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I.P. Pavlov: Princeps physiologorum mundi and philosopher

Georgy H. Shingarov

Modern University for Humanities
32 Nizhegorodskaya, building 4, Moscow 109029, Russia;

Lomonosov Moscow State University
1 Leninskiye Gory, Moscow 119991, Russia;

N.A. Semashko National Public Health Research Institute, The Federal Agency for Scientific Institutions
12 Vorontsovo Pole St., building 1, Moscow 105064, Russia

Abstract. I.P. Pavlov studied and analyzed the epistemological and methodological foundations of physiology as a natural science, to which he applied the principle of unified results of scientific knowledge and the methods used to achieve these results, the principle of ascent from the abstract to the concrete, the dialectic of absolute and relative truth. Pavlov proved that the study of any self-developing system starts with some initial ideas and becomes a complex and rich system of scientific knowledge. He created synthetic physiology of the digestive system, treating it as a link in the integral megasystem of the living organism's vital functions. Proof was provided that showed that the consistent development of the activities of the digestive organs is carried out on the principle according to which the result of the previous link is a factor that causes the activity of the next level. This pattern was seen as a phased development of the body's principle functions. Synthesis of the system as a whole was based on certain ontological synthesizing factors. The determination of the digestive system's functioning had an autopoietic character. Pavlov's synthetic physiology of digestion was a meaningful objective dialectical logic of self-developing systems, the Pavlovian reflex – a sign system *sui generis,* a natural-scientific model study of sign systems.
The function of the sign in the conditioned reflex carries the conditioned stimulus. It causes the same reaction, which prior to the formation of a conditioned reflex was caused by the unconditioned stimulus. The same type of character of actions of the conditioned and unconditioned reflexes testifies to the identity of the causes of this activity. The conditioned reflex is represented by a unique natural phenomenon of a scientific study of one of the most difficult problems in the theory of knowledge – the perfect appearance in the practical relationship between subject and object. The discovery of the phenomenon of reflex characterizes the physiologist Pavlov as a unique philosopher.

Keywords: synthetic physiology, metaphysical foundation, self-developing systems, a conditioned reflex, sign, value, autopoietic nature of organic systems

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About the author
Georgy H. Shingarov – Doctor of Philosophical Sciences, Professor, Professor at the Philosophical Department of Modern University for Humanities, Professor at the Faculty of Philosophy of Lomonosov Moscow State University, Leading Researcher of N.A. Semashko National Iinstitute of Public Health (Moscow). E-mail: aspirant@muh.ru

I.P. Pavlov belongs to a group of great scientists who, with the help of concrete scientific research, created and developed the epistemological and methodological foundations of science. Delegates of the 15th International Physiological Congress, which took place in August of 1935 in Leningrad and Moscow, assigned Pavlov the honorable title of "Princeps physiologorum mundi" – "elder of the world's physiologists". This was not simply a tribute, but recognition of his enormous service in the name of global science.

In 1877, Pavlov published a critical article "On Vascular Centers in the Spinal Cord," in which he researched in depth the epistemological and methodological foundations of physiology as a theoretical ("not completely descriptive") natural science. Physiology as a biological science originates from the Cartesian ontological model ("the idealization of an object"), according to which a living organism is a machine, or "non-artificial mechanism".

Physiology employs the hypothetical-deductive method, the core of which is based on the idea that certain principles**,** axioms, and theories advance hypotheses, which are in turn verified by empirical methods. In light of this, as Pavlov writes, "natural sciences are the best applied logic, where the correctness of intellectual processes is approved by receiving such results that allow for the prediction of phenomena without doubt, in a mistake free manner" [1, p. 35].

There is a special place in the system of epistemological foundation of physiology

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occupied by the *principle of unity,* the result and means of its achievement in the course of scientific research, which was formulated in philosophy by Hegel in his work "Phenomenology of Spirit". According to the Hegelian definition "the crux of the matter is limited to its *goal*, but to its *fulfillment,* and the *true* whole is not the *result*, but instead the result together with its formation" [2, p. 2]. We were unable to determine whether or not Pavlov was acquainted with said works of Hegel, but he writes the following: "In the natural (but not purely descriptive) sciences the actual process of logical and experimental work carried out to get a result is as valuable as the result itself" [1].

The idea of a principle of "ascent from the abstract to the concrete" amounts to the idea that any scientific knowledge is abstract and one-sided at the beginning, but it is enriched and solidified in the process of growth. This principle is clearly manifested in the creation of Pavlov's synthetic physiology of digestion. In "Lectures on the Work of Main Digestive Glands", we find the classic example of the "work" of this principle in the research of a complex biological object – digestion as an element of a mega-system of vital function of the whole organism.

In the preface to the first publication of "Lectures" (1897) Pavlov writes, "I find it comfortable for the reader when one idea is unfolded before him, increasingly embodied in the form of strong and harmonically connected experiments" [3, p. 11]. Here Pavlov points, first of all, to the fact that he studies the subject-matter of "Lectures", starting from a fundamental idea that then grows from this specific starting point. Progress, rising from an idea to knowledge of the digestive system, is conducted in the form of experiments and theoretical generalizations. Pavlov notes, "...the topic of the lectures has been developed by my laboratory in continuation for almost ten years, with all work relating to the work on gastric and pancreatic glands being consistently repeated, altered and expanded, such that the material naturally lost at least for us its fragmentary character and emerged as a system" [3].

The growth of synthetic physiology from an abstract idea to a system of experimental facts and theoretical generalizations changed the conception of digestion – one of the basic functions of an organism. "In the place of rough forgery of insufficient knowledge the contours of the artificial mechanism is outlined, full of subtleties and internal utility, like everything else in nature, since we are getting to know it better" [3, p. 172].

Pavlov paid special attention to how the process of scientific growth raises alternative hypotheses and how they are confirmed or denied. He posed the question about the evidence-based meaning of empirical data for alternative hypotheses. In order for empirical data to acquire the character of physiological facts, it should carry a certain theoretical load, cover the biological meaning, and find confirmation in subsequent studies.

Pavlov considered the mechanism of growth of scientific knowledge and its truthfulness at every historical era: what remains and what is refuted in the process of expanding knowledge, on the strength of what reason did it remain incomplete, one sided, or relative in a certain period?

Based on the analysis of the evolution of how the circulatory system was viewed, Pavlov showed just how closely intertwined the methods of experimental research were with theoretical conclusions modeled on foundational data received with the help of these methods. Analysis of the historical growth of doctrine on vasomotor centers convinced Pavlov that "often in natural sciences the discovery of methods, the study of some important experimental conditions, is more worthwhile than the discovery of certain facts" [1, p. 35]. What exactly was wrong in the conception of the vasomotor center only in the medulla oblongata? Pavlov noted that this was the only part that relied on negative experiences. Physiologists F.V. Ovsyannikov and Dittmar irritated freshly re-cut spinal cord, but this did not lead to an increase in blood pressure. Although, as Pavlov noted, it was generally known in any physiological laboratory that experiments on cerebrospinal centers of headless animals should not be conducted directly after an operation, seeing as after a certain amount of time the function in these centers returns and different experimental data would be recorded.

Pavlov began his scientific work in a period when physiology everywhere was introduced to the principle of "*self-regulation of body functions*". In 1883 he published an article that summarized the data of his research on blood pressure self-regulation, proving that "in the normal course

of life pressure persists at a certain level during large periods of time and under very different conditions" [4, p. 308].

Pavlov believed it was extremely important to understand the relationship of fundamental and applied knowledge in medicine when researching epistemological and methodological physiology. In the 19th century medicine went through its own version of a "metaphysical" revolution when the conceptual foundations of the nature of disease began to be considered from the point of view of the achievements of physiology, anatomy, general pathology, and other biological and medical disciplines. "There is no doubt," wrote Pavlov, "that in the last half century the vast accumulation of clinical observation is based on the fact that the physiologist put the scheme of life into the doctor's hands, with which he might comfortably observe phenomena presented to him, recognize them, and group them" [5, p. 247].

The accumulation of physiological and other knowledge significantly altered doctors' understanding of patients as an object of diagnostics and treatment. As such, a distinctive change in the "ontology" of the sick and their diseases occurred. The undifferentiated "confluent image" of disease, as Pavlov noted, was divided into separate parts; a connection between different organs was conceptualized, the idea about the internal environment of the body arose, cell theory became mainstream, etc.

Before natural scientific knowledge was fully accepted, the observational method was the foundation of clinical expertise. From the second half of the 19th century, experiment began to play a larger role in medicine, on par with observation. Pavlov proceeded from the assumption that modern medicine didn't use only the achievements of fundamental science, but it also became its own "supplier" of materiel for physiological and other research. Clinical casuistry, as Pavlov wrote, "will always remain a rich source of new physiological ideas and unexpected physiologic facts" [3, p. 68-69].

Conditioned Reflex – A Natural Scientific Model for Studying Semiotic Systems

The history of the discovery of conditioned reflex as a phenomenon of nervous system begins at the edge of 19th-20th centuries. The first official statement about this discovery was made by Pavlov at the International Medical Congress in Madrid in April 1903.

In order to talk about the conditioned reflex as a part of the natural-scientific model of semiotic systems, it follows to prove that it is indeed a semiotic system *sui generis*. But, so that it may be clear that this conditioned reflex is a particular phenomenon of nervous system activity, we will consider the concepts constituting the categorical apparatus of description and understanding of the events that occur in the process of creation and functioning of conditioned reflex. These categories are important for this understanding:

The unconditioned stimulus, the cause of the activity in the unconditioned reflex;

reinforcements – originally reworked unconditioned stimulus, creating a special mental state in the organism and supporting the function of the conditioned reflex;

conditioned stimulus – a signal or sign that causes a specific activity in the body and represents a kind of *idealized* form of the unconditioned stimulus.

Regardless of the differences in some authors' understanding of the essence of semiotic systems, signal systems (semiosis) are generally seen as a process in which something functions as a sign. Semiosis includes a subject – an interpreter marker referring to the object and a sign indicating the subject. C. Morris defines semiosis as "a marking process, in which something is a sign for some sort of organism" [6, p. 353].

Directly connected with the understanding of the nature of a sign is the understanding of the essence of *meaning*. There are many approaches to addressing the question of what exactly meaning is. This multifaceted point of view can lead to two foundational paths. According to the first, meaning of a sign is that it incites a subject to some sort of action. For instance, C. Pierce wrote, "the meaning of a sign is the fact that it can motivate us to act" [7. p. 135]. In accordance with the other approach, meaning is considered as "a corresponding connection (relationship) in our consciousness between the sign and the thing it represents" [8, p. 10].

Meaning as an answer to the perception of a sign and as a process of recognizing a designatum, like knowledge of a subject that represents a sign, cannot be viewed as independent from each other. The pragmatic core of a signal (sign)

is determined by the semantic relationship of the sign to the designatum. The organism's reaction to the sign – actions to the designatum that is represented in the sign. In a pavlovian conditioned reflex in which, for example, the signal is the chime of a bell, a dog releases saliva or gastric juice not to this stimulus as if a physical phenomenon, but to "meat" that causes this reaction in normal conditions, although in a conditioned reflex it is contained in the sign and serves as reinforcement. Pavlov wrote, "you can clearly see that this activity is signaled: the chime of the bell signals food because the animal reacts to it as it would to food. If we show a dog food, then the reaction will be the same" [9, p. 36]. From this it follows that he considered the relation of the signal (conditioned stimulus) to the unconditioned stimulus that denotes the signal as symbolic, semiotic relationships.

Pavlov underlined that the active beginning of reflexive action comes from the organism itself (autopoiesis). Speaking on eating behavior, he connected it firstly to the active alimentary center of the brain. "It is absolutely clear," he wrote, "that the first impetus to action of this alimentary center, forcing the animal to move, take food, release saliva and gastric juice, comes from the chemical composition of blood in the animal, which slowly makes the animal "hungry"' [10, p. 148]. The inner nourishment factor itself without "hungry blood" does not cause food-related behavior. In an unconditioned stimulus the subject "*pre-locates"* itself and sees in it a source of its existence.

Signaling mechanisms are implemented by the cerebral hemispheres of the brain, which Pavlov viewed as "grand signaling devices of higher sensitivity". He had in mind not only the classic conditioned reflex, but also the basic signaling mechanisms of the cerebral hemispheres which was also driven by the so-called natural conditioned reflex. There the signal can serve some characteristic of an object, which itself is an unconditioned impetus. A wolf's howl, the growl of a tiger, the shadow cast by an eagle – all these are danger signals for a living animal. Reflexes of this type can be seen as "accidentally-substantial" signaling reflexes. The classical pavlovian conditioned response is a time-signaling reflex. Pavlov examined unconditioned reflexes as phenomena firmly connected to instinct. An unconditioned stimulus in a conditioned reflexive activity acts in two ways: as the cause of an activity and as the object of this cause's influence. Conditioned reflexes are created under certain circumstances. The first and basic condition is the simultaneous co-occurrence in time of the action with a previously indifferent agent with the action of the unconditioned stimulus, which causes a certain unconditioned reflex.

What can become a signal in conditioned-reflexive actions? Pavlov answers this question by saying "...countless changes in both external and internal environment, both reflected in certain states of nerve cells of the cerebral cortex can create different conditioned stimuli" [11, p. 57–58].

The rise of a conditioned reflex and the formation of an indifferent stimulus signal is not a mere coincidence of unconditioned and conditioned stimulus occurring at the same time, but also a result of complex activity in the body in transforming and taking over the unconditioned stimulus. An organism's conditioned reflexive reaction begins after the signal's action, the organism meets with an unconditioned stimulus "armed" at the beginning of activity.

What incorporates the signal to cause the action which, prior to the establishment of a conditioned reflex, evoked the unconditioned stimulus? This question can be answered if you look to the change in relation to the body and the unconditioned stimulus during the creation of conditioned reflexes. In this process the signal takes in the motivating ability of the unconditioned stimulus without the properties of the sensually-perceived object.

The view of the food located in front of the dog and the dish from which he eats are both signals, conditioned stimuli that trigger salivation just like food or other discarded substances. However, this signal brings about a reaction sooner than when the food reaches the mouth. The organism is armed with the necessary "weapon" for exposure to the relevant objects. This function, conditioned-reflexive activity, was designated by Pavlov as *pro-active*.

The case of creating a classic salivary conditioned reflex is such that the effect, caused by the signal – salivation – is in a number of ways identical to the effect caused by the unconditioned stimulus. But the effect, caused by the signal, markedly differs in its adaptive character.

"Previous" food acts in the signal on the dog as the "absent unconditioned stimulus." The saliva released from the signal acts on "future" food that should soon enter the mouth of the animal. In a conditioned reflex the reason for action (unconditioned stimulus) becomes the *goal* of this action. This process of "inverting the relationship," "splitting" one unconditioned stimulus into "past" and "idealized" reasons and a future goal underlies the origins of the sign in the classic pavlovian salivary conditioned reflex.

"Language," writes Hegel, "retained essence (das Wesen) in the past tense (gewesen – was) in the verb 'to be' (sein); because essence exists in the past, but in a timeless past" [12, p. 455]. In the signal, the motivating force of the unconditioned stimulus to eat is "passed", but the organism's impetus is only "temporarily passed". It follows to underline that transformation of the unconditioned stimulus – the causes of the unconditioned reflex – would be impossible in reinforcing the conditioned reflex if the unconditioned stimulus as a cause in of itself did not hold the ability to reinforce. It could not "induce" the cause in the signal if it could not serve as the cause in a different interrelationship between the organism and an unconditioned stimulus. Thus, in the signal the motivating capability of the idealized, "immaterialized" unconditioned stimulus is connected with the sensually-perceived body of the conditional stimulus, or sign.

The process of "idealization" of the unconditioned stimulus in conditioned-reflexive activity and the connection of the sign with an "ideal" biologically viable result of integral conditioned-reflexive activities demonstratively appears in the transformation of a biologically negative, harmful unconditioned stimulus in a positive signal of a biologically positive action. In an experiment in Pavlov's laboratory, M.N. Erofeeva was able to turn a strong electrical skin irritant into a signal for a conditioned reflex for food. Even Hegel noted, "that which acts on the living, self-determined and transforms the latter, for the living do not get to cause their actions, that is to say vacate it as a cause of the nature of the spirit... even in a higher sense than the nature of living in general, tend not to accept a different beginning, to put it another way, to prevent the continuation of some sort of cause in the spirit, but instead to interrupt and convert it" [12, p. 680].

A sign could be considered as a sensually-perceived object, containing a uniquely transformed, "idealized," "purified" form of its characteristics perceptible by sense, an unconditioned stimulus with transference to the motivating sign causing action of the ability of the unconditioned stimulus. The meaning of the sign (signal) is driven, on one hand, to that activity which causes the sign, and on the other hand, to the rise in the consciousness of the relevant cognitive process or the way of talking about the designatum's properties as the transformation of real environmental objects.

With that said, we consider a conditioned reflex to be a natural scientific model for studying semiotic systems because it allows for understanding how and by what mechanisms and forms of subject activity signs emerge.

Digestion – a self-developing unit of vital function of an organism. Design of the research subject

The building of any scientific discipline, the rise of a new school of thought, or moving into a new stage of scientific growth always happens on the basis of a new ontology that changes the conception of a subject. Euclid's geometry is founded on the concepts of space on a plane; the geometry of Lobachevsky and Riemann are based on the concept of curved space. Synthetic physiology of digestion, created by Pavlov, is no exception to this rule.

Before the classical research of this great Russian physiologist there was a concept of physiology in place which he called analytical (or sometimes anatomical). This physiology, in Pavlov's opinion, was plagued by inherent shortcomings. The first and most substantive (theoretical-cognitive) was the incompatibility of physiological knowledge of the genuine nature of physiological processes. He writes, "there is without a doubt an entire chasm between this knowledge on one side, and physiological reality and empirical laws of dietetics on the other" [3, p. 21]. The idea of the activity of separate digestive organs did not correspond to their real functionality. Pavlov noted, "I cannot picture a digestive mechanism in such an abstract way as it is in modern physiology" [3, p. 21].

Analytical physiology studied the function of different digestive organs, never connecting this

activity into a unified whole. Pavlov began from different epistemological and methodological bases and believed that "in physiology it is insufficient to know only the elements of digestion acting in separate reactions, for complete mastery of this subject it is also necessary to embrace observation of the true course of digestion" [3, p. 21]. If we use the determination that Aristotle gave similar forms of knowledge, then it could be said that analytical physiology of digestion was a "fable" in which "episodes follow one another without any likelihood or necessity" [13, p. 69, 1451v].

To create synthetic physiology Pavlov had to construct a general idea of a system in which an organism's vital functions in the digestive process could be pictured as a unified, self-developing whole. The understanding of a "system" was widely known at the time that Pavlov created synthetic physiology of digestion. However, he needed a definition of this concept that would cover the entire contents of the mega-system's vital functions and still make it possible to operationalize certain moments to present it so that its movement and development had its origin within the framework of the whole. The general outline of this system was sketched out in Aristotle's treatise "On the Art of Poetry": "Consequently, just as in the other imitative arts, a single imitation is an imitation of a single [subject], and the fable that serves as an imitation of action should be the image of one and, moreover, complete action and parts of these events should be composed as such that when changing or removing a certain part, the motion of the whole is changed" [13, p. 66, 145a].

To create such a system in digestive physiology it was necessary to introduce new fundamental principles of study and understanding of the substance of the entire digestive process, which we consider here as *the metaphysical foundations of synthetic physiology of digestion*, created by Pavlov. When talking about metaphysics, as Kant wrote, "in it we strove to expand *a priori* of our knowledge and for this we should use those basic principles that attach something to this concept that it does not yet contain" [14, p. 33].

What did Pavlov add to the concept of digestion that was not included in analytical physiology? In his November 12, 1904 speech in Stockholm, he said, "It is not without reason that all the phenomena of human life are dominated by the concern for daily bread. It is that ancient bond that connects all living things, human included, with the rest of their natural environment. Food that enters the body is there modified, dissolves, enters into new combinations and again separates, personifies the life process in its entirety, from the most basic physical properties of the body, like the law of gravity, inertia and so on, up to the highest manifestations of human nature" [15, p. 347]. Here, the main characteristic Pavlov assigns to the mega-system of an organism's vital function is its structure. The first element of such a system is the interaction of a living organism with its natural environment at the expense of the substance and energy that it is made of. The metaphysical link that includes the outside world in the integral process of vital function is digestion, an idea introduced by Pavlov. But how do elements of the outside environment get incorporated into the digestive process, which occurs within an organism?

Pavlov gives this precise and unambiguous answer – with the help of the *appetite*. *"The persistent and unremitting nature,"* writes Pavlov, *"of a passionate food instinct closely linked the seeking and obtaining of food* with the beginning of its processing in the organism. It is not difficult to guess that such a deeply analyzed fact is closely related to the everyday occurrence in human life-the appetite. *This actor*, so important in life and yet remaining so mysterious to science is clothed, finally, in scientific flesh and blood, *transforms from a subjective sensation to a precise laboratory fact"* [3, p. 104].

In the appetite, Pavlov discovered the ontological backbone that connects foraging activity with the beginning of activity in the digestive glands. In it he saw the phenomenon that unites the mental and somatic factors of life. He frequently wrote about the existence of a hypertrophic psychosomatic dualism in modern medicine and in the mind of the modern, reflective man.

For proof of the role of appetite in the entirety of the digestive process, Pavlov created a special experimental methodology: "imaginary feeding". In order to receive pure gastric juice, the esophagus is cut so that the food does not reach the stomach, but nonetheless causes the release of gastric juice. In the laboratory, Pavlov named this juice "ignition"

juice, that is to say juice that "ignites" and sets the whole process of digestion into motion. This phase of the process of gastric digestion was labeled by Pavlov as the "psychic" phase.

Under the action of the "ignition" juice, substances are formed (peptones, peptides) from the food that stimulate the peptic glands into activity. This begins the second phase of gastric digestion, which Pavlov called the "chemical" phase. For its study, he invented the famous "small Pavlovian ventricle" in 1894.

Before Pavlov's work it was unclear what acted as the stimulus for activity in the *pancreas*. Pavlov and his coworkers proved that this stimulus was the *acidic environment* of gastric contents, food, exposed to hydrochloric acid that is released by the stomach's peptic glands. The acidic food does not only stimulate the activity of the *pancreas*, but also regulates the transfer of food mass from the stomach to the *duodenum*. The pancreatic juice has an alkaline reaction. Pavlov believed this was of great significance, he viewed it as the display of feasibility for activity in the *pancreas*. Figuratively, he called the pancreas "clever".

Summarizing the data, showing the sequence of growth of digestive system activity, Pavlov wrote, "Before us is the instructive and already outlined fact of the succession and connection of work in one part of the digestive tract with the work of the subsequent part. Saliva, moisturizing what is dry, might figure in the stomach as a stimulant, like water. In the stomach itself the mental discharge that begins digestion, in the same terms, as we have seen, ensures its continuation. This principle, in the case of acids as a stimulus for the *pancreas*, acts with particular clarity" [3, p. 157].

We view the sequence and succession in the activity of digestive organs and in the whole mega-system of vital functions of an organism as *the principle of growth and regulation of their function*. As the multitudes of experimental research conducted by Pavlov and his coworkers show, the natural mechanisms of nourishment are not just the powerful stimulus and factors of determination of activity in digestive organs, but so are the appetite and the result of the activities of these very organs.

The strong agent of activity in the *pancreas* is hydrochloric acid which is produced by the stomach, and secretin produced by the mucus membrane of the duodenum. All of the above indicates that the factors driving the activity of the digestive organs are created by those same organs and have an autopoietic character. This characteristic of determination is one of the metaphysical foundations for synthetic physiology of digestion, created by the great Russian scientist Pavlov. In our view, Pavlov was a pioneer in the study of processes of autopoiesis in living nature.

Pavlov held that method allows for success in any scientific research. For the study of digestive activity he created a series of experimental methods and techniques, among them the already mentioned method of "imitation feeding", "small Pavlovian ventricle", Pavlovian pancreatic fistula, and others.

Pavlovian synthetic physiology of digestion is a system of knowledge created with experiments and "thought" in which the individual links are connected in a necessary fashion based on the combination of their ontological "nodes": appetite, hydrochloric acid, chemicals encountered in the process of digestion, the products of metabolism, and others.

When Pavlov wrote in 1877 that "natural science is the best applied logic", he proceeded from the fact that these sciences, based on original, undeniably proven scientific knowledge, theories, or axioms, with the help of a hypothetical-deductive method, "predicts phenomena in a doubtless, unmistakable way". Otherwise, the *synthetic physiology of digestion* could be considered as applied logic. It is the substantive, informative logic of self-developing systems. In synthetic physiology Pavlov was able to realize "μεγαλη συνταξίζ" of the entire digestion process. In this vein, it makes sense to consider the "logic of things" that Galen writes about [17, 18].

The conditioned reflex, constructed in experiment and truly existing in the life of higher animals and man, is a problem that has not yet been researched in the context of signal systems. The conditioned reflex, as Pavlov described it is certainly not the word of a conscious person. However, in both the bell and the lighted lamp, to which a dog releases saliva and gastric juice in a conditioned reflex, as well as the words, we see the same pattern: a material object with sensually

perceivable properties becomes an element of a mental and spiritual world in both man and the higher animals, and we see the emergence of a sign and meaning.

The stated allows for Pavlov to be considered not only as a great physiologist (Princeps physiologorum mundi), but also as an outstanding philosopher who created a meaningful logic of a self-developing organic system – synthetic physiology of digestion.

It should be emphasized that there remains the priority of introducing the concept of "self-creation" (or as it is written now, autopoiesis – αύτόποίησις). In the structure of Pavlov's scientific views, it adequately explains not only the physiological processes of digestion, but also the vital activity of the human body as a whole.

Pavlov was guided throughout his work by epistemological and methodological principals put forward at the very beginning of scientific activity. The fruitfulness of these principles is clearly illustrated by the fact that his brilliant scientific results were acknowledged when he was awarded the Nobel Prize.

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About the author

Georgy Hristovich Shingarov – Doctor of Philosophical Sciences, Professor, Professor at the Philosophical Department of Modern University for Humanities, Professor at the Faculty of Philosophy of Lomonosov Moscow State University, Leading Researcher of N.A. Semashko National Iinstitute of Public Health, Moscow (Russia).