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From One Ontology to the Set of All Possible

Nataliia O. Khazieva[1]

Abstract

In the framework of hundreds of ontologies that already exist today, it would seem impossible to build other buildings of theories about the world. Any "new" thought will only be an element, a brick in defense and strengthening of a separate theory, or a stumbling block to the new great minds of mankind leading to new reflections and clarifications. Everyone who dared to reconsider the very foundations of the whole being of mankind was a kind of revolutionary and had the opportunity to be remembered as a great scientist, philosopher, artist, writer, thinker. Establishing a completely new and untested before the foundations of being, a person is able to discover unprecedented worlds, the worlds that had not previously imagined by anyone. This is what happened with the discovery of non-Euclidean geometry. The study is about the new ontologies that saw the light after this event, the new conditions for the existence of man, his renewed place in a very complicated world, and the consequences of such drastic changes.

Keywords: Ontology, Geometry, Existence, Euclidean geometry, Non-Euclidean geometry, Mathematics, Space, Time.

[1] Kazan Federal University, Institute of Social and Philosophical Sciences and Mass Communications. E-mail: apotre@mail.ru

"...But you must note this: if God exists and if He really did create the world, then, as we all know, He created it according to the geometry of Euclid and the human mind with the conception of only three dimensions in space. Yet there have been and still are geometricians and philosophers… who doubt whether the whole universe was only created in Euclid's geometry; they even dare to dream that two parallel lines, which according to Euclid can never meet on earth, may meet somewhere in infinity..."

"The Brothers Karamazov" by Fyodor Dostoyevsky (2009, p. 294)

Introduction

At all times, with a formal accuracy, a person tried to comprehend the surrounding world by all suitable for this means, i.e. to determine the laws that act in it, in order to transfer the accumulated knowledge into the language of science in the future and to give the universe a credible expediency ("impregnate" it with its own intelligence). In other words, man has always been driven by the same desire to take root in this world, to understand its metaphysical, ontological, physical, mathematical, etc. foundations, and everyone chose his own means to achieve these goals. "But since unavoidable contradictions have always been found in all previous attempts to answer these natural questions, e.g., whether the world has a beginning or exists from eternity, etc, ... but it must be possible to bring it [metaphysics] to certainty regarding either the knowledge or ignorance of objects, i.e., to come to a decision either about the objects of its questions or about the capacity and incapacity of reason for judging something about them, thus either reliably to extend our pure reason or else to set determinate and secure limits for it." I. Kant (1998, pp. 147-148) said.

Material studied

In the 4th century BC, "The Elements" of Euclid served as a solid ontological basis which the geometry and mathematics of the space of that time were built on, which gave the human mind self-confidence necessary for mastering the surrounding world. But it should be noted here that there was something more in this book than a set of definitions, postulates and axioms of geometry; more than it was able to accommodate - a grain of discord, doubts and causes of human tragedies.

The fact that people that are far from the exact sciences can often consider something as dry formulas, lengthy evidence and drawings, and for people who have dedicated their entire life to this peculiar kind of art, it is full of live meaning. The fifth postulate of "The Elements" of Euclid, the 11th axioms, did not give rest to many mathematicians of antiquity and all subsequent epochs. The very difficult statement formulated by Euclid himself is fraught with ambiguity[2]. All the postulates of this geometric book were proved either by Euclid himself or by mathematicians of subsequent times, except the fifth postulate (more about this see: Mueller, 2006). The Euclid parallelism axiom, which said that in a plane through a point not lying on a given line, one and only one straight line parallel to a given line could appear simple and trivial, but did not yield to rigorous proof for many centuries[3]. The answer to the question about the aims of mathematicians who paid so much attention to verifying the assertions from the "The Elements", we can try to find in the most broadcast name of the work of one of the eighteenth-century

[2] It read: "And that if a straight-line falling across two (other) straight-lines makes internal angles on the same side (of itself whose sum is) less than two right-angles, then the two (other) straight-lines, being produced to infinity, meet on that side (of the original straight-line) that the (sum of the internal angles) is less than two right-angles (and do not meet on the other side)" (Euclid's elements of geometry, 2008, p.7).

[3] It occupied the minds of mathematicians: Ptolemy and Proclus in Ancient Greece, Ibn al-Haytham and Omar Khayyam in the East, G. Borelli, P. Cataldi, G. Saccheri, A. Legendre, F. Schweikart, and many others (See: Kline, 1983; Bell, 1945, 1986).

mathematicians G. Saccheri, who pre-empted by his studies the appearance of non-Euclidean geometry: "Euclid liberated from all spots or the experience that establishes the very first principles of universal geometry."[4] A true scientist could always look deeper and see further, and he needed the purest demesne of life so that his mind unhidden by the necessity of using conventions, reservations and explanations could gain unlimited freedom of mathematical creativity.

From the letter of the father-mathematician to the mathematician-son: "You must not try to overcome the theory of parallel lines ... I pray you, leave alone the doctrine of parallel lines; you must fear it as sensual passions; it will deprive you of health, leisure, rest - it will destroy all the joys of life. This gloomy darkness ... will deprive you of joy not only in geometry, but in all life ... I know this way, I did it to the end, I experienced this hopeless night.., all the joy of my life I buried in it ... God keep you from this hobby which you have mastered" (Livanova, 1969, p.20). These words of Farkas Bolyai tried to warn his son Janos Bolyai from squandering his very extraordinary talent for what was capable of ruining the mind of a young man. But the magnificence with which the young Bolyai had already collided, struck him and completely took possession of him. A new, completely different world, unprecedented before by anyone, and created by the mathematical imagination of his genius; a world with completely different rules and laws, and a completely unknown ontology appeared in front of him.

However, two years earlier, Russian mathematician N.I. Lobachevsky publishes the work "On the principles of geometry" which will cross out many years of Bolyai's work. Just two years earlier, the imagined world will appear before the eyes of the great Russian mathematician; a world where the sum of the angles of the triangle was always less than the usual and reliable 180º. The uniqueness and infallibility of the classical Euclidean ontology were overthrown. As the "king of mathematicians" K. Gauss predicted, the real world turned out to be much more complicated than the space endowed with three dimensions, the planes of which are located under exact 90º to each other.

Methods

The fifth postulate of Euclid led Lobachevsky to ontologies-spaces of the future. N.I. Lobachevsky strove for accuracy in everything, in the very foundations of understanding of being. This, in his opinion, was and remains the main and first virtue of science: "For science itself it was always necessary that it should be on the firm ground, so that strictness and clarity persisted in its very beginnings, as they become its first dignity in continuation" (1948, p.370). Having proved the inconsistency of the axiom of parallel and, consequently, the limitation (conditionality) of the Euclidean geometry, the Russian mathematician gave the world the opportunity not only to dream about other worlds looking to the past, to the now, to the parallel universes, but one of the first ones gave *an imaginary world*[5]. The presence of one (unique) familiar and understandable world, perfectly "stacked" in a Cartesian coordinate system, he crossed out by the discovery of the existence of many worlds with different ontologies, different space-time characteristics, but *with the same person* in them…

Discussion

"The ideal coincidence" of the real world and the ideas about it of man was replaced by the many-valued understanding of this real world, the multifaceted nature of the starting conditions in the construction of his thought models. N.I. Lobachevsky placed on science hopes in the cognition and the mathematical

[4] Original title: "Euclides ah omni naevo vindicatus sive co-natus geometricus quo sfcabiliuutur prima ipsa unhersae geometriae principia. Mediolani".

[5] The work of N.I. Lobachevsky, containing the foundations of non-Euclidean geometry, was called "Imaginary Geometry."

calculus of the surrounding world: "... strict science is the science of common judgment together, that the whole justification is a fair notion of things that mathematics does not leave through its calculations. After that there are no natural phenomena which he could not explain; there are no phenomena that he could not predict and determine with accuracy and time and measure. It would seem that the notion of things and sound judgments about them should not depend on calculations; but then, however, it is true that the mind accustomed to calculations continues to go far beyond that limit which the mind uninitiated in the mystery of the science of numbers does not cross" (1823, p.50).

One world was absorbed in by a more general one, becoming only a part of it. A world that could be easily thought of and imagined turned out to be a very simplistic model of the true world. The three-dimensional measurement of space was not enough, there was a need for a fourth dimension. Such a space is no longer possible to imagine or portray as "improvised" means. Reality turned into hyper-reality. And here the most important thing is that at that moment *the position of the person* changes. Before, in Euclidean geometry, carried out in the Cartesian coordinate system, man was as if *"outside"* and *"above"* the region he was researching like a geometer bent over papers with drawings of the universe. In fact, he occupied the position of God, i.e. in front of him the book of being was opened, and he could only choose the necessary formulas and drawings for its description. With the loss of such a world, man lost his own privileged position (external in relation to the system). Beginning with the geometry of Lobachevsky, and then the geometry of Riemann and others, man is placed *on* space, he becomes *his element*. The very space takes on bizarre forms, shrinking and stretching so that nothing else is visible "from around the corner". This is what Russian philosopher M. Mamardashvili has in mind when he talks about "Poincare creatures" in "Conversations on thinking" that are unable to understand that they are in a "one-dimensional collapsing reality"[6] and unable to look at themselves from the outside.

Because of the external and dominant (extracted from the world system) position over the world, when this very world was in the hands of the researcher, his belief in the objective nature of the received knowledge and its "proportionality" of reality was also very strong. Under the new conditions, the objectivity of truth could not be discussed. It was replaced by subjectivity, relativism, conventionality in all spheres of human activity from philosophy to mathematics and physics.

At the beginning of the 20th century, numerous mathematical schools began to solve the problems of finding a new ontological basis: logicians (G. Frege, R. Dedekind, B. Russell), intuitionists (L. Brouwer, A. Heyting, H. Weyl), formalists (D. Hilbert, J. Neumann), followers of the set-theoretical basis of mathematics (G. Cantor, and later R. Dedekind, B. Bolzano, B. Riemann, in some measure A. Poincaré) (See: Perminov, 2001). However, none of the modern approaches to determine the basics of (mathematics) has achieved full success. Certainly, questions remain about the nature of logic (in other words, the codification of the means of mathematical reasoning), the redefinition of the method of mathematics (the softer form of deduction rules), questions about the mathematical object, and the correspondence of the real world and the world of mathematical constructions.

Mathematics was finally and forever broken beyond the bounds of its understanding by the ordinary inhabitant. In modern conditions, Plato could no longer resort to the theory of recall, when the laws of geometry (more broadly – the universe) could lead a student, accompanied in his reasoning by a wise mentor. A person cannot draw on the sand, nor imagine in his own imagination what kind, for example,

[6] M.K. Mamardashvili talks about "Poincare creatures" in the course of lectures delivered in 1986-1987 at Tbilisi University.

the 10-dimensional or 26-dimensional space necessary for the leading modern theory of the origin of gravity.[7]

Results

The shock that happened in mathematics and forced humanity to reconsider all the ontological foundations of its existence, called for new forms of philosophical understanding of the universe, new philosophical systems, etc., new nonclassical, "non-standard" ideas and approaches of existentialism, phenomenology, hermeneutics, structuralism, forced to seek new opportunities for rooting a person in the current world, changed to unrecognizability. Psychologization and anthropomorphization of all sciences and modern (above-named) philosophical systems is designed to help the modern man, the *new "Poincare creature"*, thrown into a new space, in no way capable of comprehending it. He is no longer able to foresee what awaits him behind the turn in the curved space of the new ontology and the relativity of time. Such a person is able to appear in front of himself only in the state of manifestation, extremely rarely – instant beingness; he constantly needs to confirm his own rootedness in the real world or in the imaginary ones, because in his understanding a clear line has already been erased, capable of dividing them. Moreover, he needs a periodic deconstruction of his own world to grains of sand, his constituents: photons, bosons, numbers, formulas, etc. – concepts with a metaphysical degree of accuracy.

Conclusion

In one of the letters to his friend Gauss wrote: "Recently I had occasion to revisit Lobachevsky's book ("Geometric Studies"), which contains the foundations of a geometry that should have been and would be strictly consistent if the Euclidean geometry were not true..." (Livanova, 1969, p.72). One of the greatest mathematicians did not dare to overcome the ontology that accompanied mankind for two millennia. With the discovery of a different geometry, *the human world was heard many times*, and it received a gift of a true understanding of the mega and micro worlds with completely different laws than in the world entwined with the life of man.

There was a revision of the ontology (topology, space metrics), the space turned out to be twisted, uneven, the theory of the relativity of time-space arose; there was a need for a fourth space and spaces of a higher order. Significant was the change in the location of a person in a new ontology – the position of the observer, i.e. subject is first, the geometer was "outside" the system of his own post-production, outside the Cartesian coordinate system, in other words, he took the place of God when all the constructions and calculations were in front of him. Moreover, from this position he dared to insist on the objectivity and accurate accuracy of his own geometric constructions, his own calculations, thereby minimizing the errors in describing the actual picture of the world. Occupying a privileged position, he extracted himself from the system being "outside" and "above" it. Modern man has not yet discovered new means that will be able to help him pull himself "beyond" the universe and forced to learn the reality "from within", i.e. a person is topologically placed (moved) to a new space that no longer obeys the Cartesian-Newtonian laws of mechanics. The space under his feet, the space of his life is twisted and multidimensional.

Having freed himself from the rigid shackles of the generally accepted understanding of space-time since the time of Euclid, did not a person, together with the freedom to understand the polyvariance of the emergence of the universe and the functioning of its laws, unrestrained freedom of action, regaining to

[7] In respect to String theory, Superstring theory and M-theory, which were developed by Y. Nambu, H. Nielsen, L. Susskind, E. Witten, and others.

himself the once lost and renewed now on a new coil the position of the ruler of destinies, capable of *comprehending* and *accepting* the world not only in any of its guises, but *in all guises at once (simultaneously!),* arriving at its inseparable part? Are we moving further and further from the positions of scientists and philosophers of the past centuries who have sought the unshakable foundations of being and human mind, and are we not on the path to indifference, apathy and total pluralism (omnivorousness), when what was yesterday completely unacceptable today is not only allowed by us to exist, but also causes us to feel guilty for his former rejection.

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