

Review Article

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Gnoseology of K.E. Tsiolkovsky – Instrumental-Geometrical Language of Knowledge of the Around World

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ABSTRACT

The philosophy of K.E. Tsiolkovsky discovers and formulates a new form of the relationship between a person and objects of the surrounding world: measuring everything with a certain measure, builds a geometric copy understandable to all consumers, engineers, printers, the term Epistemology is introduced as the cognition of objects of the surrounding world through a geometric language.

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In the "Philosophy of the Universe" published in 2022, Tsiolkovsky K.E. (1857-1935) is revealed with new force as a great Russian scientist, philosopher and teacher, the founder of theoretical cosmonautics, an outstanding representative of the philosophy of cosmism. Tsiolkovsky K.E. gives a peculiar characteristic to the property of knowledge in the Chapter "The Genus or Characteristics of Cognition (to the Department of Epistemology). According to the properties of knowledge, K.E. Tsiolkovsky divides into 10 categories. In the first place are

- Direct Knowledge: For example, we can measure the distance between two cities by simply applying a measure. We can directly weigh an object, determine its density, volume, etc. A lot of scientific knowledge should be classified in this category.
- Theoretical Knowledge: Theoretical knowledge that can be directly verified. For example, geometry provides ways to measure the distance to objects, as well as their size, without approaching them. Direct verification confirms the geometric method. Volume can also be measured by immersion in water and the weight of the displaced water. All branches of science use indirect methods of measuring quantities. The results can be confirmed directly. [13, p. 137].

First, let's dwell on the concept of GNOSEOLOGY. In the Great Soviet Encyclopedia from 1930 to 1990, this word is absent, in subsequent editions for 1998-2009 it appears with comments in one line (theory of knowledge), with a short postscript gnoseology from the Greek gnosis knowledge and the same as the theory of knowledge. In the same dictionary, this word is present in the decoding of the word ONTOLOGY - (from the Greek ON, genitive ONTOS - being and logic, a section of philosophy, the study of being (in contrast to GNOSEOLOGY - the study of knowledge).

In all encyclopedic dictionaries, the maximum number of pages are devoted to the THEORY OF KNOWLEDGE, and even in the THEORY OF KNOWLEDGE by V.A. Lektorsky in the electronic journal "Problems of Philosophy" there is no mention of either K.E. Tsiolkovsky or his Gnoseology ("science of knowledge") is "the philosophy of knowledge and thought activity" [1]. In Italian, Soviet and post-Soviet philosophy, this word is often used as a synonym for epistemology [2,3]. Currently, this term is also used in relation to Eastern Christianity [4].

The term comes from the ancient Greek words gnosis ("knowledge", γνῶσις) and logos ("word" or "speech", λόγος). Linguistically, it can be compared to epistemology, which comes from the Greek words episteme ("certain knowledge") and logos.

The Encyclopedia Britannica (1911) notes that "The term gnoseology, however, did not come into general use," and why, when in Europe GEOMETRY is present as a DEPARTMENT in the French Academy of Sciences in the article by A.P. Yushkevich "A.M. Lyapunov and the Academy of Sciences of the Institute of France [16, p.380]

The term "gnoseology" (Modern Greek : γνωσιολογία) is more commonly used in Modern Greek than in English. As a philosophical concept, gnoseology in the broad sense means the theory of knowledge, which in ancient Greek philosophy was perceived as a combination of sensory perception and intellect, and then transformed into memory (the so-called mnemonic system). When considered in the context of science, epistemology takes on a different meaning: the study of knowledge, its origins, processes, and reliability. Epistemology is the study of types of knowledge, i.e. memory (abstract knowledge gained through experimentation, which is episteme, or teachable knowledge), induction (or empiricism), deduction (or rationalism), scientific abductive reasoning, contemplation (theory), metaphysical, and

instinctive or intuitive knowledge. Epistemology focuses on the study of noesis and the noetic components of human ontology [6,7].

The concepts of "COGNITION" and "CONSCIOUSNESS" are closest in human understanding in the EXPLANATORY DICTIONARY of the living GREAT RUSSIAN LANGUAGE by VLADIMIR DAL, 1882, [8 v.3, p.655]. "COGNITION" or "COGNITION" -information, knowledge, experience, scholarship, everything that a person knows scientifically. CONSCIOUSNESS, p.268, v.4, p.683. CONSCIOUSNESS of oneself, complete memory, the state of a person in his common sense, able to give an account of his actions." [8 v.3, p.260].

The concept of "CONSCIOUSNESS" in the speech of Umov N.A. (1846-1915), physicist, philosopher, professor of Moscow State University "Physical and mechanical model of living matter": "The main source of activity of living matter are the chemical processes occurring in it. Life observed by us is possible only under certain temperature conditions - in other words, when the energy of the environment in which it develops has depreciated to a certain extent. Without the growth of entropy, we had worlds that were alive from time immemorial and dead from time immemorial.

The highest degrees of harmony could arise in nature only with such adaptations that would make it possible to protect the very thread of harmony among accidents. Such adaptations include the sense organs, memory, and the psyche.

The law of entropy growth is of great importance in the implementation of these adaptations. What do we discover in nature with our senses? We discover, for example, the area of electrical phenomena without having a special organ of electrical sensations, but using the organ of sight, with the help of which we determine both light sensations and the presence of invisible rays. Thus, the physical sciences enable us to discover in nature such phenomena for the direct sensation of which we are not endowed with special senses. The volume of the world sensed by man is determined by the organs of hearing, sight, smell, touch and taste. In parts of the nervous system, as a result of internal and external influences and transmissions, chaotic processes with a certain energy occur. The adaptations of selection bring harmony to these processes, in accordance with their nature. Such adaptations can exist in the organism as inherited, but can be formed during the life of the organism, representing an instrument of memory ... The physical-mechanical model of living matter is harmony. The evolution of living matter represents the natural history of the struggle for the realization of the highest manifestations of harmony-ethical ideals. The value of harmony is the basis of the feeling of beauty and ethics." [14, p.187-200].

In the article "Misunderstanding in Understanding Nature" Umov writes: "Another conclusion that we make is that for life to be possible, the feelings of the living must be limited. Man compensates for this limitation by creating tools - scientific instruments, which in connection with scientific methods provide ways, at will, to perceive, to bring to our consciousness signals that are imperceptible to us, in a word - to know nature".

And so nature makes life. It follows that life, in itself, is the same abstraction that we make when, proceeding from real bodies, we create geometric images and a science – geometry. The process of such geometric abstraction is vividly reflected in our speech, for

example, in the words "disembodied spirit". The idea that grows on the soil of such abstraction is the current idea of immortality" [14, p.256].

In all encyclopedic dictionaries the word GEOMETRY (GEO - earth, METRIA - measure). The concept of space, position and form are among the original ones with which man was familiar in ancient times. The first steps in geometry were made by the Egyptians and Chaldeans. In Greece, geometry was introduced by the Phoenician Thales (624-548 BC), who studied in Egypt and founded the Ionian (land surveying) school in Miletus. Thales's student Pythagoras (c. 580-500) founded a famous school in Italy bearing his name. In Russia, the first land surveying school was created in the first half of the 18th century, and Lomonosov M.V. was sent abroad to study land surveying, but he categorically refused, saying: "You don't need much intelligence to pull a surveying chain and count triangles," and asked to study chemistry, mineralogy and mining. In 1745, Lomonosov M.V. was appointed professor of chemistry on July 25, which corresponds to the status of a full member of the Academy of Sciences and Arts in St. Petersburg. He became the first Russian academician in the field of natural science. In 1745, the Atlas of the Russian Empire was published for the first time. On January 25, 1755, with the participation of Lomonosov M.V., Moscow University was established, for which he compiled the initial project, in which geometry as an academic discipline was absent.

But the events taking place in the world did not pass without a trace for Russia. For the first time in 1795, in the first Higher Engineering School, the first higher educational engineering institution (Normal School, and then Polytechnic School), lectures on descriptive geometry were given by Gaspard Monge (1746-1818), Minister of the Paris Commune, Marine Minister of the French Republic, Napoleon's adviser and participant in his campaigns of conquest, in particular in Egypt. The main subject in the first Higher Engineering School was descriptive geometry. Thus, an abstract geometric model of real space was created. Lectures on descriptive geometry were published in 1798 in France.

"The language of graphics, descriptive geometry, is the language of engineers, craftsmen, workers who give bodies a certain form, and if society does not pay due attention to this art, the development of industry is slow." [12, p.9.]

"Topography" was included in Monge's lecture course - its subject is a detailed study of the earth's surface in geometric terms and the study of methods used to depict this surface on a plane. Now any point on the earth acquires a number - the height along a plumb line from the initial level surface and a geometric appearance, like a trace from a section by a horizontal plane. With the techniques of descriptive geometry, it became possible to build a 3-dimensional world on a 2-dimensional sheet of paper. This method taught the accuracy of construction and inaccessible points were determined by a number - the so-called mark, and also provided an opportunity to become familiar with "topography, which has as its subject a detailed study of the earth's surface in geometric terms and the study of methods used to depict this surface on a plane. Topography deals exclusively with the hard shell of the planet - land inhabited by us ... Topography is, first of all, an arena for wars and battles for state units adjacent to us." [6, p. 9.]

The topography was kept secret for 20 years in France, "so that this knowledge could not harm France.

The events that took place in Europe did not pass without a trace for Russia. Catherine II, who ascended the Russian throne in 1762, was already in correspondence with Voltaire, Diderot, D'Alembert and their associates in 1763, discussing state affairs with them. Communication with European celebrities secured Catherine II the fame of an enlightened monarch, a benefactress of Europe, "the Great Semiramis of the North". From century to century, the main feature of enlightened absolutism was manifested in the reign of the Romanovs - an alliance of monarchs and philosophers who wanted to subordinate the kingdom to pure reason. The most outstanding teachers, mathematicians, and scientists were invited to Russia. Throughout the entire period of the Romanovs' reign, this line of government was maintained.

Paul I during his trip to France visited Paris under the pseudonym "Prince Silver". He repeatedly attended meetings of the Paris Academy of Sciences, personally knew many academicians and was aware of the opening in 1795 by Gaspard Monge (1746-1818), the first higher educational engineering institution (Normal School, and then Polytechnic School). Paul I, proclaimed Emperor of All Russia on November 6 (17), 1796, in his rapid reign was also obsessed with the idea of the possibility of communicating in the language of graphics, drawings. In his personal safe were drawing instruments made of gold: a compass, a scale ruler, a triangle, a plumb line. Images of these instruments and a triangle with an all-seeing eye in radiant light were the main symbols on Masonic banners and emblems. Paul I personally made the drawings of the future engineering castle, the construction of which was carried out around the clock. During the reign of Paul! the first person in Russia who mastered the graphic language was Ivan Petrovich Kulibin (1735-1818). At the age of 64, he was able to see his drawings in a book published in 1799: "Description of the bridge shown in the drawing, extending from one arc to 140 fathoms, invented by the mechanic Ivan Kulibin with various calculations of the weights in it by distance and other extensive knowledge", St. Petersburg, I.K. Shnorenko.

When Emperor Alexander I entered Paris with his troops in 1814, on the very first day of Easter Sunday, March 29 (April 10), he granted La Harpe, his teacher, the Order of St. Andrew the First-Called, and the rescript stated: "I wish to give due justice to those excellent cares and labors. "Which you have provided from my earliest years during my upbringing" ([3, p. 399]. Geometry was the main subject in Laharpe's education. From 1814-1816, Alexander did not part with Laharpe, who was with him as his closest adviser. Laharpe was Swiss, lived in the suburbs of Paris, and was a well-informed politician in European affairs. Under the influence of Laharpe, Alexander I demanded from the famous congresses in Vienna that Swiss affairs be resolved, as Laharpe insisted on. Thus, Alexander I thanked Laharpe's fatherland: he granted Switzerland eternal neutrality among European states, and, in addition, it was given self-government, in which representatives of all canons took equal part" [3 p. 101] In gratitude to him for his work, Alexander I granted Switzerland the status that it still has pores have.

This passion for geometry continued in the future.

In Russia, Alexander I, like Paul I, understood the importance of knowledge of descriptive geometry of France, but in accordance with the Treaty of Tilsit, concluded in 1806 between Alexander and Napoleon, Alexander I took measures to translate into Russian

the 4-volume "Instructions for Officers of the French Army". 300 copies were printed and sent to Russian officers for training. [3, p.411] Despite the barrage of curses that Europe showered on Alexander I for his alliance with Napoleon, for the sake of studying geometric methods of warfare and topography. In February 1822, the Corps of Military Topographers was established.

In pre-revolutionary Russia, this method was widely used both in the war of 1812 and in establishing interstate and private borders, in the construction of engineering structures (roads, canals), in mining allotments for the development of minerals, and in the implementation of the Stolypin land reform.

In the article by O. V. Pavlenko "Political Myths of Imperial Power" the words of the American scholar R. Wortman are quoted about the dominance of the "foreign interpretation of Russian power" until the end of the 19th century. This stamp of foreignness transformed the imperial capital into a cultural cosmopolitan center. This article cites the memoirs of Grand Duke Alexander Mikhailovich, the grandson of Nicholas I: "A foreigner who visited St. Petersburg in 1914, before the suicide of Europe, would have felt an irresistible desire to remain forever in the brilliant capital of the Russian emperors, combining the classical beauty of direct perspectives... the majestic architecture of the Winter Palace, the embodiment of the genius of Italian architects, with a pleasant, captivating way of life, cosmopolitan in form, but purely Russian in its essence." [19, p. 117]. "The foreignness of the interpretation of Russian power" bore the stamp of geometrization and organically entered into the distinctive structure of the Russian world.

The structure that monitored the processes that took place on Earth in the Russian Empire before the revolution, namely the Corps of Military Topographers, was liquidated in 1918. And the GUGK/ Main Directorate of Geodesy and Cartography/ was completely under the supervision of the FSB, which classified all maps, along with elevation marks. As a result of such work: The entire Russian Federation is horizontal for builders, cadastral engineers, housing and communal services, officials, if water collects somewhere - poured - horizontality is ensured. The water around us must go to its level. If it is not removed. It destroys buildings.

During the years of Soviet power, the book "Descriptive Geometry" was published for the 200th anniversary of Gaspard Monge's birth, M., 1947. Monge's influence can be traced in the speech given at the 1st Congress of the Academy of Sciences on December 29, 1922 by Kurnakov N.S.: "Continuity of chemical transformations of matter", which is included in the list of publications in Russian about Monge in the book "Descriptive Geometry" Publishing House of the Academy of Sciences of the USSR, 1947. It examines the topology of the chemically equilibrium diagram of salt lakes, on which singular points repeat the heights and depths on the earth's surface.

The idea of continuity was developed by Monge's student Ponsellier, who, all alone, set out this idea in 7 notebooks while living in captivity as an officer in Napoleon's army in Saratov. His book "TRAITE des PROPRIETES projectives DES FIGURES; published in PARIS in 1822. Page 852. Has not been translated into Russian for 200 years.

Typical of Poncelet's way of thinking was the principle of continuity, which allowed him to deduce the properties of one

figure from those of another. This principle, in particular, enabled Poncelet to establish that all circles on the plane have two common imaginary points at infinity; and this led, in turn, to the concept of an infinitely distant line in the projective plane.

In the magazine "Chemistry and Life" No. 42024" in the article "Breakthrough laser technology. Mass spectrometers print on a printer." Mass spectrometers, which determine the composition of substances, are widely used in forensics, toxicology, geological exploration, etc. However, these devices are bulky and expensive, and they are easy to damage. Physicists from the Massachusetts Institute of Technology, led by the chief research scientist of the Laboratory of Microsystems Technologies Luis Velasquez-Garcia (Luis F Velasquez - Garcia) printed a miniature quadrupole mass filter 12 cm long on a 3D printer, which is not inferior in its characteristics to commercial devices. This was done for the first time in the world » [17, p.9]

Tsiolkovsky K.E. wrote: "In order to understand me you must completely renounce everything obscure, such as occultism, spiritualism, dark philosophies all authorities except the authority of exact science, i.e. mathematics, geometry, mechanics, physics, chemistry, biology and their applications" [13, p. 100]

As the Swiss philosopher Richard Avenarius (1843-1896) describes the third coordinate on the earth's surface - the height as a person feels this component: "But the totality of everything given in experience or everything that can be given in experience at all we call the world. Therefore, we consider philosophy as thinking about the world in accordance with the principle of the least measure of forces: [1, p. 30] Just as in this feeling of discontent caused by unfamiliar thinking we must see a passive manifestation, the desire of our soul to save forces, so we must also see the same desire from the outside - from the side of energy and in the desire of the soul to neutralize this inconvenient idea. And in the choice of means for this we can again prove the influence of the principle of least expenditure of force - this manifests itself right down to our language." [2, p. 17]

Austrian physicist and philosopher Ernst Mach (1838-1916) wrote: "Man's spatial outlook is rooted in his physiological orientation. Geometrical concepts develop through the idealization of the physical experience of space. Finally, a geometric system is created by the logical ordering of the concepts obtained. All three points have left clear traces in modern geometry. Thus, the theoretical and epistemological questions of space and geometry are subject to the study of the physiologist, physicist, mathematician, philosopher and logician and can be gradually resolved only by taking into account all the very different points of view here." [11, p372] further: "A single discovery and proclamation of some knowledge is not enough. Often years and even centuries pass before general thinking develops so much that it can become common property and become stronger. This fact is especially well illuminated in Duden's profound studies on the history of statics." [11, p325]

After the fabulous book: "Pi is the number of God. The golden section is the formula of the universe" Mario Livio takes up the question of the unfounded effectiveness of mathematics in explaining the world. Mixing philosophy, mathematics and other sciences, he creates an intellectual reading that is perceived as a detective story. And in the book "Was God a mathematician?" Mario Livio writes: "I will timidly try to clarify some questions concerning the essence of mathematics, and, in particular, the

nature of the relationship between mathematics and the observable world" [10, p10].

Stephen Hawking and his book "God Created the Integers" is a collection of original works by great mathematicians from ancient times to the present day, "a history of mathematical breakthroughs that changed history." The review begins with the most ancient Chinese mathematical treatises that have come down to us in the second century BC edition and, in all likelihood, were a processing of even more ancient works: "Mathematical Treatise on the Measuring Rod." [15, p.3]

The winner of the All-Russian competition "Teacher of the Year 2020" was the mathematics teacher Mikhail Nikolaevich Gurov with his conviction: "Euclid's Geometry should be on par with the Iliad"

And in conclusion, I would like to quote a quatrain from the poem "Liberty" by A.S. Pushkin, 1827: Lords! The crown and throne are yours
It is the Law that gives, not nature.
You stand above the people,
But the eternal Law is above you.
We all speak different languages, but we can only get closer to understanding the Eternal Laws of Nature using the instrumental-geometric method, translating data into numbers, and this arithmetic will rule the world.

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21. Sogrin VV. Analyzing the special features of the “American empire,” writes: “The American founding fathers dreamed that America would become an empire, but a special one, radically different from European monarchies and despotisms... about the creation and spread of the empire of Reason - a special universe unknown to history, organized in accordance with the principles of F. Voltaire, C.L. Montesquieu and J.J. Rousseau 3: 55-76.

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