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ESCAPING FROM THE SHADOW OF RUSSIAN PHILOSOPHY OF SCIENCE
Book review: O. Gabovich and V. Kuznetsov. Philosophy of Scientific Theories. The First Essay: Names and Realities[1]

Factually, Western philosophers of science have some knowledge of Soviet, in reality, Russian philosophy of science. Ukrainians are usually mentioned in connection with such a negative hero of the Stalin epoch as Trofim Lysenko (Graham, Loran. *Science, Philosophy, and Human Behaviour in the Soviet Union*. New York: Columbia University Press, New York, 1987). The reviewed book indicates that the Ukrainian philosophy of science has a long tradition and presents some of its latest achievements.

First, it demonstrates the evident escape of Ukrainians from the shadows of their former "Big/Older Brother", i.e., Russia. The book criticizes the contemporary icon of Russian philosophy of science V. Stepin (1934-2018); Stepin, Vyacheslav: *Theoretical Knowledge*. Dordrecht: Springer, 2005) and his numerous adepts not only in Russia but (paradoxically) also in Ukraine. For example, the authors demonstrate the senselessness of Stepin's isolation of a new period of World science development which he named "post-non-classical" and considers on the same footing as the classical and non-classical (usually associated with the appearance of relativity and quantum mechanics) periods (*ibid*. p. 408).

Second, they also criticize such gurus of Western philosophy of science as Karl Popper and Thomas Kuhn and their numerous epigones in connection with their ideas about science history, organization, and developments (*ibid*. pp. 505-507). What are the foundations of criticism of such apparently different West and Soviet trends in the philosophy of science? To answer this question let us consider, who are the authors of the book reviewed here. Both of them were educated as theoretical physicists at Shevchenko Kyiv State University. Gabovich became a professional scien-

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tist (https://www.researchgate.net/profile/A-Gabovich). Kuznetsov converted into the philosopher of science (https://www.researchgate.net/profile/Vladimir-Kuznecov), who with his coauthor professional mathematician Mark Burgin (1946-2023) (https://www.researchgate.net/profile/Mark-Burgin) was the first Soviet philosopher to publish their works on the philosophy of science in Western journals (*Epistemologia*, *Quality and Quantity*, *Fuzzy Sets and Systems*, *Synthese*, etc.).

The book combines reflections on scientific theories that are based on the practical usage of theories by Gabovich on one hand, and the profound knowledge of the main figures and topics of modern Western philosophy of science by Kuznetsov on the other hand. The latter received numerous grants for research and lecturing visits to the UK, Germany, Norway, the USA, and the Netherlands. The synergy of their collaboration resulted in the building of a detailed vision of REAL scientific theories, which they baptized as the polysystemic view. According to it, the main shortcomings of Kuhn and Kuhnians consist of the replacement of scientific theories by paradigms and their changes as the main engine of scientific developments. The main weakness of Popper and Popperians is the oversimplified understanding of the theory structure. The authors consider real scientific theories, i.e. theories used in the actual practice of science, as developing complex polysystems that include the following flexible subsystems: ontic, denominative, linguistic, definitional, model-representational, formal-model, logistic, nomic, approximative, problematic, operational, procedural, evaluative, heuristic, hypothetical, and connective ones. Their content is obvious from their names.

The authors state that available reconstructions of theories in the current philosophy of science identify a theory with at most several selected subsystems and miss the rest (for example, ontic, denominative, and procedural subsystems). On the other hand, the authors consider a theory as a long-term and never-ending assembling of structures that were previously considered separately from each other. They include languages, problems, definitions, models, etc. The authors disclose these structures and their ties taking Newtonian mechanics of the Solar system; and contemporary celestial mechanics (theory of orbital motions; Roy, A. E. (2005). *Orbital Motion*. 4th ed. Boca Roton: CRCPress; Milani, Andrea; Gronchi, Giovanni F. (2010). *Theory of Orbit Determination*. Cambridge University Press) and Euclidian geometry as examples interpreted as an empirical theory of the ordinary space. They hypothesize that one can find such type of components in any more or less developed scientific or mathematical theory.

The book consists of six chapters. The first chapter describes the features of the authors' approach to the structure of scientific theories. In the second chapter, the types of systematicity of scientific theories are considered in detail. The third chapter describes some practical theories mentioned above. The fourth chapter is the most voluminous part and is devoted to the problem of names in a theory and the denominative subsystem. The fifth chapter focuses attention on the ontic subsystem and typology of "realities" and their attributes. In the final sixth chapter, the authors turn to aspects of the history of science that illustrate the authors' approach, on one hand, and show the weakness and incompleteness of the ideas about scientific theories prevailing in the world philosophy of science, on the other hand.

To summarize: The book is dedicated to the building and development of the original direction in the philosophy of science in general and in the philosophy of physics in particular. The underlying problems of current discussions in these branches of philosophy are viewed through the prism of the polysystemic vision of scientific theories. Particular attention is paid to the problem of analyzing the folding/complex structure of physical theories. It is noted that most philosophers of science practically ignore theory complexity and reduce theories to their certain fragments, such as organized systems of propositions/statements or models. Moreover, theories are often closely identified with models, which only confuses the aims, means, and functioning of theories. In fact, the authors consider real scientific theories as polysystems, changing subsystems, which are driven by both the internal logic of their improvement and convenience and the need to explain new experiment data. The main original results of the book are in the formulation and implementation of nontraditional and fresh ideas as follows.

1. The relatively unknown, but clearly important information about the current state of natural sciences is introduced into the philosophical community. There is much philosophical work to be done in an explication of structures and interrelations of established and universally accepted scientific theories. The secret of the current situation lies in the fact that many philosophers of science when analyzing science, dwell on old manifestations of its progress or exchange mantras with ancient words, the meaning of which they cannot understand. The wording "synergetics" (being *per se* the important multidisciplinary branch of modern science) is especially popular, which is the parasite of many post-Soviet philosophers of science.

2. It is established that based on universal subject-free theories like general quantum mechanics subject-oriented partial theories like quantum mechanics of atoms or the theory of superconductivity are subdivided and embedded into the practice of scientific research. In this connection, case studies of some historical episodes from plasma physics and astrophysics are analyzed.

3. The authors put forward a hypothesis about the presence of all types of components of the mentioned subsystems or their origins in other developed theories of natural sciences, which can be verified upon closer examination of real theories.

4. Equal hierarchies and structures of ontic and denominative subsystems are identified. The first includes the names and descriptions of the facts concerning material realities studied by various theories (from planets to quarks). The continuity in science development follows from this. The second subsystem analyzes different types of names of realities and their attributes as well as names of internal components of the theory (models, problems, approximations, fragments of various mathematical works, estimates, etc.). Realities are discovered by studying their attributes that are represented in terms of their qualitative and quantitative (mathematical) modeling.

5. Types of systematicity of these subsystems are established (heterogeneity, organicity, openness, dynamism, changeability, adaptability), as well as their entanglement and interdependence.

6. It is pointed out that it is necessary to understand the realities both from the existing theoretical models and from methods of their experimental investigation.

7. It is demonstrated that the statements about the theory development are confirmed by the analysis of changes in subsystems.

8. The assertions about the theories are supported by important and current physical material, although rather unfamiliar to philosophers of science.

9. The developments in the work about the theories lead to a specific historical-philosophical-ideological analysis of Vlasov's equations in plasma physics.

It should be noted the authors only made the first steps of spreading their innovative ideas to Western communities of philosophers and scientists in such journals as *Global Philosophy*, *S.I. Epistemologia 2023* (accepted for publication), and *The European Physical Journal H* (https://doi.org/10.1140/epjh/s13129-023-00051-6).

Of course, the book also has its shortcomings. On one hand, it implements an informal presentation of the author's understanding of the philosophy of science and the significance for the development of the philosophy of science as a polysystemic vision of scientific theories. It would be desirable to give a more strict, formal description at least of some fragments of this vision, as was done, for example in Burgin's and Kuznetsov's article in *Synthese*, 1994 (https://doi.org/10.1007/BF01063918), which preceded the formation of polysystemic vision. On the other hand, the authors illustrate their ideas with scientific material, the knowledge of which seems to be beyond the competence of most philosophers of science. Therefore, it would be possible to give a more popular presentation of such material.

Interesting ideas about the nature of mathematics and the uniformity of the structures of mathematical and empirical theories require justification that should be developed more carefully. The authors' preoccupation with presenting their own ideas clearly has prevented them from dwelling in more detail on the connections of these ideas with existing views on scientific theories that were and are being developed by such philosophers as Imre Lakatos, Fredrick Suppe, Bas van Fraassen, Larry Laudan, Joseph Sneed, Wolfgang Stegmüller, Wolfgang Balzer, Carlos Moulines, Steven French and others. Also, the possibility of using a polysystemic vision of theories for the analysis of social and sociological theories remains open. One can hope that these and other shortcomings will be overcome in the next essays promised by the authors, which will be devoted to a detailed analysis of the remaining fourteen subsystems of scientific theories. I would recommend the authors publish an English translation of the book under review. I hope that the book will be of interest to undergraduate and postgraduate students, philosophers of various sciences, professors of science, as well as to professional scientists, both theorists and experimenters. This would enhance their understanding of what science is and how it works/functions at its theoretical level. Overall, it turns out that Ukrainian Philosophers of Science Matter. The understandable draft of the English translation of the book was kindly given to the reviewer by the authors.