Cybernetics and the Russian Intellectual Tradition

Кибернетика и русская интеллектуальная традиция

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Аннотация

Понимание различий между научными подходами к кибернетике затруднено из-за очень разных историй и интеллектуальных традиций России и Запада (США и Европы). В этой статье, во-первых, описываются особенности русского стиля научного мышления, в качестве примера рассматривается теория Александра Богданова (тектология) в контексте русской интеллектуальной традиции. Во-вторых, в статье сравниваются теории кибернетики Владимира Лепского и Стюарта Амплеби как представителей русской и американской интеллектуальных традиций. На Западе кибернетика второго порядка включает биологическую и социальную версии. Она происходит из «экспериментальной эпистемологии». Цель – в том, чтобы понять процессы познания на основе нейрофизиологических экспериментов. В результате кибернетики пришли к выводу, что наблюдателя (субъекта) нельзя исключать из науки. В основе биологической кибернетики лежит представление о том, как мозг создает описание мира. Самому миру уделяется немного внимания, поскольку он уже включен в восприятие наблюдателя. Социальная кибернетика опирается то, как люди действуют в мире. Считается, что теории или описания мира менее важны, чем соответствующие действия людей. Русская интерпретация кибернетики второго порядка развивает ее социальную версию в контексте русской интеллектуальной традиции. В статье делается вывод о том, что описанные различия демонстрируют большой потенциал для совместной работы российских и западных ученых в целях обогащения и дальнейшего развития кибернетики на Востоке и Западе.

Ключевые слова: интеллектуальные традиции, кибернетика первого порядка, кибернетика второго порядка, кибернетика третьего порядка.

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Summary
Understanding the differences between scientific approaches to cybernetics is difficult because of the very different histories and intellectual traditions in Russia and the West, i.e. the U.S. and Europe. This paper, firstly, describes the peculiarities of the Russian style of scientific thinking, considering as an example Alexander Bogdanov's theory (tectology) in context of the Russian intellectual tradition. Secondly, the paper compares Vladimir E. Lepskiy's and Stuart A. Umpleby's theories of cybernetics looking at them through the prism of Russian and American intellectual traditions. Western cybernetics of the second order includes biological and social versions. It arose from "experimental epistemology." The goal was to understand the processes of cognition on the basis of neurophysiological experiments, as a result of which cyberneticians came to the conclusion that the observer cannot be excluded from science. Biological cybernetics is concerned with how the brain creates descriptions of the world. Little attention is paid to the world since it already is included in the perceptions of the observer. Social cybernetics is concerned with how people act in the world. Theories or descriptions are thought to be less important than appropriate actions. The Russian interpretation of second-order cybernetics develops its social version. The paper concludes that the differences described demonstrate the great potential for ideas from Russian and Western scientists to enrich further development of cybernetics and science in East and West.

Keywords: intellectual traditions, first-order cybernetics, second-order cybernetics, third-order cybernetics.

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Introduction

In 1930, British psychologist Frederic Bartlett looked for a new method of studying human memory. He was convinced that memory is a social and cultural phenomenon. After a series of experiments, he discovered that "educated subjects are likely to understand and remember astonishingly little of any scientific subject concerning which they have been given no specialized training. Here… statements are promptly converted into their opposite, the title disappears, proper names are changed. Between the original and the final reproduction there is no obvious link of connection." [Bartlett 1932, 168].

People who participated in experiments tended to transform the original text into something more comprehensible to them. They retained the details that made sense to them and omitted or distorted everything else. From his experiments Bartlett concluded that remembering was determined by "schemes," or cultural patterns characteristic of a larger social group.

It is likely that knowledge has a cultural foundation. The way that knowledge is created and communicated is different in different societies. So, we should not be surprised to find that the implementations of the same scientific idea differ from one country to another. For example, different interpretations of fundamental ideas can be clearly illustrated by the American and Russian development of I.P. Pavlov's idea of the "conditioned reflex." Pavlov discovered a conditioned reflex while experimenting with animals as *a physiologist*. Later he learned that American *psychologists* were experimenting in the same way. He wrote about the difference between his work and the American work by noting that the practical American mind found that it is more important to know the *external* behavior of a man, than to guess about his *internal* state. However, the Russian psychological tradition is to aspire to understand the human soul in order to make people better. Western behavioral science has a completely different aim: to understand behavior in order to make people more successful. Using the formula "stimulus-response" behaviorism cultivated only individualistic values and ignored any values except personal success. It provided the means to manipulate other people and to be a winner. The American science of behavior teaches us *to act in the right (instrumentally successful) way*. Russian psychology teaches us *to make right (ethical) actions.*

The Russian intellectual tradition

Characterizing the Russian intellectual tradition in comparison with the American intellectual tradition requires describing several points. There are fundamental differences. Among the most important differences, from our point of view, are the following:

1. Different interpretation of some fundamental concepts, for example, the definition of "development." "Development" has been interpreted in the West mostly in terms of technology and science (a technocratic view of the term). Technological progress is a mainstream idea. But Russian civilization interprets "development" as transfiguration, self-perfection, vanquishing sin in people (a spiritual view of the problem) [Platonov 2010].

2. Historically, the Russian intellectual tradition is broader (in direct and existential senses) and dualistic. On the one hand, there is a strong striving for being a part of the West. But this requires acceptance of Western values. On the other hand, there is a strong rejection of absolutely rationalistic consciousness. This internal paradox leads to an existential drama. Western science claimed neutrality in its attitude to values. The Russian intellectual tradition never accepted this neutrality.

3. Many Russian scientists often used a different foundation for their process of thinking, they strove to build a better world, to include ethics and spirituality in scientific theories (N.A. Berdyaev, N.G. Chernyshevsky, and others). The first systematic critiques of classical rationalism as a scientific position were formulated in Russia. ("Although rationalism led us to the gate of truth, it is not fated to open the gate," V. Odoevsky.)

4. Russians feel a need to understand the world as a whole. Therefore, they emphasize different patterns in the world, society and nature than are emphasized in the Western intellectual tradition. For example, academician N.N. Moiseev emphasized that the formation of a global collective consciousness lays the foundation for the development of an informational society. He wrote: "The notion of collective consciousness is a fundamental notion of civilization… Civilization itself could not emerge without development of a collective consciousness. This phenomenon emerges as an effect of the necessity and possibility of information exchange among individual consciousnesses, evolution of collective memory and organization of collective efforts in decision making" [Moiseev 2000]. Western academics are more likely to speak about "shared beliefs and values" rather than a "collective consciousness."

5. Russians prefer a systematic approach and have a tendency to create general theories. Examples are such well-known names as N.I. Lobachevsky, D.I. Mendeleev, A.A. Bogdanov, N.F. Fedorov, V.I. Vernadsky, K.E. Tsiolkovsky and others.

Hence, Russian scientific thinking can be characterized by the systems approach, a tendency to create general theories, including a moral component, and acceptance of irrationality.

Bogdanov's tectology in context of the Russian intellectual tradition

In the Russian intellectual tradition, an idea of world integrity finds its earliest rational-theoretical contours. One of the best examples of such a theory is *Tectology*, written by outstanding Russian scientist A.A. Bogdanov. "As a generalization of all investigations of human experience, tectology is a completion of the cycle of sciences" [Bogdanov 1989].

Bogdanov considered tectology as a methodological basis of world cognition, allowing to create the picture of the world for all sciences. For him tectology is "a developed and generalized methodology of science," "a science of comprehensive scale and a general methodology of any practice and theory" [Bogdanov 1989]. He tried to find universal principles of organization of living and inanimate nature. He defined tectology as a science uniting organizational methods of all sciences. His original proposal was to unite all human, biological and physical sciences, consider them as systems of interrelationships and search for organizational principles lying at the basis of all types of systems. In the framework of tectology, he tried to transit from the contemplative-descriptive character of philosophy to using it as "a practical theory." Bogdanov criticized limited thinking that derived from specialization and tried to create a universal, general basis of a new science, uniting the organizational experience of humankind. The task of a new science should be systemizing the organizational experience. Tectology should find the organization constructs existing in nature and in human activities and then generate and systematize them and explain them, that is to install abstract schemes of their trends and to determine the directions of the development of organizational methods and their role in world development. He thought that finding general laws by the process of generalization and abstraction creates the fundamental basis for planned organizational activity – practical and theoretical. His goal was systemic research on general laws of

the functioning and development of different systems in order to use them for solving scientific and practical tasks. The idea was that the organizational point of view is a means of solving practical tasks.

Such ideas, which are stated in Bogdanov's book, necessarily require appropriate socio-cultural conditions. Cybernetics ideas and ideas of general systems theory became widely-known in the world of science in the period of scientific-technical revolution, when the intellectual climate in science changed. The tasks included overcoming narrow specialization, integration of the sciences and synthesis of scientific knowledge. Organizing interdisciplinary research became a first priority task.

Dr. Gorelick of the University of Britain Columbia, in a paper "Bogdanov's *Tectology*, General Theory of Systems and Cybernetics," published in 1987, wrote, "although tectology contains all the ideas which were developed and popularized by general systems theory and cybernetics later," it is something larger. It is a specific field – "all forms of organization in nature and human activity," and it is an "utmost widening of any theory of systems" [Gorelick 1987, 160].

Another Canadian scientist, R. Mattessich in his book *Instrumental reasoning and systems methodology* determines Bogdanov as "a creator of a really comprehensive theory of systems" [Mattessich 1978].

Russian scientist Kostov writes: "…on the largest historical scale it is possible to define at least two global integrations of scientific knowledge and they are limited by two great scientific revolutions. The former happened in 16th–17th centuries in natural sciences, and the latter, in 20th century simultaneously in both the natural and social sciences. The first revolution was epitomized in Sir Isaac Newton, and the second is evidenced in Alexander Bogdanov's work. The works of Newton became the trigger for a scientific revolution in the natural sciences, and the works of Bogdanov, in the whole field of scientific knowledge. The core-catalyst of the first scientific integration was the mechanics of Newton, later called classical mechanics. The core-catalyst of the second scientific integration was the tectology of Bogdanov as a total organizational science, fully deserving to be in the same domain as mathematics, logic and philosophy" [Urmantsev 1995; Kostov 2005].

Comparison of V.E. Lepskiy's and S.A. Umpleby's theories of cybernetics

Understanding the differences in intellectual traditions leads us to a deeper understanding of the theories of cybernetics of V. Lepskiy and

S. Umpleby as representatives of these scientific traditions. Table 1 presents a description of the development of cybernetics, made by S. Umpleby.

Table 1

Three versions of cybernetics

	Engineering Cybernetics	**Biological Cybernetics**	**Social Cybernetics**
The view of epistemology	A realist view of epistemology: knowledge is a "picture" of reality	A biological view of epistemology: how the brain functions	A pragmatic view of epistemology: knowledge is constructed to achieve human purposes
A key distinction	Reality vs. scientific theories	Realism vs. constructivism	The biology of cognition vs. the observer as a social participant
The puzzle to be solved	Construct theories which explain observed phenomena	Include the observer within the domain of science	Explain the relationship between the natural and the social sciences
What must be explained	How the world works	How an individual constructs a "reality"	How people create, maintain, and change social systems through language and ideas
A key assumption	Natural processes can be explained by scientific theories	Ideas about knowledge should be rooted in neurophysiology	Ideas are accepted if they serve the observer's purposes as a social participant
An important consequence	Scientific knowledge can be used to modify natural processes to benefit people	If people accept constructivism, they will be more tolerant	By transforming conceptual systems (through persuasion, not coercion), we can change society

Source: [Umpleby 2005, 66]

In spite of the fact that the table is called "Three versions of cybernetics," Western scholars only single out cybernetics of the first and second orders. Cybernetics of the second order includes a biological and social version. It arose from "experimental epistemology." The goal was to understand the processes of cognition on the basis of neurophysiological experiments, as a result of which cyberneticians came to the conclusion that the observer can not be excluded from science.

The Russian interpretation of second-order cybernetics is different from the Western concept of it. Table 2 presents a description of Lepskiy's theory using Umpleby's criteria.

Table 2

Description of V.E. Lepskiy's theory using S.A. Umpleby's criteria

	1st-order cybernetics	**2nd-order cybernetics**	**3rd-order cybernetics**
Leading scientific paradigm	Subject – object	Subject – subject	Subject – meta-subject
The dominant approach	Activity approach	Subject-activity approach	The subject-oriented approach
Type of scientific rationality	Classical type of scientific rationality	Non-classical type of scientific rationality	Post-non-classical type of scientific rationality
The view of epistemology	A realist view of epistemology: knowledge is a "picture" of reality	Knowledge depends on the methods and means that the subject (observer) of the activity uses	Knowledge depends on the meta subject and its values, goals (meta-observer: family, group, organization, country, etc.)
A key distinction	Reality vs. scientific theories	Positivism vs. philosophical constructivism	Positivism vs. humanistic constructivism; emphasis on communication processes
The puzzle to be solved	Construct theories which explain observed phenomena	Include the observer within the domain of science	Reconcile intrascientific and social values and goals with the comprehension of value orientations of the subject (observer) of scientific activity
What must be explained	How the world works	Reflection as a new dimension	How the self-developing reflexive active environment works
A key assumption	Natural processes can be explained by scientific theories	The subject's goals and values are included through the choice of methods and means of studying the object	Freedom as acceptance
An important consequence	Scientific knowledge can be used to modify natural processes to benefit people	Scientific knowledge can influence the phenomenon being studied	Scientific knowledge can be used to implement the idea of co-evolution: the coordinated evolution of nature and humanity as equal partners

Source: [Medvedeva 2017, 35]

The development of the conception of third-order cybernetics is based on Russian ideas: the activity approach, the typology of scientific rationality, inclusion of the moral component, etc., are not well known in the West, which leads to some misunderstanding of the concepts.

Conclusions

Briefly, the main differences between the theories of V.E. Lepskiy and S.A. Umpleby, from our point of view, are the following:

1. The American vision of second-order cybernetics includes the biological and social versions; the development of cybernetics takes place within the framework of the paradigms of classical and non-classical rationality.

2. The Russian vision of second-order cybernetics excludes from consideration the biological version, in fact, reducing second-order cybernetics to the cybernetics of the individual subject (observer) and, indirectly, its values (through the choice of methods and means of studying the object), in contrast to the third-order cybernetics concept, with its focus on the social (meta-subject).

3. Western scholars do not consider third-order cybernetics to be necessary, since the inclusion of an observer (subject) in the field of science, from their point of view, solves the problem of taking social values and goals into consideration [Medvedeva, Umpleby 2003].

4. It seems that V. Lepskiy's theory of the third order of cybernetics develops in the direction of typically Russian ideas: "noosphere," "collective consciousness," "co-evolution," etc., i.e. it is not just social cybernetics but cybernetics of environments, and probably one can call it the cybernetics of nature.

The different descriptions of cybernetics demonstrate a great potential for ideas from Russian and Western scientists to enrich further development of cybernetics and science in East and West. Such cooperation is increasing. In September of 2020, the Institute of Philosophy of the Russian Academy of Sciences plans to host the Congress of the World Organization for Systems and Cybernetics (WOSC2020).

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