universal and in connection with it. In the classical paradigm, the result of creative activity should be novel, and the created novelty should not go beyond the universal.

In the Middle Ages, philosophy was dominated by the tendency to question the mind omnipotence and the mind power to understand the world. Two opposite approaches, logical-gnoseological and theological, were outlined in the understanding of creativity. Medieval philosopher theologians interpreted the novelty in creativity as the inclusion of reason and faith in the creative process, as the fusion of rational and irrational in the act of creation.

During the Renaissance, an anthropocentric approach emerged in the creativity study and the personal role in the process of creation. According to the anthropocentric vision, man is the subject of creation, not God or nature. Anthropocentrism endowed man with maximum opportunities in the act of creation. Creativity is considered mainly as art, artistic creation. The Renaissance gave rise to the cult of genius. Michelangelo and Leonardo da Vinci – larger-than-life personalities with significant achievements in invention, poetry, art -were the greatest geniuses of the era.

The classical concept of creativity, originating from Plato, was further developed in the teachings of B. Spinoza and R. Descartes. The rationalistic approach defines creativity as the activity of a thinking person, and this activity should result in the creation of something new. Novelty is the criterion of creativity in classical philosophy. Researchers of creativity have recognized the novelty as a criterion of creativity as a process of creating something new until recently.

Non-classical approach to the understanding of creativity begins to form in the 20th century. It comes from the critique of a "pure reason" and involves the opportunity to think about the world in a new way (Bakeeva, 2017; Gudova & Lisovetc, 2017; Turoma, Ratilainen, & Trubina 2018). Exploring classical and non-classical concepts of creativity, Tomyuk (2014) concludes that, unlike reductionism, non-classical concepts at the turn of the 20th century were aimed at clarifying the specifics and revealing the essence of creativity (Tomyuk, 2014). In a non-classical theory, there are changes in the understanding of the phenomenon of creativity. These changes applied mostly to the area of construction of reality and the role of man in this design. There was a departure from any substance centering role to the understanding of reality in its processual, movement, formation.

These circumstances raise the question: is it possible for the novelty to be a criterion of creativity if everything is changeable? In our opinion, the reality is ontologically represented by innovations in modern non-classical philosophy. The modern understanding of reality as a reality of constant change is the basis of a non-classical understanding of creativity that goes beyond classical rationality.

Philosophy of Nietzsche postulates that will, not reason, dominates the act of creation, in contrast to the classical paradigm of creativity. Actualizing irrational components of consciousness, A. Bergson favors intuition in the act of creativity, Freud – the unconscious instincts. In a non-classical concept, creativity is viewed as the opposite of mechanical rationalism.

Non-classical philosophy rejects logical connections in nature, its integrity, and regularity, and denies Hegel's teachings on development. In non-classical philosophy, the world is chaos with effects and will, but without orderliness and patterns. Unlike classical concepts, non-classical philosophy (existentialism, philosophy of life, and others) considers creativity in conjunction with will, intuition, faith, and feelings – but not reason. Thus, existentialism considers creativity in its relationship with the

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individual and defines its essence in ecstasy and intuition. An individual, viewed as existence itself, is capable of creativity, of creating something new by irrationality (Hartmann, 1975; Heidegger, 2010; Jaspers, 1993; Merleau-Ponty, 1962; Sartre, 1984; Wild, 1959).

The main difference between non-classical and classical approaches understanding of creativity is that novelty is hidden in the process of creation, not in its result. Such concepts determine creativity in non-classical rationality as inter-subjectivity, duration, multiplicity. In non-classical tradition, creativity is studied at an interdisciplinary level, based on the integration of achievements of philosophy, psychology, and other sciences. Non-classical concepts also consider creativity in social and anthropological aspects.

6.2. Models of creative activity in scientific knowledge

How does scientific knowledge develop? Although the history of this question goes back many centuries, it is still one of the topical issues of philosophy (Akbarova, Dyganova, & Shirieva, 2018; Gauvreau, 2018; Leontieva, Khalilova, Galochkina, Symaniuk, & Spirchagova, 2017; Shibayama, 2019; Wallhagen, 2007).

In the New Age, F. Bacon formulated his famous scientist appeal "knowledge is power" and offered the ideals of scientists: "ants" (ancient scientists), "spiders" (medieval scientists), and "bees" – the New Age ideal. A "bee" combines empirical facts and theoretical knowledge in its activities, thus implementing the process of increasing scientific knowledge. However, Bacon considered this process in the tradition of cumulative. More detailed models of scientific creativity were represented by the post-positivism of Kuhn, Lakatos, and Feyerabend (the second half of the 20th century).

Kuhn introduced such concepts as "scientific paradigm," "scientific community," "normal science," and "scientific revolution" into the philosophy of science. In "The Structure of Scientific Revolutions" (1962), Kuhn explores the socio-cultural and psychological factors in the activities of both individual scientists and research teams. The concept of "paradigm" (a collection of the most common ideas and methodological guidelines in science, recognized by the scientific community) is central to Kuhn's work.

The main components of the paradigm are perceived by members of the scientific community in the learning process. Thus, Kuhn emphasizes the role of education in shaping the scientific community. Then the components mentioned above become the basis of the scientists' activities during "normal science." While focusing on "normal science", scientists do not attempt to create a new theory or a significant change in their scientific discipline. They merely clarify some parameters of the paradigm, expanding the scope of its application.

The development of "normal science" within the adopted paradigm lasts as long as the existing paradigm's ability to solve scientific problems. Anomalies and discrepancies between observations and predictions of the paradigm usually occur at one of the stages of the "normal science" development. When anomalies accumulate, the normal flow of science stops, and a state of crisis sets in. It is resolved by the scientific revolution, which leads to the breaking of the old and the creation of a new scientific theory – a new paradigm.

The change of fundamental theories makes scientists discover a whole new world with entirely different objects and conceptual systems. Scientists discover new problems and tasks since paradigms

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cannot be corrected in the framework of normal science. On the contrary, this leads to acknowledging anomalies and to crises. These crises are resolved not through reflection and interpretation, but due to a somewhat unexpected and non-structural event, like a gestalt switch. After this event, scientists often speak of a "veil being lifted" or an "epiphany." It illuminates a previously intricate puzzle, thereby adapting its components to a new perspective, which allows achieving its solution for the first time. Thus, the scientific revolution as a change of paradigms is not subject to a rational, logical explanation, because the crux of the matter is in the professional "well-being" of the scientific community: it either has the means to solve the puzzle or not. In the latter case, the community creates them.

Lakatos assesses the change of fundamental scientific conceptual models differently: the change occurs as a result of competition between theories within research programs. Lakatos' concept has certain advantages in comparison with Kuhn's concept of paradigmatic creativity. Competition between theories does not allow the development of science at the "normal" stage. Thus, the problem of abrupt paradigm change and the final result – scientific revolution – is removed, since any research program seeks to protect its "solid core." Therefore, scientific revolutions do not play a significant role in the dynamics of scientific creativity. Science does not have a period of complete domination of anyone "program," and various programs, theories, and ideas coexist and compete.

Methodological pluralism of Feyerabend is another new theory of creative change of scientific views. It is sometimes referred to as the "theory of epistemological anarchism." Feyerabend's idea of the incommensurability of scientific theories consists of the assumption that there is no universal scientific language. Different scientists at different times put different meanings in the same terms.

Therefore, the scientific work of solitary scientists must be universally supported and welcomed; scientists are much more productive outside the scientific community. Their creativity is individual, it does not fit into paradigmatic regulatory requirements, and it cannot be controlled. Thus, Feyerabend replaces the collective creativity of scientists in the framework of Kuhn's paradigm with the creativity of an individual scientist.

6.3. Practical aspects of scientific creativity (based on the example of analytical reading)

Scientific style is a functional style of a literary language. The specificity of scientific style is related to its primary purpose – to convey information objectively, concisely, and accurately, which is valuable in the process of learning and implementation of scientific activity (Jones, 2018; Shutaleva, Putilova, & Ivanova, 2018). Scientific style is characterized by the logical structure of presenting information, specific vocabulary (terms), lack of emotional statements, some morphological features. Scientific style can be divided into the following sub-styles: scientific, popular science, scientific-educational.

Scientific creativity is primarily associated with the production of high-quality texts conveying new ideas. However, it is equally important to learn how to read complex works well. Analytical reading is a focused analytical activity, a means of extracting information contained in the text in explicit and hidden forms. Thus, analytic reading classes form the student's skills in analyzing and interpreting text – the essential skills of research, creative, and cultural activities.

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Students often have "prejudices" regarding many texts or their abilities to understand such texts. Therefore, these interferences should be eliminated before proceeding with academic reading (see exercises no. 2 and no. 3).

Exercise 1. Learning the genres of academic texts.

Carefully read the names of text genres. Clarify the meaning of the term in the dictionary. Distribute the following terms in columns (Scientific texts; Educational and scientific texts; Other texts): abstract; annotation; dissertation; collective monograph; synopsis; lecture; training manual; monograph; declaration; review; preprint; article; textbook; transcript; theses; vita; telegram.

Exercise 2. Free unfocused writing.

Students spend 5 minutes writing anonymously, without lifting their hands from the sheet, about the topic they are occupied with at the moment. Then these writings are set aside; they should not be read. Students can crumple and throw them away. This exercise stimulates motility and cognitive abilities and allows students to get into the working mood.

Exercise 3. Conversation with the author.

This exercise can be used to solve the problem of "fear of the venerable author."

Method 1. Ask one student to play the role of the author. Let him tell a little about himself (biography of the author). He should speak in the first person. Ask the rest of the students to ask him various questions about his life, work, favorite ice cream, or the color of his handkerchief... The main goal is to show that the "master" is also human, and one should not be afraid of him.

Method 2. Ask students to engage in a mental dialogue with the "venerable author." The dialogue should be friendly, and it should include topics that concern the student. The goal is to overcome the fear of authority and to develop empathy.

Exercise 4. See the text.

Visualizing the text makes it easier to memorize.

Method 1.

Read the selected text. Try to visualize the text as a tree, where the trunk is the main problem, the roots are the causes of the problem, and the branches are the result of the problem. This model of working with text helps students to structure the material to trace cause-and-effect relationships.

Method 2.

This method is applicable to seminars. Students are divided into small groups. Next, they visualize the text fragments in the form of a picture. For example, they can come up with visual metaphors for the main ideas of complicated work, draw a map of a chapter/work, draw connections between basic concepts.

Exercise 5. Interrogation of the text.

It is essential to ask the text/author questions while reading actively. For example: What is the main idea of the text? How are the author's theses related to each other? Does the author prove his ideas? What proof does the author give? Are there any contradictions in the given facts? Is there a substitution of evidence? Do the author's thoughts and your thoughts have anything in common? If yes, what exactly? Is this text useful for your term paper?

Exercise 6. Notes.

It is necessary to take notes while reading.

Method 1. Cards. This method of working with texts is used for the systematization of material on the research topic since it is a visual method. The main ideas of the text should be written on small cards, which include: 1. The theme, 2. Author's statement, 3. Reference to the source.

The cards are convenient for a quick comparison of the views of different authors on the same issue. The cards also help facilitate the citation process.

Method 2. Synopsis. The synopsis allows students to develop analytical skills and abilities, to articulate the author's idea conclusively and convincingly in writing, to comment on it, to understand the text. Do not write down the content of the source entirely. Consistency, brevity, and clarity are the main features of a good synopsis. In Russian education, long synopsis is used more often: the text is ordered from the first to the final thesis, using the sequence given by the author of the text. Synopsis can be constructed as a graphical record: a diagram, a table, a figure.

7. Conclusion

The current stage of scientific development is characterized by the fact that hundreds of thousands of people with different ideological positions, scientific ideas, and ethical values are involved in the implementation of scientific work. Critical rethinking in the dialectical interaction of theories expands the scientific cognitive field and the scientist's creative abilities. This allows scientists carrying out scientific communications and cooperation more effectively. However, this does not free them from ethical imperatives.

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